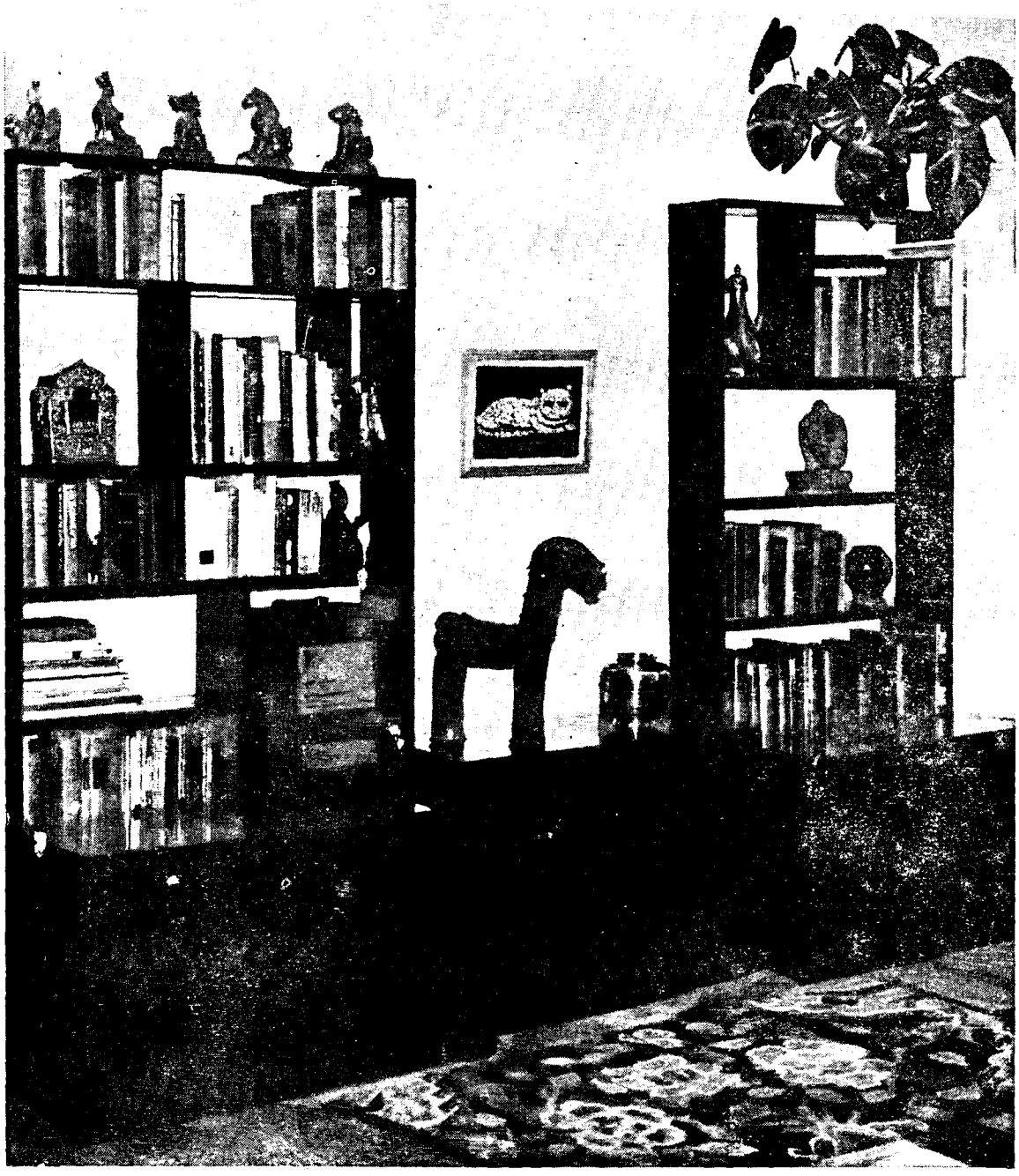
TEXTBOOK OF

HOME SCIENCE



SHELVES MADE FROM PACKING CASES FOR ECONOMY AND DECORATION

TEXTBOOK OF
HOME SCIENCE

Compiled by
RAJAMMAL P. DEVADAS

FARM INFORMATION UNIT, DIRECTORATE OF EXTENSION
MINISTRY OF FOOD, AGRICULTURE, COMMUNITY
DEVELOPMENT AND CO-OPERATION
GOVERNMENT OF INDIA
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FOREWORD TO THE FIRST EDITION

When the Home Science Wings in Extension Training Centres were established in July, 1955, to train Gram Sevikas, one of the problems facing the organizers in the Ministry of Food and Agriculture was the absence of suitable textbooks of reference literature on Home Science applicable to Indian conditions. Being a new field of education and extension in India, there are few books on the subject. The Technical Cooperation Mission of the United States came forward to give a nucleus library to each of the new Home Science Wings. Useful as they undoubtedly are, these books have their own limitations, as the language and approach are not suitable for wide use of the Gram Sevikas in India. It was felt that our students should be provided with textbooks which will be Indian in approach and content, and be based on actual studies and research findings in the country. Accordingly, experts in the various branches of Home Science were invited to write the different sections for the book.

In modern times, great advances have been made in the fields of health, nutrition, sanitation, textiles, psychology, housing, etc., with potentialities of making available the scientific knowledge which the home-maker needs in her day-to-day work of managing the home. However, this knowledge has so far remained the exclusive preserve of experts in the universities and cities only. This book is an attempt to disseminate such scientific information in a usable way to all the people.

The various sections of this book, written by eminent persons in the field, point out the numerous ways in which families can improve their standards of living. Since the HOME is the basis of all improvements and basically affects national programmes, it is essential that such knowledge is made available to every home-maker in the country. Therefore, this book, the first attempt of its kind in a series of Home Science publications planned in the Extension Wing of the Ministry of Food and Agriculture is a timely one and I congratulate the compiler, Dr. (Mrs.) Rajammal P. Devadas, Chief Home Economist, Ministry of Food and Agriculture, and all others concerned with the bringing out of this book. It is my earnest hope that all home-makers, Extension workers and educators will find the book useful.

K. R. DAMLE, I.C.S.
Secretary
Ministry of Food and Agriculture
Government of India

NEW DELHI
January 5, 1959

PREFACE TO THE FIRST EDITION

Today, there are twenty-seven Home Science Extension Wings functioning all over India, training Gram Sevikas. So far, these Home Science Wings have turned out more than a thousand Gram Sevikas who are posted in the Community Development Blocks at the rate of two per Block. Our target is to train ten thousand Gram Sevikas to staff the five thousand Blocks expected to be in operation by the end of the Second Five Year Plan. In order to train this number, there are proposals to expand the training capacities of 24 existing Home Science Wings and establish 42 additional Wings by the end of 1963. Nearly 300 Home Science Instructors will be staffing these Wings.

Home Science is a recent development in the field of women's education. The Lady Irwin College in New Delhi, established in 1932 at the initiative of the All-India Women's Conference, was the only college imparting Home Science education for several years. The importance of Home Science has been so well recognized during the last decade that, today, almost all the Universities have departments of Home Science, with courses leading to a degree or diploma in the subject. Over 30 colleges affiliated to the Universities teach Home Science at the pre-University, Intermediate, Bachelor's and Master's Degree levels. In secondary education, Home Science has been given a very important place in the multi-purpose schemes. There are hundreds of teachers engaged in teaching Home Science in the high schools and colleges.

While Home Science is receiving increasing recognition in our developmental and educational programmes, there are some serious limitations preventing its gaining momentum among the common people. Not many understand the real meaning and scope of Home Science. There are not enough books or literature in the field, written by Indian authors, suitable for Indian conditions. Home Science programmes have remained too much in the urban areas and have not made their impact on the rural population. With the establishment of the Home Science Extension Wings, there is now a trend towards the realization of the usefulness of Home Science in rural development programmes. All these have necessitated the bringing out of suitable books on the subject. This book is one of the efforts the Directorate of Extension, under the Extension Wing of the Ministry of Food and Agriculture, is making towards the fulfilment of this need.

This book is divided into several subject-matter sections. The first section introduces the reader to the meaning, philosophy and application of Home Science, and explains the progress made in India in teaching the subject. Then follows the section on Family Health, where, as far as it is possible, the home-maker is given

suggestions on how to solve her day-to-day health problems. The next section deals with Nutrition in a comprehensive manner. From this, the home-maker can learn the importance of nutrition in daily life, the signs of good nutrition, the differences between appetite, hunger, starvation and hidden hunger, and practical points on providing adequate diets for the family within the budget. The section on Home Improvement attempts to teach how the home can be made beautiful, comfortable and livable, by making some adjustments and arrangements, without necessarily increasing the cost. In the section on Clothing, the authors have tried to give the methods of making, washing, mending, renovating, and storing clothes, using the resources available and under Indian climatic conditions. The much-needed knowledge about the psychology, behaviour and bringing up of children is given in the comprehensive section on Child Care and Development. Children are somewhat taken for granted in our society, and are not given the attention they deserve. That they have their individualities and live in a world of their own, must be understood by the mothers, if children's personalities are to be developed to the best.

The purpose of Home Science, that is, the creation of an environment and outlook which will enable people to live richer and more purposeful lives, has been propounded with clarity by Dr. (Mrs.) Rajammal P. Devadas, in the last section. Achievement of family happiness is the goal towards which all activities in Home Science—cooking and eating food, looking after the health of the family, child care, etc.,—are directed. If knowledge of these factors is not focussed towards this attainment, there is no use acquiring such knowledge. In this section, the author has brought out, in a lucid manner, that Home Science is the art of Human Relationships.

Being the first of its kind in India, with its universal application and importance, this book will be welcomed by all those who are interested in the art of living. Although primarily meant for teachers and students of Home Science Extension and social workers, the book can be studied by all with benefit, as would be clear from its contents.

Shri K. R. Damle, Secretary, Agriculture Department, Ministry of Food and Agriculture, has blessed this venture by giving the 'Foreword,' for which and for the interest he has evinced in the Gram Sevika's training programme, we are grateful to him. We are indebted to Dr. M. S. Randhawa for initiating this work. The responsibility of compiling the book was entrusted to Dr.(Mrs.) Rajammal P. Devadas, Chief Home Economist, and we are proud to say that she has made a good job of it. She has taken great care to plan the book in such a way as to help the reader understand the various subjects in an easy manner. Her selection of authors has resulted in the collection of very useful material, which makes the book authoritative, with a prestige of its own. Before sending the manuscripts received from the different authors to the editorial section, she has scrutinized them, with regard to their presentation and technical points.

Shri Prem Nath, Editor, Indian Council of Agricultural Research, assisted by Shri M. L. Madan, Assistant Editor, Indian Council of Agricultural Research, had the responsibility of editing this book. Considering the newness of the subject, and the multiplicity of authors, they have done a good piece of work. Shri N. S. Bisht, Director of Arts, Indian Council of Agricultural Research, helped in the selection and preparation of some of the illustrations in the book, which add to its value.

We are happy to have the opportunity of presenting the first comprehensive book on Home Science, and hope that its usefulness will justify our efforts.

J. V. A. NEHEMIAH
Extension Commissioner
Directorate of Extension
Ministry of Food and Agriculture
Government of India

NEW DELHI,
January 15, 1959

COMPILER'S NOTE TO THE SECOND EDITION

Although Home Science is a recent development in the field of women's education, its expansion during the last decade has been phenomenal, as evidenced by the number of schools, colleges, universities, research institutes and Extension Training Centres which have started teaching Home Science. Whereas in 1950 there were only half a dozen colleges teaching Home Science, today departments of Home Science have been established in almost all the universities with courses leading to a degree or diploma in the subject. Over fifty colleges affiliated to different universities teach Home Science at the Pre-university, Intermediate, Bachelor's and Master's degree levels. In secondary education, Home Science has been given an important place in the multipurpose schemes. There are nearly 2,000 teachers of Home Science in high schools and colleges.

The Directorate of Extension of the Ministry of Food and Agriculture has had its full share in the expansion of the frontiers of Home Science. The 27 Home Science Wings or Gram Sevika Training Centres started in 1955, each training 20 Gram Sevikas per year, have now expanded to 44 Gram Sevika Training Centres distributed all over India, each training 40 Gram Sevikas per year. At the central level, the 1955 nucleus of one Chief Home Economist with an Assistant Home Economist has been enlarged to include one Joint Director of Home Science, one Senior Home Economist, one Assistant Home Economist, and five Regional Home Economists.

So far, the 44 Gram Sevika Training Centres have turned out 6,845 Gram Sevikas, who have been posted in the Community Development Blocks at the rate of two per Block. The target of training ten thousand Gram Sevikas to staff the five thousand Blocks in operation has been nearly fulfilled. It is now hoped that the Ministry of Community Development will plan to increase the number of Gram Sevikas per Block from two to ten, as in the case of the Gram Sevaks. This is imperative in the context of the increasing responsibilities that women are expected to shoulder in the building up of the nation. The initial apprehension that women were not coming forward to take up Gram Sevikas' work in the rural areas has been proved false.

In 1961, the Directorate of Extension further established a Home Science Extension Wing each at the Sri Avinashilingam Home Science College, Coimbatore, and the Rajasthan Mahila Vidyalaya, Udaipur, to train B.Sc. Home Science graduates in Extension Methods. The success of these two pilot projects led to the starting in 1964 of the M.Sc. course in Extension in the Lady Irwin College, New Delhi. Arrangements are now in progress to increase the number of Home Science College Wings in the Fourth Plan. These programmes are bound to strengthen the triangle of Education—Research—Extension in Home Science.

The increasing recognition that Home Science is now receiving in our developmental and educational programmes has accentuated the [illegible] producing Home

Science literature suitable to Indian conditions, written by Indian authors, and based on the findings of research conducted in India. The first edition of this book was a pioneering effort in that direction. Realizing the usefulness of Home Science in rural development programmes, the Directorate has also launched the monthly journal 'Home Science'.

In this, the second edition of the Textbook of Home Science, the subject matter has been thoroughly revised, based on the comments received from the Home Scientists, professors and students, and on the needs felt by Extension workers. I am grateful to:

Km. T. K. Adranvala, Chief Nursing Adviser, Ministry of Health, for her suggestions for revising the section on 'Health' written jointly by Km. Lilian Bischoff, T.C.M. Nursing Adviser, Ministry of Health, Government of India, Dr. Henry Moses, Assistant Director of Training, Poonamallee Training Centre and Sri Pishority, Public Health Engineer, Poonamallee Training Centre;

Smt. Kanta Kapoor, Regional Home Economist, Directorate of Extension, Ministry of Food and Agriculture, for revising the section on Clothing written jointly by Smt. Levice Ellis Allen, T.C.M. Chief Home Economist, New Delhi and Smt. Sushila Dantyagi, M.Sc., Joint Director, Directorate of Extension;

Smt. Godavari Kamalanathan, Professor, Sri Avinashilingam Home Science College, Coimbatore, and Smt. N. V. Dutt, Junior Home Economist, Directorate of Extension, Ministry of Food and Agriculture, for writing the section on Home Management, and for revising and enlarging the section on Home Improvement written by Km. Patsy Graves, M.A., T.C.M. Regional Home Economist (East);

Km. Yasmin Morenas, Senior Home Economist, Directorate of Extension, Ministry of Food and Agriculture, and Smt. Amita Verma, M.A., M.Ed., Reader in Child Development, M.S. University, Baroda, for revising the section on Child Care written by the latter;

Dr. Elda Robb and Km. Dorothy Lyon, Home Economists, T.C.M., University of Tennessee India Team, for their valuable suggestions for revising the section on Nutrition, written and revised by Dr. Rajammal P. Devadas; and

Shri M. G. Kamath, Director, Farm Information Unit, and his staff for editing the revised edition.

This revised and enlarged edition is being brought out because of the great demand for the first edition of this book. If the book continues to increase the understanding of Home Science in India and serve the Home Science Institutions, I shall feel amply rewarded for whatever little I have done towards this publication.

RAJAMMAL P. DEVADAS
Principal
Sri Avinashilingam Home Science College
Coimbatore

January 1

CONTENTS

PAGE

SECTION I—HOME SCIENCE
by
Dr. Rajammal P. Devadas

Chapter 1
THE MEANING OF HOME SCIENCE 3

Chapter 2
HOME SCIENCE IN INDIA TODAY — Home Science in the kindergarten; Home Science in elementary schools; Home Science in the secondary stage; Home Science in colleges and universities; Home Science in teachers' colleges; Home Science in rural institutes; Home Science in Extension services; the future of Home Science 7

SECTION II—HEALTH
by
Km. Lilian Bischoff

Chapter 3
THE MEANING OF HEALTH — Factors influencing health 17

Chapter 4
THE COMMUNITY WORKER'S ROLE — At the personal level; at the community level .. 20

Chapter 5
PERSONAL HEALTH — Signs of good health; health habits 22

Chapter 6
CARE OF THE SICK 31

Chapter 7
COMMON DISEASES — Disease germs; body reactions; disease immunity; preventive methods 41

Chapter 8
MOTHER AND CHILD — Essentials of maternity care; basic problems of maternity; some facts about maternity; signs of pregnancy; diet during pregnancy; danger signals in pregnancy; getting ready for the baby 49

Chapter 9
ACCIDENTS AND EMERGENCIES — How to render first aid; shock; bleeding; burns; drowning; poison cases; snake bite; bone fractures .. 60

SECTION III—NUTRITION
by
Dr. Rajammal P. Devadas

Chapter 10
NUTRITION, HEALTH AND HUMAN WELFARE 69

		PAGE
Chapter 11 WHAT FOOD DOES FOR US	Energy-giving foods; body-building and repairing foods; protective and regulatory foods; effects of nutritional deficiency	71
Chapter 12 THE CONSTITUENTS OF FOOD (PART I)	Carbohydrates, fats, proteins, minerals and water ..	74
Chapter 13 THE CONSTITUENTS OF FOOD (PART II)	Vitamins; measurement of vitamins; effects of vitamin deficiency; nomenclature of vitamins; the fat soluble vitamins; the water soluble vitamins; sources of vitamins; the more important vitamins in human nutrition	89
Chapter 14 ENERGY REQUIREMENTS—HOW MUCH FOOD ONE NEEDS	The calorie; factors which determine energy needs; total calorie requirement; comparison of the total energy requirement and the calorie intake	109
Chapter 15 NUTRITIONAL REQUIREMENTS	Recommended daily dietary allowances; calculation of individual food requirements; the required amounts of various nutrients	118
Chapter 16 WHAT HAPPENS TO THE FOOD WE EAT	Digestion; absorption; metabolism	123
Chapter 17 DIFFERENT TYPES OF FOOD AND THEIR NUTRITIVE VALUE	Foods of vegetable origin; foods of animal origin	131
Chapter 18 SUPPLEMENTARY FOODS	Milk substitutes; malt foods; the Indian multi-purpose food; other supplementary foods	140
Chapter 19 BALANCED DIETS	Knowledge of the daily nutritional requirements; selection of foods which will supply the daily nutritional requirements; assessing the adequacy of diets ..	145
Chapter 20 PLANNING A MEAL	What is a good menu? the meals of the day	150
Chapter 21 BUYING FOOD FOR MEALS	Economical buying	155
Chapter 22 STORING FOOD TO SAVE	General points on storage; facilities for storage; outdoor storage; storage in pits; keeping the storage space clean; handling the produce; storage of vegetables	156
Chapter 23 PREPARATION OF FOOD	Cooking of meals; methods of cooking prevalent in different parts of India; changes that occur while cooking foods; serving meals	161

CONTENTS

		PAGE
Chapter 24		
NUTRITION IN SPECIAL CONDITIONS	Nutrition in pregnancy; nutrition in lactation; nutrition in childhood; nutrition for labourers and hard working persons; nutrition for older people; overweight and obesity	169
Chapter 25		
DIETS DURING ILLNESS	Bland diets; liquid diets; high protein diets; fat restricted diets; diabetic diets; low cholesterol—low fat diets; low purine diets; high calorie diets; sodium restricted diets	184
Chapter 26		
DEFICIENCY DIETS	Protein deficiencies	192
Chapter 27		
HEALTH ASPECTS RELATED TO NUTRITION	Appetite, hunger and nutrition; sound teeth and nutrition; effects of mental attitudes on digestion and nutrition; effects of the stimulants found in common beverages; bacteria and food poisoning	193
Chapter 28		
FOOD CONSERVATION	How to avoid wastage of foods	198
Chapter 29		
FOOD PRESERVATION	Classification of foods; causes of food spoilage; different methods of food preservation	200
Chapter 30		
NUTRITION AND HOME SCIENCE EXTENSION	Surveying dietary habits; how to improve nutritional habits; an economic and educational process ..	204
	SECTION IV—HOUSING	
	by	
	Km. Patsy Graves	
	Smt. Godavari Kamalanathan	
	Smt. N. V. Dutt	
Chapter 31		
FUNCTIONS OF A HOUSE	What is a good home ?	211
Chapter 32		
SELECTING A HOUSE	What kind of a house does the family need ? Factors which affect the choice of a house	213
Chapter 33		
PLANNING YOUR HOUSE	Choosing a house plan; planning of rooms; choosing and arranging home furnishings	215
Chapter 34		
KITCHEN ARRANGEMENT	Kitchen activities and work centres; the smokeless *chulha*; the location of the kitchen in the house ..	219
Chapter 35		
STORAGE AND SANITATION	Advantages of good storage; analysis of the storage needs of a family; storage space for families with rented houses; storage space for families owning houses; disposal of body waste; disposal of waste water; disposal of animal waste; how to get mosquito-free surroundings; anti-fly measures	222

		PAGE
Chapter 36 HOME LIGHTING	Health and lighting; illumination factors; artificial lighting; electric lighting	232
Chapter 37 THE WELL-GROOMED HOUSE	Cleaning equipment; cleaning routines; chinaware; glassware and earthenware; home-made cleaning aids	245
Chapter 38 HOUSEHOLD PESTS	General measures for the control of insects; flies; bed bugs; mildew; insecticides; fumigation process ..	252
Chapter 39 HOME DECORATION	Pictures; house plants; cut flowers; ornamental foliage; ornamental grasses; ornamental palms; scented flowers; shrubs; climbers and creepers; flowering trees for the garden; ornamental flowering trees suited for dry localities	263
Chapter 40 THE KITCHEN GARDEN	Planning the kitchen garden; garden tools; soil preparation; making and using compost; planting the seed; care of the garden	274
	SECTION V—HOME MANAGEMENT *by* Km. Patsy Graves Smt. Godavari Kamalanathan Smt. N. V. Dutt	
Chapter 41 WHAT HOME MANAGEMENT IS	.. ..	279
Chapter 42 DECISION MAKING	.. ..	284
Chapter 43 MANAGEMENT OF RESOURCES	Material or non-human resources; human resources; general characteristics of resources; management of time; management of energy	286
	SECTION VI– CLOTHING *by* Smt. Levice Ellis Allen Smt. Susheela Dantyagi Smt. Kanta Kapoor	
Chapter 44 CLOTHING THE FAMILY	Social aspects; personal aspects; functions of clothing	301
Chapter 45 PLANNING AND BUYING OF CLOTHES	Planned spending; shopping hints	303

		PAGE
Chapter 46		
SELECTION OF GARMENTS	Personality factor; figure factor; colour considerations; fabric variety; selection of fabrics	307
Chapter 47		
MEASUREMENTS FOR GARMENTS	Body measurements; tools for drafting; basic patterns; alteration methods	320
Chapter 48		
CONSTRUCTION OF CLOTHES	Sewing tools and materials; sewing machine; cutting a garment; fitting garments; putting the garment together	327
Chapter 49		
CARE OF CLOTHES	Common laundering agents; laundering; dry-cleaning methods removal of spots and stains; storage of woollen garments; mending methods; reinforcing and patching	341
Chapter 50		
CHILDREN'S GARMENTS	Proper choice; baby's clothing; clothes for the toddler; construction of children's garments; some basic patterns; self-help garments; good dressing habits; footwear	365
	SECTION VII—CHILD CARE	
	by	
	Smt. Amita Verma	
	Km. Yasmin Morenas	
Chapter 51		
THE CHILD IN THE FAMILY	The role of parents; the child's first lessons; the child in the family; childhood needs..	385
Chapter 52		
PRINCIPLES OF GROWTH AND DEVELOPMENT	Different aspects of growth; individual differences; pattern of growth; development rate; stages of growth; learning that takes place with growth	390
Chapter 53		
PROBLEM BEHAVIOUR	Underlying causes; thumb-sucking; masturbation; bed-wetting; tantrums; jealousy; fears; stuttering and left-handedness; lying; stealing; bad language ..	397
Chapter 54		
DISCIPLINE	The need for discipline; basic facts; causes of indiscipline; some suggestions; individual approach; rewards and punishment	405
Chapter 55		
THE HEALTHY CHILD	Signs of health; warning signals; healthy surroundings; diet; exercise and rest; routine habits; proper clothing; play and recreation; simple rules for health and safety; medical care; a happy home for a healthy child ..	409

SECTION VIII—LIVING HAPPILY TOGETHER

by

Dr. Rajammal P. Devadas

PAGE

Chapter 56

LIVING HAPPILY TOGETHER — The cultural background of Indian women; family relationship; influence of the home environment on children; modern trends in family life; what makes a home happy and successful; the needs of human beings; achieving mental health; what constitutes a good personality; the characteristics of a successful home 433

APPENDICES 445

TABLES

	The signs of health	22
2	The normal structure of the organs of the human body	23
3	The normal body functions	23
4	Hours of sleep needed at different ages	25
5	Diseases spread by faeces and other filth	45
6	Diseases spread by air	46
7	Insect-borne diseases	46
8	Prevention of diseases caused by direct contact	47
9	Prevention of diseases caused by conditions other than those listed in Tables 5 to 8	48
10	Developmental stages before birth	54
11	Danger signs during pregnancy	57
12	Carbohydrate content of some important foods	75
13	Digestibility of proteins	78
14	Protein content of some important foods	80
15	Calcium content of some important foods	83
16	Phosphorus content of some important foods	84
17	Iron content of some important foods	85
18	Important food sources of vitamin A	93
19	Important food sources of vitamin D	96
20	Important food sources of thiamine	99
21	Important food sources of riboflavin	100
22	Content of niacin in some important food Sources	102
23	Important food sources of vitamin C	106
24	Calorie value of some important foods	109
25	Energy expenditure per hour under different conditions of muscular activity	115
26	Recommended daily dietary allowance per individual	118

27	Summary of the actions of the digestive secretions	126
28	Composition of milk	137
29	The nutritive values of duck's and hen's eggs	138
30	The chemical composition of groundnut milk and cow's milk	141
31	The chemical composition of malt and malt food	142
32	Comparison of the nutritive values of M.P.F., Bengalgram dal and skimmed milk powder	143
33	A score card for assessing the adequacy of diets	149
34	A balanced diet for an adult	149
35	A sample menu for a week	153
36	Diet for the expectant mother	171
37	Diet for the nursing mother	172
38	Diet for the school age child	177
39	Diet for the adolescent	178
40	Diet for the industrial or agricultural worker	181
41	Reflecting powers of various types of finishes	234
42	Budget samples—1	295
43	Budget samples—2	297
44	Methods of removing different types of spots	354

SECTION 1

HOME SCIENCE

CHAPTER 1

THE MEANING OF HOME SCIENCE

"For nothing lovelier can be found in woman than to study household good and good works in her husband to promote."
(Milton—'Paradise Lost')

The home has been the instrument for a country's moral and material progress ever since civilization began. By catering to the physical, emotional and spiritual needs of the members, the home gives meaning to life, provides a suitable environment for the growth of children, and cultivates and refines the life of citizens. It builds up character, ensures happiness and directs the individual and the community towards better living. In India, the home has been regarded as a temple in which the mother is the presiding goddess. It is the mother who first instils in the Indian such qualities as self-sacrifice, brotherhood, love, charity, patience and good human relationship. Indian mothers and wives have made the home a stable factor through the centuries. It is because of their integrity that Indian culture has been preserved in spite of invasions, famines, wars and poverty.

Home-making has long been an art for women in India. The 'sixty-four arts' which a girl had to master to prepare herself for marriage and family life indicate the emphasis placed by our forefathers on the need for a sound preparatory training of the future home-maker. From their very childhood, girls were taught by their mother and the other older women in their family, the various aspects of home-making such as cooking, entertaining guests, bringing up children, managing the household, making garments, carrying out the social obligations and looking after the members of the family in every possible way. Since until very recently organized schools for girls did not exist, such education was imparted through oral transmission, observation and imitation of the elders.

Times have, however, changed. And today, it is necessary for Home Science—the art of home-making—to be taught scientifically and systematically in an integrated course in educational institutions. One might, of course, ask : What exactly is Home Science ? Why should it be taught in schools, colleges and Extension Training Centres when the simple facts of cooking and sewing can be learnt at home from the mother and the grandmother? How can Home Science help the modern Indian woman in making a success of her life?

The answers are not difficult to find. Society has changed a good deal in its mode of living. The impacts and inroads of science have altered ways of home-life, leading to the danger of neglecting or abandoning such spiritually elevating practices as worship, devotion to the members of the family and self-sacrifice. There is a great need today for reorganizing our educational systems on the foundation of all that is best in our ancient culture, reinforced by modern science and technology.

Modern girls and boys need help in discriminating between the useless traditions and useful principles of the past. Knowledge and educational thought have to be vitalized with spiritual power. Pupils have to be equipped with the ability to adapt themselves to the changing standards of living and the consequent psychological changes and tensions in family and community life. Modern facilities such as electricity, machinery, rapid transportation and communication, very close international contacts, new technology in food production, clothing, housing, etc., and new findings on the nature of the mind and human behaviour, create an imperative need to teach our youngsters how to utilize them.

Due to the leisure time made available through science or to economic necessity, many women to-day seek careers outside the home. They need the requisite knowledge to enable them to successfully combine home-making and wage-earning careers. Democracy has made it possible for Indian women to take full part in politics and government. Home Science has become a vital need in women's education, for it helps them in meeting the challenge of the times and fulfilling their new role.

Dr. Ellen H. Richards, a notable chemist by profession and an expert in Home Science, who founded the American Home Economics Association in 1912 described Home Economics as aiming at :

'The freedom of the home from the dominance of things and their due subordination to ideals; the utilization of the resources of modern science to improve home life; the simplicity in material surroundings which will free the spirit for the more important and permanent interests of the home and society; the ideal home life for today unhampered by traditions of the past.'

Home Science can be defined as education for home life. The home and the family reflect the progress of the country. Good citizenship, mutual respect, contentment, health, cooperation, a wholesome personality and efficiency in work are all derived from happy homes. The goal of home-making is prosperous living and the highest happiness. Since home life affects the very foundation of an individual's life, Home Science is education for living.

Home Science or the study of home-making deals with subjects intimately connected with the daily activities of the home-maker such as food, clothing, shelter, finance, health, child care, home beautification, community service, etc. Religion, culture, art and music form its integral parts. To understand the various aspects of home-living, a knowledge of the basic science and art subjects such as physics, chemistry, physiology, biology, economics, sociology, psychology, art and architecture is essential. Such knowledge enriches life in the home. Above all, it enables women to live within their means and give satisfaction and joy to all the members of the family. On the strong foundation of the basic science and art subjects and their applications, the structure of Home Science which comprises food and nutrition, clothing, home management, housing, health, child development and human relationship is built.

In the field of nutrition, the following topics are dealt with : national food problems and their effects on food production and on the economy; the scientific

facts about the nature of food; the constituents of food; the foods required for the growth and maintenance of body functions; food needs at the different stages of growth; nutritional deficiencies and ways of overcoming them; preparation of food in such a way as to conserve the maximum nutritive value and preserve its flavour, taste and appearance; ways of making the best use of the money available for food; the bio-chemical changes that food undergoes in the body; the preservation of surplus food; and fads, superstitions and wrong food habits. Food production, sanitary handling of food, avoidance of waste, hygiene of food, the psychological effects and pleasures of eating, and the important relationship of adequate diet to health are the important topics comprising this field.

Under clothing are included the selection, construction and care of clothing; its effect on the family income; the chemical nature and behaviour of different textiles; different types of weaves; the quality, colour fastness, shrinkability and durability of fabrics; the qualities of silk, wool, cotton, linen and other natural fibres; the nature of synthetic fibres such as rayon, nylon, etc., the choice of clothes according to income, age, season, occupation and becomingness; colour designs; the advantages of making one's own clothes; and the historical background of clothing as reflecting the national character. Methods of washing clothes, mending clothes, taking care of clothes, repairing and renovating clothes, and storing clothes are other important aspects.

Housing influences the mental and physical health of human beings throughout life. Therefore, the basic facts about housing designs, furnishings which will save money and labour, and methods of getting the maximum work done through the minimum equipment are some important considerations in this field. Under housing, we also study how to build the house for beauty, health, ventilation, ease of movement, comfort and functional efficiency; how to rent houses to derive maximum satisfaction; how to make suitable adjustments and modifications in rented or purchased houses; and how to construct and maintain home or kitchen gardens and landscape gardens.

Management is the key to success in home-making. 'Management' implies making the best use of the available material and human resources, to derive the best values and to conserve time, energy, money, space and labour. It means getting what we want out of what we have. For good management, all the members of the family must work together, set up common goals, make plans and contribute towards the efficiency and happiness of the home. The home-maker must plan wisely, if she is to provide out of the available resourses the best possible food, clothing, shelter, health, education and recreation for the members of her family. She must have the ability to evaluate her needs according to priorities, increase her income through sound management and subsidiary occupations or handicrafts, and save for the future. Finding short cuts in work and labour-saving devices is a great skill.

Health is an important branch of Home Science. Only when a healthy mind dwells in a healthy body can there be perfect harmony and happiness. All that

affects health, sanitation, personal and mental hygiene, bacteria and their role in health and disease, fighting infectious diseases, looking after the sick, home nursing and the hygiene of food, housing and clothing are included under this title.

Children are the future citizens of the nation. They must be brought up in an atmosphere conducive to growth and development. We need men and women of a tremendous strength of character to meet the challenges of a growing democratic nation. Childhood experiences set the stage for the future. Democracy can be best felt, understood and practised in the home. The mother is responsible for the success or failure of the child. The home-maker must know the needs of childhood and the physiological changes that accompany growth. Children's clothing and food combinations, recreation, education and the factors or conditions which promote their health are important topics.

Man is a social animal. He is happiest in society, amongst people. To achieve happiness in a group, it is necessary to understand the principles underlying sound human relationships. A knowledge of psychology, sociology and other related subjects is imparted in Home Science to help family members in understanding people.

No profession in the world is as diversified as that of the home-maker. She must be, to her family, a doctor, nurse, psychologist, banker, tailor, cook, nutritionist, caterer, gardener, governess, educationist, economist, recreational worker, home manager, decorator, companion, social worker, spiritual hero, wife and mother. She should make the home a place of devotion, culture and beauty. Home Science trains the student not only for the role of 'home-maker'—the greatest of all careers—but also for a number of others, such as teacher, Extension worker, social service worker, dietitian, warden, house-keeper or nursery school teacher. Home Science thus serves the community in a variety of ways.

Home Science, moreover, helps in building integrity of character, presence of mind to meet any emergency in and out of the home, and the ability to create an affectionate environment for the members of the family so that they can find love's fulfilment and life's joy in the place called 'Home'.

"Home's not merely four square walls
Though with pictures hung and gilded
Home is where affection calls
Filled with shrines the heart hath."

CHAPTER 2

HOME SCIENCE IN INDIA TODAY

Today, Home Science has found an important place in the curricula in Extension training, in adult education and in educational institutions right from the nursery school (pre-basic school) level to the university level.

The need for conducting special courses for women in schools and colleges has been recognized in other countries over a long time. In the U.S.A., U.K., New Zealand, Australia and Europe, Home Science is a recognized field of education.

It is only recently that countries in Eastern Asia have started giving attention to the organization of Home Science courses in educational institutions and Agricultural Extension. The first Technical Meeting on Home Economics for South and East Asia was convened in 1956, by the Food and Agricultural Organization of the United Nations in Tokyo, Japan. At this Meeting, delegates from Hawaii, India, Indonesia, Japan, Korea, Malaya, Philippines, Thailand and Vietnam outlined Home Science programmes suitable to their cultural background and needs.

During the last decade, Home Science has received great attention in the field of education in India. Educationists, administrators, governments and philanthropists are encouraging Home Science education at all levels. More than 40 colleges affiliated to the following universities offer Home Science at the Pre-university, Intermediate, Bachelor's and Post-graduate and rural institute levels : the Universities of Aligarh, Allahabad, Andhra, Baroda, Calcutta, Delhi, Gauhati, Gujarat, Jammu and Kashmir, Jabalpur, Kerala, Lucknow, Madras, Mysore, Nagpur, Osmania, Patna, Punjab, Rajasthan, Saugar, S. N. D T. Women's University, Bombay, Sri Venkateswara, Utkal, Vallabh Vidyapith. The Annamalai University and the new Agricultural University in Uttar Pradesh are also contemplating the introduction of Home Science. The following colleges have provision for teaching post-graduate courses leading to the M.Sc. Degree : Sri Avinashilingam Home Science College (Coimbatore), Faculty of Home Science (Baroda), Lady Irwin College (Delhi), and the Women's Christian College, South Indian Educational Trust and Queen Mary's College (Madras).

Home Science has been introduced into nearly 400 multi-purpose or higher secondary schools in all the States. Forty-six Home Science Wings are training Gram Sevikas in the different States.

When Home Science was first introduced into schools and colleges, it was called by various names—Domestic Science, Domestic Art, Household Science, Household Art, Household Economy, Household Administration, Home Craft, House Craft, Euthenics (The Science of controllable environment), etc. It is now known as Home Economics in the U.S.A. and as Home Science in the U.K. and other Commonwealth countries including India.

Home Science in the Kindergarten

Children in pre-basic, nursery or kindergarten schools learn Home Science through such activities as keeping themselves clean, washing their own hands and utensils, cleaning and serving food, playing together, keeping things in the right places and taking care of their belongings. Organized group practices are the first step towards the appreciation of the art and joy of living together. Various projects in the nursery schools provide the children with the opportunity to appreciate art, music and beauty.

Home Science in Elementary Schools

In the elementary schools, regular courses have been outlined and definite periods of time are allotted to the teaching of Home Science. In some schools, Home Science is taught as part of Hygiene and Physiology. Some of the lessons included are on nutrition, cooking, budgeting, cleanliness and decoration of the home.

Home Science in High Schools or the Secondary Stage

In a number of States, the Departments of Education have made provision for the teaching of Home Science at the secondary level either as an out-of-school or optional subject or as an examination subject offered for one, two, three or four years of the secondary stage. Madras was the first State to introduce Home Science as a bifurcated course in 1948.

The Secondary Education Commission appointed by the Government of India pointed out that the then existing system of education did not, specially in the case of girls, provide general education and that education should be more closely connected with the home and community. Therefore, it declared that the teaching of Home Science in girls' schools was essential and that it should become an integral part of the educational background for girls.

The Secondary Education Commission gave importance to Home Science as an independent group of subjects to be taught during the last four years of the secondary school. The All-India Secondary Education Council further included Home Science as one of the subjects in the other elective groups. Thus, in the present revised scheme, it is possible for a girl to take Home Science completely as a diversified subject or as one of the many subjects in the optional groups such as the sciences, the humanities or the fine arts.

The Government of India have encouraged the starting of Home Science classes in several Higher secondary and multi-purpose High Schools in the country. A 'Draft Curriculum' for the three years' course was prepared in 1956 and sent to the State Boards of Secondary Education who have adopted it with suitable modifications.

In post-basic education, ample provision has been made for learning Home Science through such activities as preparing food, serving food, calculating the nutritive values of food, preserving food, keeping the home and its surroundings clean, personal hygiene, applying art and beauty in everyday life, managing money and other resources, subsidizing the income through such crafts as spinning, paper-making or weaving, and caring for children. Through these the students acquire

the knowledge and skill essential for successful living. If education is preparation for life, then Home Science, by virtue of its intimate relationship with and concern for individual and community life, has a tremendous scope in general education.

Home Science in Colleges and Universities

Several colleges offer Home Science either at the intermediate level or at the degree level. There is no uniform curriculum for Home Science in college programmes. In many institutions, Home Science is one of the optional subjects at the intermediate or degree level. Some of the institutions devoted mainly to Home Science are Lady Irwin College, Delhi; the Faculty of Home Science, Baroda; the Central Institute of Home Science, Mysore; the M. H. College of Home Science, Jabalpur; the Viharilal College of Domestic Science, Calcutta; and the Avinashilingam Home Science College, Coimbatore. In these colleges, a full three or four years' Home Science curriculum with the basic sciences, arts and the special areas of Home Science subjects has been outlined leading to university degrees.

The depth of the curriculum in Home Science in the colleges depends upon the level for which it is meant and the traditions of the university to which the colleges are affiliated. However, any college curriculum in Home Science should be built around three disciplines—the sciences, the humanities and the fine arts. These should include :

(i) *The physical sciences*, including physics and chemistry with their applications in nutrition, textiles, health, home nursing, home management and household equipment.

(ii) *The biological sciences*, including bacteriology, physiology and hygiene with their applications in nutrition, health, home nursing and child development.

(iii) *The social sciences*, including economics, sociology, civics and psychology with their applications in home management, household and consumption economics, child development, family relationships, food and nutrition, textiles and clothing.

(iv) *The fine arts* with their application in housing, home furnishing, household equipment, food preparation, textiles, clothing, art in everyday life, child development and family relationships. Students apply their knowledge of colour, literature and music to create beauty in everyday living, in family festivals and ceremonies and in the selection and arrangement of clothes.

Round this core the Home Science subjects are built, as a synthesis of the arts and sciences, to solve the everyday problems of home and family life. In Home Science programmes, students study child development, family relationships, home management, textiles and clothing, food and nutrition, family health and home nursing, housing, household equipment, art in everyday life, home science education and spiritual, moral and cultural values.

It is necessary that the core subjects and the requirements prescribed for Home Science in the different universities have a basic common minimum to enable-

students graduating from one university to get admission into another university for post-graduate or teachers' training courses without difficulty.

Home Science in Teachers' Colleges

About six colleges offer Home Science for the Bachelor's Degree in Education. In these colleges, graduates who had taken subjects other than Home Science for the basic degree can also take Home Science for the B.T. Preparation for teaching Home Science should emphasize the need for correlating the requirements of home conditions to the teaching and learning in school.

Home Science in Rural Institutes

Following the University Commission's report on rural universities, the Government of India through the Ministries of Education and Food and Agriculture, have taken some bold steps to formulate the policies for higher education in rural areas. The Ministry of Food and Agriculture appointed the first Joint Indo-American Team in 1955 to go into the programmes of agricultural education and research in Indian universities. With regard to Home Science, the Team reported :

> 'India is increasingly aware that any upward trend in the levels of living of the farm families in five lakh agricultural villages must include not only improvement in farming, but improvement in living ; not only better agriculture, but better homes and families.
>
> Certainly, wherever the development of rural universities is contemplated, there should be included in the plan, provision for the eventual organization of a college of Home Science.
>
> In these colleges, those women who have a village background and are willing and anxious to work at the village level for the improvement of the village home, should be trained.'

Following the recommendations of the Team, many agricultural and veterinary colleges have established new post-graduate courses and Extension Wings. Similar developments have not taken place in the field of Home Science. It is encouraging, however, to note that the Sri Avinashilingam Home Science College is making some attempt in this direction. Some state agricultural colleges such as those in Madras, Punjab, Bihar (Ranchi), the Vallabh Vidyapith and the Osmania University are also contemplating the setting up of Home Science courses with a bias on agriculture and community development.

The Ministry of Food and Agriculture appointed the Second Indo-American Team on Agricultural Research and Extension in September 1959 to evaluate the progress made during the period after the first Indo-American report and to make supplementary recommendations with special reference to the Third Five Year Plan. Their report has several references pertaining to Home Science :

> 'Great progress in the field of Home Science education can be made in the immediate future. A standard curriculum for Home Science colleges, suited to Indian rural conditions, should be prepared by an appropriate committee after a thorough examination of the existing curricula in India as well as in foreign countries.
>
> One Home Science college per State should be the minimum goal. As suggested elsewhere, these colleges should be located close to an Agricultural College or form part of an Agricultural University.
>
> It was the privilege of the Team to visit one of the Home Science colleges and to see one Home

Science Wing of an Extension Training Centre. We commend this effort to take scientific knowledge to the homes of this great nation. The Team believes this effort should be extended and closely associated with agriculture. For Home Science knowledge has as valuable a contribution to make in India as in other parts of the world.'

The Ministry of Education also appointed a Committee on Higher Education for Rural Areas in 1955, under the chairmanship of Dr. K. L. Shrimali. The Shrimali Committee recommended the establishment of rural institutes in selected institutions which have had considerable experience of work in rural service. It suggested the following departments in these rural institutes—Rural Engineering, Agricultural Sciences, Teacher Training, Health and finally a Diploma in Rural Services (equivalent to a Degree). One of the subjects taught in the Diploma course will be Home Science, the others being Cooperation, Social Education, Public Administration and Village Industries. Since then, 11 rural institutes have been set up in different parts of the country. The students in these institutions undergo a common course on rural problems and community development, in addition to the subject they choose to specialize in.

The Home Science course taught in these institutes is based on rural needs and problems. Three rural institutes, *viz.*, Gandhigram, Shri Shivaji Education Society and Rajpura are teaching Home Science. The holders of this diploma can be readily employed as instructors in Home Science Wings and as Women Social Education Organizers.

Home Science in Extension Services

The need for extending the knowledge from educational institutions and research laboratories to the homes and farms of the community has been recognized in many countries. The working of the Community Development and National Extension Services in India revealed that any attempt at improving community living requires the active cooperation of the women in the house. For this purpose a large number of trained women workers (Gram Sevikas) are required. The Ministry of Food and Agriculture through its Directorate of Extension established a Home Science Section in 1954 for training Gram Sevikas. The original 27 Home Science Wings have now increased to 44 Gram Sevika Training Centres spread all over India, and form an integral part of Agricultural Extension Training Centres. In each of these Wings, 40 Gram Sevikas undergo a one-year training programme comprising:

1. Agriculture and allied subjects
2. Home Science subjects including
   - Food and nutrition
   - Clothing for the family
   - Mother and child care
   - Household management
   - Health and sanitation
   - Human relationships
3. Handicrafts and cottage industries
4. Cooperation

5. Extension philosophy and methods correlated with village work
6. Office procedures such as the maintenance of records and diaries, writing of reports, etc.

The Gram Sevikas, after completing the training in Home Science Extension techniques, will live in villages and try to bring about an improvement in the rural standards of living. They will study the needs and remove the weaknesses of rural homes and give directives to the laboratories regarding the type of research required to meet those needs.

Long before the Government of India took up the task of training Gram Sevikas, the Kasturba National Trust started preparing Gram Sevikas for social work. For a long time, they assisted the Central Social Welfare Board in training Gram Sevikas for their Welfare Extension Projects. Besides these, some other agencies have also been doing useful work in this direction.

The Ministry of Community Development has established eleven Mukhya Sevika Units in the different States. The training programme for Mukhya Sevikas includes practical training, theoretical work and field work in the following :

1. Promotion and development of the urge for better living in village women; improvement of the home and the community.
2. Organization and promotion of family and child welfare activities.
3. Establishment of women's organizations dealing with cultural, recreational and other programmes.
4. Promotion of education among girls and improvement of the standard of living through some economic programme such as that of crafts.
5. Helping village women to adopt improved agricultural and allied practices.
6. Preparation and use of audio-visual aids.
7. Development of minimum programmes for women, children and the family ; preparation of work plans in coordination with the Village Community and other Extension workers.
8. Establishment of a working relationship with other organizations which are active in the same field, *e.g.*, Sarvodaya, Bharat Sevak Samaj, etc.
9. Participation in people's programmes such as Panchayats, Cooperatives, etc.
10. Guiding and supervizing the women field staff in the Blocks.
11. Evaluation of the programmes.

As the institutions offering Home Science expanded in number and strength, the need for an association through which periodic conferences could be held, the problems pertaining to Home Science could be discussed, the criteria for curricula and courses determined, research promoted and publications brought out was felt. A beginning was made in 1951 when a meeting of Home Science experts and teachers was held at the Baroda University. The Home Science Association was organized in 1952 with headquarters in New Delhi. It now has over 200 active members, approximately 100 associate members and 10 institutional members.

The Future of Home Science

It is an encouraging sign that Home Science has made a tremendous progress during the last decade. Since it meets an important need in education, there is a great demand for Home Science teachers and Extension workers. The vast expansion of Home Science brings with it various problems and short-comings that have to be overcome to enable Home Science to fulfil its role. We have first to evolve a philosophy for Home Science based on India's great cultural heritage and genius. This philosophy should indicate that the ultimate goal of Home Science is 'abundant and simple living' aimed towards high thinking, robust health and the fullest spiritual expression. This philosophy should be understood by all persons if the popular misconceptions about Home Science are to be dispelled.

On the basis of the philosophy evolved, suitable curricula and courses should be developed in educational institutions. Production of literature, equipment, teaching aids and other facilities should be promoted for effective teaching of the curricula. Since Home Science was first developed into a science and taught in the west, we have to depend upon the textbooks and research findings of Western countries. We shou'd adapt them suitably for use in our country and make all possible efforts to bring out relevant Indian publications.

Through the University of Tennessee–the Technical Cooperation Miss'on (now U.S.A.I.D.) Contract, the various Indo-American contracts and the Ford Foundation, professors are working in different colleges to develop Home Science programmes. Their guidance in the interpretation of the syllabus, the methods of teaching, the techniques of research and the development of a scientific approach to problems will be most valuable to us. We should adopt techniques in Home Science which are capable of country-wide application. We should design the courses according to our needs, conditions and cultural background to assimilate the best from our spiritual traditions and from the scientific outlook of other advanced countries.

Practical and applied research in Home Science is the crying need of the day. Investigations on housing, clothing, the most suitable methods of cooking and preserving food, child care, cottage industries, etc., are greatly needed. How to live happily within the means available and strive to increase the amenities of life, how to conserve food values and eliminate malnutrition, how to make the most of our human and natural resources, how to appreciate and express art and how to adjust to a fast changing world without losing the best in our ancient culture are some of the problems which need to be studied.

With the advance of science, village communities are undergoing a great transformation. Greater facilities for education, health, communication and recreation call for certain adjustments in home-living. The increased privileges and opportunities which the Indian woman enjoys today have created a need for the right type of education, an education which will strengthen her position as a citizen, a transmitter of culture and a home-maker. Home Science education should attempt to meet these needs.

SECTION II

HEALTH

CHAPTER 3

THE MEANING OF HEALTH

Health means complete physical, mental and social well-being. Normal physical health means that the whole body functions in such a way that a person is free of pain, discomfort and disease. Health also implies the possession of a sound and efficient mind and wholesome emotions. A healthy person has good relations with his family and associates. Health is the quality of life which enables a person to 'live most and serve best.'

It is not enough to have a knowledge of health. One must also make use of that knowledge at all times. Your health depends not on *what you know* but on *what you do*. Most of us are born with a sound body and mind which must be maintained by healthy living, by practising safe and sound health habits every day, and by doing the things that build and maintain a healthy body and mind.

Using scientific knowledge to plan and act will bring maximum health to the individual, the family and the community. For example, the mother who boils drinking water may save the lives of her children who may otherwise die of cholera, dysentery or typhoid.

A knowledge of health and its constant purposeful application to everyday life brings vigour, satisfaction and happiness. Before progress can be made in the health of the people, prejudice and superstition, the real enemies of health, must be conquered and replaced by an understanding of the scientific truths about creation of life, maintenance of health and protection against disease and accident.

People can attain health by :

(*i*) Practising good health habits ;

(*ii*) Making health a major goal ; and

(*iii*) Working in close cooperation with the health team in their area.

FACTORS INFLUENCING HEALTH

The three major factors that affect a person's health are *heredity, environment* and *adjustment to the forces that affect him.*

Heredity

Life begins when the sperm cell of the father unites with and fertilizes the ovum or female cell of the mother.

The colour of the eyes, hair and skin, the shape of the nose, the height and general form of the body, etc., are inherited through the reproductive cells of the parents. For example, most men from the Punjab have a large body build, while many men from other States are of a smaller build ; the skin of some people is like of the golden sunshine, while that of others is a majestic ebony. High intelligence is inherited in the same way as certain types of feeble-mindedness are inherited. A few

diseases are also hereditary. There are two genes in each cell for every inherited trait. This is why people are different.

Environment

The world we live in consists of (*i*) factors and conditions such as soils, forests, rivers, plants, animals, insects, bacterial life, houses, cultivated fields, wells, ponds, electrical units, trains, cars, wagons, newspapers, books and countless other things; and (*ii*) people and their behaviour as expressed by customs, habits, traditions, prejudices, superstitions and institutions.

We are healthy, sick or disabled depending on our physical environment and our health habits. Here are a few examples :

(*i*) Until recently, people could not live in the rich Terai region of India due to the malarial mosquitoes. During the First Five Year Plan period, the Government successfully exterminated the mosquito in this area, and today, the Terai is populated by a thriving and happy community of people.

(*ii*) Cholera, dysentery and typhoid are more prevalent in the villages than in the cities due to lack of clean drinking water.

(*iii*) Due to the lack of iodine in the food and water, goitre is prevalent in some areas.

(*iv*) Syphilis is more common along trade routes and in the cities than in the villages.

(*v*) Accidents are more common in the cities because mechanical devices are used on roads, in factories and homes.

The combined efforts of the individual, community and government are necessary to create a safe physical environment where man can work and live a healthy and happy life.

The Social Environment

Most of our thinking about health and our habits of eating , cleanliness, clothing, home treatment of illness are the direct outcome of the influence of our parents, grand-parents, other members of our family, teachers and friends. Many people believe that sickness is caused by the evil eye or that sickness is a curse that must be endured. People can be taught sicentific truths about the cause and prevention of sickness.

Social environment is created by people. It is difficult to change, because the things we do or believe in form part of the way of life discovered by our ancestors as most suitable to the physical environment surrounding us. Science has made great headway in recent years but the changes in education, health, transportation, communication, etc., that ought to follow on the heels of science have been very slow in reaching the majority of villages. Therefore, the villagers neither understand nor make use of modern scientific advances relating to health.

Many villagers always answer calls of nature in the fields, probably because:

(*i*) It has been the custom of the people to do so:

(*ii*) Body wastes have a fertilizing value;

(*iii*) They do not know that body wastes may contain hookworms or germs of dysentery, typhoid, cholera, etc., or that these germs are carried by rain to drinking water;

(*iv*) There is no other place to deposit body wastes;

(*v*) Many latrines are not kept clean, so the odours are offensive and repulsive and people prefer to use the open fields for relieving themselves. Community workers must understand the villager's point of view and his attitude towards changing such of his habits as are accepted by society. Change in personal habits comes but gradually.

Personal Factors

Each person's health habits, attitudes and goals are the result of his learning and experiences. They are first established by what he sees his family doing and by what he is taught at home, and later by imitating the habits of his friends, in the village or school and the place where he works. When the child goes to school, he is given scientific knowledge about health and hygiene, but all too often does not apply this knowledge to his own life.

The only true test of a person's knowledge of nutrition is his ability to find ways of applying his knowledge of nutrition in his daily life, as for example, getting and eating a balanced diet every day. Some students who had successfully passed an examination on nutrition were asked to analyse their own diet. They felt satisfied that they had a balanced diet, when they had eaten a very large portion of rice, a very small amount of greens and a small piece of salted fish. The salted fish represented their protein intake for three days. Actually the students did have some body-building foods, some vitamins and some energy foods ; but the amount of rice was so out of proportion to the other foods that the diet had little balance. These students had acquired knowledge about food elements ; yet they did not have a balanced meal.

While many families do not have enough money to provide a balanced diet every day, many others who can afford a balanced diet do not spend their money on this kind of health protection, mainly because they do not understand the need for a balanced diet.

Community workers and health personnel must practise scientific health habits themselves. Only then can they teach the villager that the adoption of health measures not only prevents many an illness but will also help him to maintain a strong body and mind.

CHAPTER 4

THE COMMUNITY WORKER'S ROLE

Permanent improvements in health practices cannot be brought about by merely providing better health facilities but by convincing the people of their effectiveness. And this is where the community worker proves useful.

What is the role or responsibility of the community worker in the health programme ? How can she help in solving the greatest of all community problems ? The responsibilities of the community worker in matters of health fall into the following categories:

1. Personal responsibilities.
2. Responsibility to the community under which fall (*i*) her responsibility to the individuals and families with whom she works, and (*ii*) her responsibility to the health authority.

The following activities are to be planned and put into practice.

AT THE PERSONAL LEVEL

Every community worker should :

1. Analyse her own understanding of health, and replace her own prejudices and superstitions with scientific truths.
2. Learn the scientific methods of attaining and maintaining good health.
3. Secure a medical examination including, if possible, an X-ray to ascertain the state of her own health and then get the defects, if any, corrected.
4. Analyse her health habits and change those that do not measure up to the standard.
5. Secure regular immunization against typhoid, small-pox, cholera, plague and other infectious diseases prevalent in the area of service.
6. Practise healthy living ; eat a balanced diet ; drink boiled water; practise cleanliness; and give their due place to exercise, recreation and rest in her daily life.
7. Establish and maintain happy relations with her family, co-workers, village people and others.

AT THE COMMUNITY LEVEL

In relation to individuals and families, the Extension worker should :

1. Observe and study the health habits and customs of the people.
2. Observe the general health status of children and give medical care as needed.
3. Teach and demonstrate the ways of healthy living.
4. Urge every pregnant woman to attend an ante-natal clinic regularly

if such a clinic is in the neighbourhood and to employ a trained midwife or qualified doctor for delivery.

5. Urge families to utilize the medical supervision available including immunization for infants and the pre-school or school-going children.
6. Develop adequate medical supervision and make health a major goal underlying all teaching and work.
7. Assist families in using all available health facilities.
8. Work with the support of the health visitor, midwife and health officer.
9. Render first aid, and either send for the doctor or send the patient to the doctor.
10. Avoid any medication. Medicines may help the patient, but if he gets worse or dies, then the worker may be considered responsible and, in future, her usefulness in the village may be doubted.
11. Give simple treatment, and that only after receiving written orders from the doctor.
12. Bring all signs of sickness and unhealthy conditions to the notice of the health workers in the area.

The community worker who is not trained in medicine should understand her limitations in the use of medicine and devote her time to the prevention rather than the treatment of diseases. Over a period of years, she will save many lives and eliminate much suffering, if she succeeds in helping the people in the prevention of diseases.

It is important that the community worker should do the first things first in the health programme. Priority should be given to help people :

1. Understand why all water taken from the well, tank or river should be boiled or purified before drinking.
2. Understand why a variety of foods including eggs, fish, milk, sprouted gram, par-boiled or hand-pounded rice, tomatoes, oranges, limes or other citrus fruits, carrots, beans and other vegetables should be eaten daily.
3. Adjust their spending in such a way that they have some vegetables and other protective foods in their daily diet.
4. Learn to cook food without destroying its nutritive values.
5. Get themselves vaccinated or revaccinated.
6. Help all expectant mothers get adequate care during pregnancy.

There are many other things to be done, but the above-mentioned ones are of first importance. Changing the health habits of people is a slow process. With courage, persistence and intelligent action, all community workers who understand and practise safe health habits can hasten the change.

CHAPTER 5

PERSONAL HEALTH

Persons who consistently follow good health habits are less likely to fall ill than those who do not. Most people attain sound health and happiness by following habits that are based on scientific truth and self-discipline. But it must be remembered that there are no fool-proof formulas for remaining healthy. For example, one cannot say, 'If you are inoculated (vaccinated), you will not develop cholera.' If a person had been exposed to cholera before inoculation, he may develop the disease in spite of inoculation. However, one can say that inoculation prevents cholera in the majority of cases.

THE SIGNS OF GOOD HEALTH

The signs of good health are physical fitness, emotional stability, personality and harmonious relationship with others.

The following Tables will enable you to correctly gauge the state of your.health :

TABLE 1

THE SIGNS OF HEALTH

Body Parts	*Good*	*Bad*
Hair	Glossy ; clean	Dull ; unruly
Eye	Alert ; clear ; free of discharge	Dull ; heavy ; puffy ; not free from discharge ; having spots
Skin	Clear ; smooth ; firm ; intact	Red ; rash ; swollen, discoloured ; broken
Nose	Clean ; breathing freely	Not free of discharge ; obstructions in breathing
Mouth and lips..	Happy expression ; relaxed ; smiling ; red and moist mucous membranes	Tense ; drawn down, ulcers on lips ; pale ; dry cracks at corners of mouth
Teeth and gums	Clean ; regular ; good occlusion ; no decay ; firm and red gums	Cavities ; discoloured ; gums spongy, swollen or bleeding
Throat	Clear ; moist ; no obstruction	White patches ; increased redness
Neck	Regular form ; no protrusions	Enlarged glands
Chest	Regular form	Irregular shape
Breasts	Equal in size ; no irregularities	Lumps ; inverted nipples
Hands	Clean ; short and clean nails	Abrasions ; rough skin ; unclean ; swelling ; long and dirty nails
Abdomen	Soft ; regular in size and shape ; free from pain or discomfort	Pain ; distention

TABLE 1—*contd.*

Body Parts	*Good*	*Bad*
Genital organs	Clean ; free of any discharge, ulcerations or irritations	Sore ; discharge ; irritation or burning
Legs	Regular in shape and equal in length	Cramps ; rash ; pain ; big veins ; swelling ; dryness
Feet	Regular position ; free from calluses and infection ; clean	Turned in or out ; calluses ; injury ; swelling
Posture	Head poised and well back ; chin in ; shoulders level ; arms relaxed ; abdomen flat ; weight on balls of feet	Round shoulders, large abdomen
Spine	Straight and regular	Forward, backward or side curve
Weight	Average for height, keeping in mind the family body-structure	Sudden increase or decrease over short periods of time

TABLE 2

THE NORMAL STRUCTURE OF THE ORGANS OF THE HUMAN BODY

Organs	*Good*	*Defective*
Heart	Regular pulse, 60-80 per minute	Too fast ; too slow ; irregular
Lungs	Clear breathing ; breathing 10-25 times a minute	Persistent cough, particularly if sputum is produced with the cough
Eyes	Normal vision by test	Discharge ; inability to see and read at a normal distance ; swelling and puffiness of lids
Ears	Normal by test of conversational voice	Pain ; discharge ; inability to hear
Abdomen	Soft; no pain or pressure	Hard ; tight ; painful

TABLE 3

THE NORMAL BODY FUNCTIONS

Functions	*Indications*
Appetite	Normal weight and energy reflects good nutrition and functions of the gastro-intestinal tract
Sleep	Vigorous and restful
Body waste	Regular bowel and kidney motions, should be free of blood, mucus or pain

The following are the signs of good mental and emotional health :

(*a*) Enthusiasm for work and play ; (*b*) ability to concentrate ; (*c*) ability to make decisions ; (*d*) ability to get along with people at work, in school and at home ; (*e*) freedom from worry, nagging, headache and other physical ailments ; and (*f*) taking interest in matters of common importance.

HEALTH HABITS

Healthy living implies the practice of safe health habits at all times. It is important for the community worker to understand the *What*, *Why* and *How* of each health habit. She should practise good health habits, and teach the principles of healthy living in all aspects of work and play. If healthy living is learnt from personal experience, one can teach health with enthusiasm and conviction. Many people know what they should do but they do not apply their knowledge of health to their own lives.

Health habits refer to all the experiences that affect the growth, development and maintenance of a person, including his physical, mental and spiritual aspects. Habits that are essential for meeting the basic needs of man, *i.e.*, the activities that have a direct bearing on health include the following:

Eating

Malnutrition is one of the major underlying causes of bad health. Most people eat enough to sustain themselves, but do not eat the right combination of foods. The community worker can make a great contribution to any health programme by helping women understand how to feed their families, when to start feeding fruits, vegetables or cereals to infants and how to adjust the food habits of their families so as to include more wheat products, gram, milk, eggs, nuts, fruits and vegetables in their daily diet. The chapter on nutrition covers this subject in detail.

Exercise and Recreation

Exercise tones up the body. The average farmer gets enough exercise. Depending on their age, sex, body structure and occupation, some persons need more exercise than others. Active children do not normally need elaborate exercise. Playing in various ways is enough exercise for them.

Exercise helps to remove waste products from the muscles and other body tissues; helps the skin, kidneys and bowels in throwing off body wastes ; helps the body relax ; and induces sound refreshing sleep.

Planned outdoor exercise in the form of play builds character and helps recreate the mind and body. Those who play in competitive games learn to give and take ; they thus learn to get along with each other. Adults need planned recreation as much as or even more than children.

Rest and Sleep

A normal person's day includes work and rest. A study of physiology illustrates the continuing normal process of building up and breaking down tissues. All activity contributes to the 'breaking down' process; sleep and rest, on the other-

hand, repair and 'build up' all that is 'broken down' during work and other activities. Rest is essential to the restoration of energy. The heart gets rest during sleep. The mind also rests during sleep.

The amount of sleep needed depends on age and activities. Table 4 illustrates the amount of sleep needed by the averge person according to age :

TABLE 4

HOURS OF SLEEP NEEDED AT DIFFERENT AGES

Age	*Hours of Sleep Needed*	*Reason Why*
Birth to 1 month	20-22	This is a period of very rapid growth
1 month to 1 year	16-20	
2 to 3 years	14-16	Needed for adjustment and growth
3 to 5 years	13-14	Needed for balance of body metabolism
5 to 10 years	12-13	Needed for restoring energy and for providing rest to the whole body
10 to 15 years	10-12	
15 to 20 years	8-10	
Adults	8	

When the weather permits many people sleep in the open in the garden, on the roof or in the verandah. These are the best places for sleeping because the air will be fresh and cool. If one has to sleep indoors, the room should have windows to admit cool, clean air which is essential for sound restful sleep and for the general fitness of the body and mind. Every person should have a space of at least eight square feet if he is to get enough oxygen to maintain his body.

The greatest problem is space. Under the present conditions, too many people sleep close together in too small a space. When one person in the family gets tuberculosis, leprosy, cold, pneumonia or any other communicable disease, other members also frequently contact the disease. Disease germs from a patient can affect all persons within an area of five feet radius.

Some people keep their animals in the same room or too near the sleeping area. This is a great problem in many homes as the people have no other place to keep their animals safely. The cattle shed should always be constructed away from the living quarters.

Mosquitoes that carry malaria and filaria travel mostly at night and attack sleeping people. The doors and windows should be screened or a mosquito net used. Spraying with D.D.T. helps in ridding the home of these pests. The sanitary inspector can help in solving this problem.

The following things must be remembered if we want to have good sleep.

1 Sleep in a well-ventilated room or in the open air.
2. Sleep at least five feet away from the face of another person.
3. To breathe cleaner air, remove all animals from the sleeping area.

4. Sleep on a firm and clean cot.
5. Sleep under a net or in a screened room to save yourself from malaria and filaria.

A person who feels tired most of the time and who sleeps too much should be referred to the health centre.

Elimination Process

Elimination means the exit from the body of waste products like urine, faeces, sputum, sweat and mucus. After the food is digested and utilized to build and repair the body, the residue is thrown out by the kidneys, bowels, lungs and skin. Waste products may be likened to the ashes that are left after wood or dung is burnt.

When a person has some disease in the intestinal tract or in the lungs, the germs that cause the disease pass out of the body in the bowel movements or in the discharge from the lungs and throat (sputum) or in both. It is important, therefore, that all body waste should be deposited in the latrine or in a hole in the ground and covered immediately with soil in such a way that the germs will be destroyed as they leave the body. Each person must take the responsibility of flushing the toilet after his use or of covering his body waste. Sputum and discharges from wounds must be burnt to prevent the spread of disease.

The following points will help you judge whether your elimination processes are working in a normal way.

Bowel : One bowel evacuation a day is considered normal. The normal stool is yellowish brown, firm and moist. If blood or mucus appears in the faeces, the person should see a doctor. Liquid or loose motions may indicate diarrhoea or dysentery. Constipation is usually due to tension or the lack of vegetables and fruits in the diet.

Urine : The normal urine is light amber in colour. In cool weather, if a person drinks eight glasses of water a day, he should pass about six glasses of urine. In hot weather, most of the waste water is eliminated through the skin in the form of perspiration or sweat so that his urine output is less. When the heart or kidneys do not function properly, the ankles, hands and other parts of the body may swell. If this happens, the person should see a doctor immediately.

Sputum : Normally, a person does not have sputum. When there is an infection or cold, one may develop sputum. Tuberculosis, colds and pneumonia are spread by the patient's coughing, sneezing or speaking.

Sweat : Sweating prevents our bodies from getting over-heated. People sweat more in hot and dry weather than during the monsoon ; but the sweat dries so quickly that it is not seen. In very hot weather, a man working very hard will need up to one quart of water every hour if he is to avoid a heat stroke. When so much water is being taken, a pinch of salt is needed to prevent cramps. Smearing oil may help in avoiding prickly heat.

Elimination can be improved if the rules given below are followed :

1. Eat a balanced diet including an abundance of fibrous fruits and vegetables.

2. Drink boiled or protected water. The amount of water or fluid that a person needs depends on his activities and the amount of fluid lost through perspiration. The average person (not a manual worker) needs about eight glasses of water a day.
3. Take lots of exercise in the open. This may be in the form of work or play. Excessive fatigue impairs elimination.
4. Rest, relax and sleep enough to meet your needs.
5. Keep to regular hours each day for evacuating the bowels.
6. Avoid cathartics. These are habit-forming. They irritate the lining of the intestinal tract and cause such essential foods as vitamins to be eliminated. Laxatives are also habit-forming. Both may prevent the bowels from functioning normally.

Cleanliness of the Body

Every normal person wants to be clean. The problem is to get enough water, soap and oil to clean the body thoroughly.

Bathing with soap or with bath powder removes dust, dirt, sweat and other waste matter from the skin. Rubbing the body while bathing brings additional blood to the skin surface and stimulates the skin glands to function better. Hands must be washed frequently to prevent the spread of disease. Cleanliness adds to a person's social acceptance. A clean person is more attractive. Cleanliness gives the person a feeling of confidence in himself and adds to his efficiency and effectiveness as a leader and as a member of the group.

Clean clothes are as important as a clean skin.

Frequent cold baths during the hot weather prevent prickly heat, rashes, scabies and other skin infections which occur due to excessive sweating.

Teeth and Gums

All our teeth start growing in the gums before birth. There are two sets of teeth. The first set or milk teeth are shed before a child reaches ten years of age and the second lasts for the rest of his life. Teeth are built and maintained by food, exercise and cleanliness.

Foods that adhere to the teeth furnish food for bacteria to grow and flourish. The bacteria produces an acid that eats into the tooth and causes its decay. Some scientists believe that tooth decay can be checked by eating less starch and sugar. Clean teeth are less likely to decay as less food or bacteria can be found in a clean mouth.

For maintaining healthy teeth, the rules given below should be followed :

1. Rinse your mouth with clean water after eating.
2. Brush your teeth with a tooth brush or a *dantun* as soon as you get up, before going to bed and after meals.
3. Use a mixture of soda or clean charcoal and salt, or a commercial tooth paste to clean your teeth. Do not use ash, cinder, brick dust and other abrasive substances because harsh substances of this nature may scratch or otherwise injure the teeth.

Hair

The average woman in India has an abundance of hair as can be seen by the beautiful braids of school children and by the lovely buns worn by women. The hair is an index of health and is affected by a balanced diet and cleanliness. A healthy person's hair is glossy and strong. Dry, dull and brittle hair can be a sign of ill health. The amount and colour of hair is inherited from parents.

You can keep your hair healthy by following the rules given below :

1. Wash your hair with bath powder or soap and warm water. Rinse thoroughly. This should be done once a week and oftener if necessary. Too much washing, however, removes the natural oils from the hair.
2. Brush your hair and rub the scalp every day to improve circulation and to keep your hair clean.
3. Get rid of lice and nits. This can be done by taking the following measures :
   (*a*) Cover the eyes with a clean cloth.
   (*b*) Dust DDT or gammaxane powder on the hair, separating one section at a time, until the entire head and scalp is well covered. Benzoil benzoate is also good for destroying head lice.
   (*c*) Leave the powder or solution on the hair for 24 hours.
   (*d*) Wash the hair with soap and water. Rinse the hair with a mild solution of vinegar to remove nits. When lice have been found in a person's hair, all other members of his family are also likely to be found infested. All members of a family should be examined at the same time.
   (*e*) Wash and boil the bed covers to destroy lice.

Hands and Nails

Nails are an index of general health and nutrition. Clean and glossy nails indicate that vegetables, fruits and other essential foods are being eaten. Nails protect fingers and toes. Bacteria and dirt accumulate under and around nails. These may be carried to the mouth while eating.

For keeping hands and nails healthy, the following rules must be followed :

1. Wash your hands frequently ; never eat without first washing them. Wash your hands with soap under running water and rinse thoroughly. The friction created by rubbing the hands together after applying the soap destroys most of the bacteria found on the hands.
2. File or cut your nails so that they will not extend beyond the finger or toe. Cut toe nails straight across. This prevents the in-growing of nails.
3. Wash your hands with soap and water after each visit to the latrine. This will help in preventing the spread of diseases.
4. Wash your hands before cooking, before handling or nursing the baby, and before going to bed.

Healthy Feet

We spend about two-thirds of our lives on our feet. *Chappals* and shoes protect the feet against injury and hookworm infection.

The following rules for protecting the feet are suggested :

1. Keep the feet clean. Wash them with water before entering the house.
2. Wash the feet with bath powder or soap and water once or twice a day. Carefully dry the spaces between the toes.
3. Massage the soles of the feet with oil.
4. Wear *chappals* or shoes to prevent hookworm infection and to prevent injury which may result in such infections as tetanus.

Menstruation Period

Menstruation is a normal function of the female reproductive system. The 28 to 34 days menstrual cycle begins with the ripening of the ova and ends with a flow of blood from the vagina.

A normal woman menstruates for about 3 to 5 days. The amount of flow differs with individuals and may vary from a scanty amount to some blood clots. There may be a bright red blood flow. The flow is usually heavy during the first two days.

There are many beliefs and hygienic habits with regard to menstruation. Many people believe that the woman is 'unclean' during menstruation and forbid her to associate with other members of the family. In many ways, isolation of the woman is a protection and gives her rest from hard work.

The blood discharged during menstruation is a waste product of the body ; but unlike other waste products such as faeces or sputum, the menstrual blood is not known to carry germs. If the clots of blood or soiled napkins are allowed to lie around, they will give a bad smell and serve as a place for germs to enter and breed.

Some psychological changes occur during menstruation. Every girl should understand the truths about menstruation from her mother or from her studies of physiology in school. This implies that mothers and grandmothers too should know scientific truths about menstruation. They should also know the best hygienic procedures to be followed during menstruation. The following imaginary dialogue will be found informative :

Q. How should my daily health habits be altered during menstruation ? Should I work as usual during menstruation ?

A. Yes, but you should not overtire yourself by doing such strenuous work as lifting heavy loads.

Q. Should I bathe ?

A. Yes, a warm bath is essential to cleanliness. One should bathe as usual. Bathe legs and the outside parts frequently during the period to prevent irritation. Avoid bathing in a tank, tub or stream.

Q. Should I eat as usual ?

A. Yes, eat a well-balanced diet. Drink milk and extra water. Eat extra

vegetables to keep your elimination free. Free kidney and bowel movements help in preventing cramps.

Q. Should I take exercise ?

A. Yes, but avoid strenuous exercise and fatigue.

Q. Should I take extra rest ?

A. Yes, if you feel the need for it.

Q. Should I stay away from others because I am 'unclean' ?

A. No, you are not unclean if you bathe and are clean otherwise.

One of the main problems about menstruation is to find a safe, comfortable and clean pad to absorb the menstrual flow. You may use a sanitary towel or a pad filled with absorbent cotton. The following remarks about sanitary towels must be borne in mind :

1. The sanitary napkin must be soft, absorbent and made to fit one's needs. If there is a heavy flow, the pad should be big enough to absorb the blood that passes from the time it is put on until it is changed. The pad must be changed as often as necessary and as soon as it is stained. Some of the pads in the market are non-absorbent ; and are neither comfortable nor clean. The used pads should be wrapped in paper and burnt.
2. The sanitary or menstrual towel can be made of old soft muslin. An old cotton sari makes the best type of towel as it is soft and absorbent. The sanitary towel should be rinsed in cold water as soon as it is removed. Place the soiled and rinsed towels in a covered pail of water. When the flow stops, wash them all and hang them in the sun to dry.
3. Some women use the ends of their saris or a part of their very wide skirts to catch their menstrual flow. This practice should be substituted for a more sanitary method.
4. Some women use soft absorbent moss as a plug. This practice may cause irritation. Clean soft moss may be good to fill a pad. The moss should be crushed to make it soft, and covered with muslin for comfort and cleanliness.

CHAPTER 6

CARE OF THE SICK

Sickness is divided into two main groups : communicable and non-communicable. Quite often, non-communicable diseases such as heart disease or liver disease follow in the wake of an attack by one of the communicable diseases. The internal organs of the body are sometimes permanently damaged following an attack of diphtheria, rheumatic fever, malaria and some other similar disease. Many diseases may have symptoms in common. Only a qualified doctor can diagnose such diseases. For example, fever is a symptom of more than 50 different diseases; skin rash is found in smallpox, measles, chicken-pox, syphilis, plant poisoning and many other conditions. Each requires careful study and diagnosis before scientific treatment can be started. One of the first things to do when sickness strikes is to consult a qualified doctor.

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NEEDS OF THE SICK

The needs of a sick person are basically the same as those of a healthy person. The main difference between a healthy and a sick person is that the latter needs someone to help him do things for himself. Sometimes, the sick person is entirely dependent on others. The life of the patient depends, among other things, on the in-patient may be classified into personal needs, environmental needs, and the need for medical and nursing care.

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Personal needs include bodily cleanliness, elimination, food, water, love and affection. Environmental needs include air, cleanliness, order, light and disposal of body waste. The need for medical and nursing care includes:

1. Scientific diagnosis based on examination by a qualified doctor.
2. The right kind of medication, treatment and diet.
3. An intelligent person to give medicine and treatment as ordered and to give thoughtful care as indicated during and after the illness.

The general care that a patient needs depends on (*a*) 'stage' of the disease; (*b*) kind of sickness; (*c*) patient's age; and (*d*) doctor's directions.

(*a*) The 'stage' of the disease refers to the length of time that the person has been ill and to the progress that he has made towards recovery. 'Stage' also refers to 'acute', 'sub-actue' and 'chronic' conditions. The general care that a person receives during the acute stage of a disease isvital for his recovery.

(*b*) The general care that a person needs during an illness depends on the diagnosis, the individuality of the patient and the doctor's directions.

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(*c*) The basic needs of a sick child are the same as those of an adult. The sick child may be wholly dependent on the person who cares for him. All nursing procedures should be adapted to the individual needs of the patient.

(*d*) The doctor's orders are a guide to the special care of the patient. No medicine should be given or taken except on the doctor's advice.

There are many things that you can do to help meet the needs of a person during and after an illness.

BASIC RULES FOR ACUTE ILLNESS

During acute illness, say, high fever, the basic rules to be followed are :

1. Make the patient comfortable in a bed. Rest and sleep help in restoring strength and in preventing damage to the heart and other internal organs.
2. Get a qualified doctor to see the patient.
3. Do not give any medicine without the doctor's orders. Medicine given before an examination may change the symptoms and distort the diagnosis. Strong cathartics such as castor oil may cause the intestines to break open.
4. Keep the patient away from other people as the disease may be contagious.
5. Empty all body waste, such as vomit, stools or urine, in a latrine or ground hole. In the case of a hole, cover the waste with lime and soil. Burn or bury all sputum.
6. Boil all dishes that are used by the patient and keep them separate. Use a leaf if possible and burn it after each meal.
7. Keep a hand-washing pot and soap near the sick area and wash your hands before and after you do anything for the patient.
8. Keep the patient quiet.
9. Reassure the patient.
10. Give boiled water, fruit juices, soup and *canji* to the patient in small amounts but often.

ISOLATION

Let us assume that Shrimati Rao, the mother of a family, is sick with a high fever and that she has been taken to the health centre where the doctor says that she probably has typhoid fever and a heart disease. He has ordered rest in bed; liquid and soft diet ; tablets to be taken once in every four hours ; and an enema daily when the bowels do not move. The Extension worker must first get a nurse and demonstrate the procedures. Then those procedures must be practised under *nursing supervision* before attempting to carry them out independently and before teaching them to others. Typhoid fever is a communicable disease, so the patient must be isolated to prevent the spread of the disease.

An isolation unit is made in the following way :

1. Select a separate room, if one is available. If one whole room is not available, curtain off one section of the room or verandah where Smt. Rao will be alone.

2. Put all the things she needs in her room or area, such as eating utensils, water jug, bathing things, bed-pan and medicines.
3. Place a jug of water, a wash-basin and soap near the door of the sick area for washing your hands.
4. Explain the arrangements to Smt. Rao so that she is not frightened but cooperates and thus helps in preventing the disease from spreading.

Hands must be washed before and after doing anything for Smt. Rao to prevent the spread of the disease. The following important points must be remembered while washing hands :

1. Remove all rings and bangles.
2. Make someone pour a little water over your hands.
3. Rub your hands over a bar of soap and work up a good lather.
4. Rub between fingers and nails. Wash hands and wrists.
5. Rinse the soap.
6. Rinse the hands thoroughly.
7. Dry the hands on a soft, clean cloth or hold them in the air to dry (depending on the weather). Drying the hands thoroughly helps in the prevention of chapping.

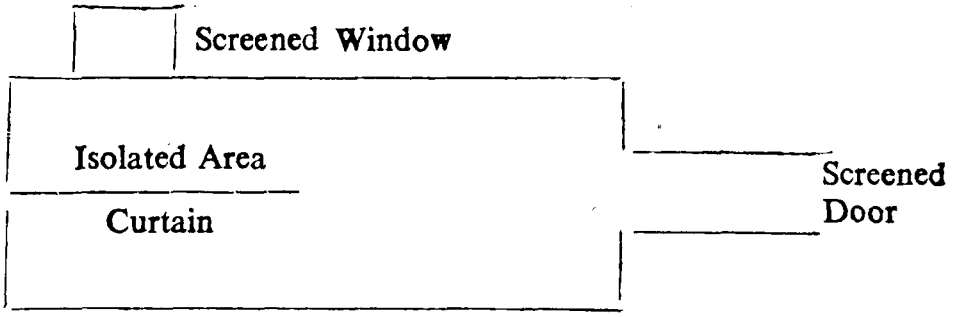

FIG. 1. ARRANGEMENT FOR THE ISOLATION OF A PATIENT

TAKING THE TEMPERATURE

The temperature indicates the amount of heat in the body. A thermometer is used to measure the temperature. Temperature may be taken from the mouth, the armpit or the rectum depending on the condition and age of the patient. Children's temperature should be taken from the rectum. Rectal temperature is more accurate than mouth temperature. The normal temperature when taken from the mouth ranges between 98° and 99° F. Rectal temperature is 1° F higher than that from the mouth and the armpit temperature is 1° F lower than that from the mouth.

A thermometer is a slender glass tube containing mercury. Thermometers have two parts: (*a*) the bulb end which holds the mercury and is the part that is put in the mouth, under the arm or in the rectum, and (*ii*) the glass tube with lines and numbers written on it. A column of mercury can be seen through a ridge that extends along the length of the tube. The long lines on the tube of the thermometer are the degrees. The short lines indicate two-tenths of a degree.

Reading the Thermometer

1. Stand so that the light falls from the back over your shoulder.
2. Hold the thermometer by the top (the end opposite the bulb).
3. Turn the right side towards you. Raise your hand to the level of your eyes.
4. Roll the thermometer back and forth until you see the mercury clearly. The end of the mercury column indicates the temperature.
5. Look at the line closest to the end of the mercury column. If it is one of the short lines, notice the nearest long degree line towards the bulb end. The temperature reading is that degree and 2, 4, 6 or 8 tenths of a degree. You write it down as 98·2°, 100·4° or 101°, as registered on the glass-tube.

Shaking down the Mercury

1. Hold the top end of the thermometer firmly with your thumb and the first two fingers.
2. Shake the thermometer with a wrist movement. Be careful not to drop the thermometer or strike it against anything when you shake it. Thermometers are easily broken and they are costly.
3. Read the thermometer and when it registers 96°, it is ready for taking the temperature.

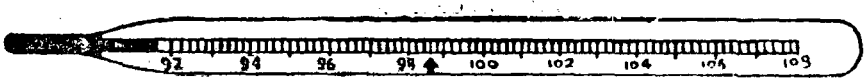

FIG. 2a. THE CLINICAL THERMOMETER

FIG. 2b. READING THE THERMOMETER

Taking Mouth Temperature

1. Make the patient sit or lie down.
2. Explain the procedure to the patient. Demonstrate how to hold the thermometer under the tongue and with the lips. Warn the patient not to bite or hold the thermometer with his teeth.
3. Place the bulb end of the thermometer in the mouth, well under the tongue and to one side. Instruct the patient to breathe through his nose and to keep his lips tightly closed.

4. Leave the thermometer under the tongue for three minutes or until you slowly count 180. It takes three minutes for the thermometer to register temperature accurately.
5. Remove the thermometer after three minutes and clean it with a wipe. Hold the wipe firmly around the thermometer and, using a rotary motion, wipe from your finger tips to the bulb end. (Wipes are small pieces of cloth or absorbent cotton-wool).
6. Read the thermometer and note down the temperature reading on a chart for the doctor.

Taking Axillary Temperature

The axillary (armpit) temperature is the least accurate of the three methods. This method is, however, the safest as there is less chance of spreading infection when the temperatures of more than one person are taken with the same thermometer. For readings, the following steps must be carefully taken :

1. Follow instructions about reading the thermometer and shaking it down to 96°F.
2. Dry the thermometer with a clean wipe.
3. Dry the area under the arm.
4. Place the bulb end in the armpit and make the person press his arm gently but firmly against his body.
5. Leave the thermometer in this position for ten minutes.
6. Remove the thermometer, read it and clean it.
7. Write the temperature down on the chart and add the word 'armpit' to the reading.

The following important points must be remembered :

1. Wash your hands before and after taking the temperature.
2. Always use a clean thermometer.
3. Follow each step in the procedure accurately.

Taking Rectal Temperature

Rectal temperature is taken for children, for unconscious adults and for persons whose mouths are sore or who have undergone mouth surgery. A different type of thermometer is used for rectal temperature. The rectal thermometer may have a blunt instead of a pointed bulb or the bulb may be red instead of silver. A little oil will be needed to lubricate the thermometer.

The method is as follows :

1. Explain the procedure to the person if he is old enough to understand.
2. Smear some oil, such as coconut oil or gingely oil, on the bulb end of the thermometer so that it will go into the rectum easily, without irritating it.
3. Have the person turn on his side and then separate the buttocks.
4. Insert about one inch of the bulb end gently into the rectum. Hold it in place for three minutes.
5. Remove the thermometer, wipe it clean and read it. Clean it thoroughly ;

shake the mercury down and replace it in the container. Note down the temperature on the chart and add the word 'rectal.'

Cleaning the Thermometer

Always clean the thermometer in the following way immediately after it has been used.

1. Grasp the thermometer at the top, with the bulb end pointing downwards and hold it over a waste pot.
2. Moisten the wipe with cold water and soap it well. Using the wipe, begin rubbing at the top of the thermometer and rub down with a rotary motion. Use friction to reach the grooves on the tube and over the bulb. Discard the wipe.
3. Moisten another wipe with clean cold water and rinse the thermometer thoroughly using the same stroke as above.
4. Place the thermometer in a container of water ready for use. If possible, each patient should have a separate thermometer.

Counting the Pulse

The heart pumps blood through the blood vessels to all parts of the body. At certain points in the body such as the wrist, the blood vessels can be felt with a slight pressure of the finger tips. This is called the pulse.

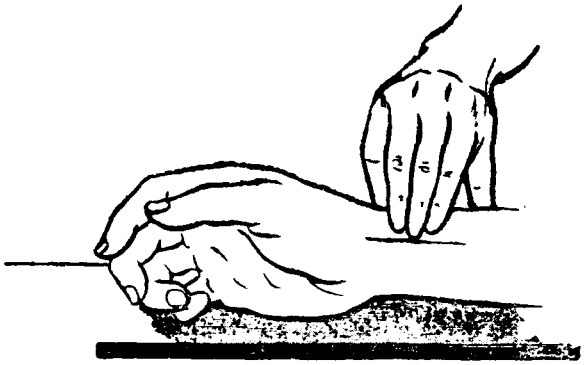

FIG. 3. THE CORRECT METHOD OF FEELING THE PULSE

The heart 'beats' about 70 to 80 times a minute in normal adults and faster in young children. The normal heart beat is regular and each beat is of the same length, like the ticking of a clock.

Take the following steps to count the pulse of a patient :

1. Ask the petient to sit or lie down.
2. Make him rest his hand and forearm on the bed, on his knee or on the floor.
3. Find the pulse by putting your first two fingers on the palm side of his wrist towards the thumb.
4. Press your fingers lightly until you feel the pulse.
5. Count the pulse for one full minute.
6. Write it down on the chart.

ELIMINATION

When a person feels helpless during the acute stage of sickness, then the attendant should keep some vessel at the bedside for urine and bowel motions. A bed-pan may be borrowed from the hospital or health centre. A bed-pan may be made from the materials that are found in the home. It must have a smooth glazed surface that will not absorb moisture. If such a pan is not available, a pan may be lined with a large leaf. Discard the leaf with the body waste. Place a cloth or cotton pad at the back of the pan to prevent injury to the skin. The skin on the back and buttocks of the patient may break and become sore if it is not carefully protected. Make every effort to get a bed-pan as part of the 'village aid equipment.'

The following rules must be observed while using a bed-pan :

1. Bring a clean and covered pan to the bedside.
2. Place a pad under the patient to protect the bed from getting soiled.
3. Flex the patient's knees, place your left hand under the small of her back and help her lift her hips. With the right hand, slip the bed-pan under the hips and adjust for comfort. Leave the patient alone on the pan until she has finished.
4. Pour warm water over the vulva and rectal area after she has finished with the pan. Dry the parts thoroughly.
5. Remove the pan. Be careful not to spill the contents. When the patient is able to do so, she should place and remove the bed-pan herself.
6. Turn the person on her side, and clean and dry the rectal area using soap and water as indicated.
7. Inspect the back and buttocks for evidence of redness or soreness. Turn the helpless person frequently to prevent pressure sores.
8. Look at the contents of the pan for evidence of blood or pus. If blood is noticed, save the contents of the pan for the doctor to look at.
9. Clean the pan immediately after use in the following way :
   (*a*) Empty the pan in the latrine and flush. If no latrine is available empty it in a dug hole and cover with ash, lime and soil.
   (*b*) Rinse the pan with cold water.
   (*c*) Cover the pan with gauze and put it in the sun to dry (the gauze prevents flies from coming into contact with the pan).
10. Wash your hands with soap and water.
11. Take water and soap to the bedside of the patient to wash her hands.

Giving Enema

An enema should not be given to a sick person without the directions of a doctor. A cleansing enema is given to wash out the lower bowels by allowing a solution to run into the bowel through the rectum.

The following things are needed for an enema :

1. An irrigating can or bag and funnel.
2. About three feet of tubing connected to the can.
3. Connecting top.

4. Rectal tube or enema tip.
5. One quart of enema solution. You may use a soap solution, a salt solution or plain warm water. Ask the doctor about the kind of solution to be used.
6. Oil to lubricate the enema tip or rectal tube.
7. A mackintosh or other protector for the bed.
8. A pot of warm water, wash cloth and towel to clean the patient after the enema.
9. An improvised bed-pan, if a commercially made bed-pan is not available.

An enema is prepared in the following way :

1. Test the enema can or bag for leaks. Test the stop-cock to see if it 'holds' properly.
2. Join the tubing to the can. Put the connecting tube on the free end, and place the stop-cock on the tube.
3. Make the enema solution. If you are using a soap solution, use a mild white soap to prevent irritation of the mucous membranes. If you are using a salt solution, use two tea-spoonfuls of salt for each quart of warm water.
4. Close the stop-cock and pour the warm solution into the can and take it to the bedside.
5. Explain to the person what you will do and how she should cooperate with you. Explain why you are giving her an enema.
6. Wash your hands.

The following steps are necessary before an enema is given to the patient :

1. Make the person turn on her side. Move her hips near the side where you will work.
2. Place the mackintosh or some other bed protector well under her hips.
3. Place a towel or a piece of soft washable cloth over the mackintosh. Keep the patient covered to prevent exposure.
4. Hang the enema can on a peg or make someone hold it about 12 to 18 inches above the level of the hip.
5. Open the stop-cock and allow a small amount of the solution to run over the inner part of your wrist to expel air from the tube and to test the temperature.
6. Pour a small amount of oil over the rectal tube or enema tip for lubrication.
7. Hold the rectal tube about five inches from the tip. Gently push about four inches of the tube into the rectum and hold it. If the person is well enough, she may insert the tube herself.
8. Open the clamp and let the solution flow slowly. If the patient complains of cramps or says she must expel the solution, tell her to breathe deeply through her mouth. Pinch the tube to stop the flow until the cramp is relieved.

9. When most of the solution has run in, close the clamp.
10. Take the rectal tube out of the rectum and allow the rest of the solution to run through the tube into the pan.
11. Wrap the tip of the rectal tube in a piece of paper or a leaf; the tip is dirty.
12. Turn the patient on her back and place the bed-pan well under her buttocks and in a comfortable position. Urge the patient to hold the solution for three or four minutes before expelling it into the pan.
13. Stay with the patient or within her call, until she expels the enema.
14. Remove the bed-pan and cover it ; set it aside until you clean the patient.
15. Help the patient wash the rectal area. This may be done as a flush or irrigation before the pan is removed.
16. Help the patient wash her hands with soap and water.
17. Remove the bed-pan ; note the contents for evidence of blood or pus.
18. Wash your hands with soap and water.
19. Return to the patient ; remove the mackintosh (or bed protector).
20. Make the patient comfortable.

The enema equipment should be looked after as follows :

1. Empty the contents of the bed-pan in the latrine or a dug hole. If you pour the contents in a hole, you should cover them with soil, lime or ash.
2. Rinse the pan with cold water and pour the rinsings in the latrine or hole.
3. Cover it with a thin gauze to keep flies away. Put it in the sun to dry.
4. Clean the enema can or bag. Rinse it with cold clean water and allow it to hang.
5. Wash the enema tip or rectal tube in cold water, then wash it with soap and water. Rinse thoroughly and put it in the sun to dry.

ADMINISTERING MEDICINE

The doctor may order a liquid medicine and some tablets for Smt. Rao, and tell you that the liquid medicine is to be given three times a day after eating and the tablets are to be given every four hours day and night. The following instructions will help you in administering the medicine properly.

Medicines are usually given by mouth or by injection. Injections are to be given only by doctors and nurses. Medicines come in the form of liquid, tablets, capsules, pills or powders. Tablets, capsules, pills and powders are nearly always given with a full glass of water. Liquid medicine may or may not be given with water. For example, cough syrup and other syrup medicines are taken without water while most other liquid medicines are more effective when taken with water. Powders are generally dissolved in a spoon of water and swallowed with a glass of water. Medicine may also be given by irrigation, by inhalation, by rectum, by absorption through the skin or by injection in the vein.

Medicines can be classified into those meant for internal use and those meant for external use. The latter may *kill* a person if taken *internally*. Medicines can

also be classified into '*poison*' and '*non-poison*' medicines. The following rules about medicines must be learnt, practised and taught :

1. Medicine should be taken only on the doctor's advice.
2. All medicines should be kept locked in a box and placed on a high shelf so that children do not have access to them.
3. All medicines should have their names labelled on them.
4. All medicines should have written directions on the label to show how much and how often they are to be taken.
5. You must always follow the rules of the '*Five Rights*' while giving medicine, namely : Give the
   (i) *right* medicine to the
   (ii) *right* person at the
   (iii) *right* time in the
   (iv) *right* amount by the
   (v) *right* method.

A liquid medicine should be given in the following manner:

The things needed are (i) the medicine ordered by the doctor ; (ii) a measure (spoon or glass) ; and (iii) a glass of water.

Here are the rules to be observed while giving liquid medicines :

1. Read the label.
2. Shake the bottle ; remove the bottle top.
3. Hold the bottle with the side on which the label is pasted touching your palm. This prevents the medicine from spilling on the label and spoiling it.
4. Measure the dose of medicine as directed by the doctor, using a spoon or some other measure.
5. Pour the dose into the empty glass and add at least two spoonfuls of water.
6. Give the dose of medicine to the patient.
7. Give a glass of water, unless directed otherwise.
8. Give cough syrup directly from the spoon ; do not add water.
9. Keep a record of what you gave, the amount you gave, and when you gave it.

Here are the rules to be observed while giving a pill or tablet.

1. Read the label and the directions.
2. Give the person a drink of water.
3. Give the person the pill and another drink of water.
4. Record as in No. 9 above.

After the medicine has been given, wash the spoon and glass with soap and water and rinse. Place it near the bed ready for use again.

CHAPTER 7

COMMON DISEASES

Most illnesses occuring in Indian villages today can be prevented. Each disease has a cause and related factors that contribute to it. For example, tuberculosis is caused by the tubercule bacillus which is its pathological cause. Over-crowding, poor sanitation and poor nutrition contribute to the development and spread of the disease. If we are to teach the villagers how to prevent such diseases, we must first know the contributory causes and try to eliminate them.

DISEASE GERMS

Most of the common diseases found in the village are caused by bacteria, viruses or parasites. Bacteria, viruses and some parasites are so small that they cannot be seen except through very strong magnifying glasses. Thousands of people die each year and many more fall ill because of diseases caused by these tiny enemies. One can get away from a mad dog, a tiger or a cobra because one can see or hear it. Disease-causing bacteria, viruses and parasites are just as deadly, and kill many more people. Learning about them will help us in avoiding or destroying them, just as we would avoid or destroy the cobra, tiger or mad dog.

Breeding Places

Bacteria, viruses and parasites are living organisms and, therefore, like every other living being, they need food, water and warmth. The human body is a favourable place for disease-producing organisms to live and breed in. Bacteria and viruses live outside the body in food, milk and water. And they live in other foods that are allowed to stand in a warm, dark and damp place. They also live in pus and dirt. Some organisms live in the bodies of animals and insects.

Mode of Growth

Bacteria reproduce other bacteria by dividing themselves into halves. Under favourable conditions, one bacterium becomes two in about 15 minutes; then these two become four and those four become eight and so on, as long as favourable conditions for growth exist. Most bacteria are very delicate and only very few survive. But some bacteria such those of tetanus are tough and it is very difficult to destroy them. The tuberculosis organism is covered with a wax coat which makes it difficult for us to kill it. It may live for many months in the dirt and dust on the walls of a dark house.

Destruction Methods

1. Methods which destroy disease-causing organisms without fail are.

Burning : Heat destroys bacteria.

Boiling : Drink boiled water to be safe from bacteria and virus infections. Boil the clothes and utensils used by infected persons.

2. Some organisms are destroyed by:

Drying : Most organisms need water. Drying robs the organisms of water.

Burying : Body wastes such as faeces, urine and sputum should always be deposited where flies cannot reach them—in the latrine or in a dug-out hole. All body wastes contain some bacteria that may cause disease. Burying robs the bacteria of the oxygen and food needed for growth.

3. Certain chemicals, provided they are applied in the proper strength and for the proper length of time, will destroy organisms. They are:

Soap and ash : Soap is an excellent chemical agent for destroying germs. Wood ash is another chemical agent that destroys bacteria. Soap and ash are most effective when used to rub and scrub an area. Ash is generally used for cleaning dishes. When sand and mud are used with ash, they must first be put in the fire to kill the bacteria and parasites present in them.

Chlorine : Treated water usually contains chlorine, a chemical that destroys cholera, typhoid and dysentery germs. Chlorine may not destroy viruses as shown by the Delhi jaundice epidemic in 1955-56. The amoeba also survive chlorination.

Entry into the Body

Disease-producing organisms get into the body through the following routes:

1. *Mouth :* Foods that contain pathogenic organisms may be eaten.

(*a*) Hands and fingers carry many germs and most people use the fingers of the right hand to eat their food. When boiling water and soap are not used to make eating utensils clean and safe, eating with the hand is better than using a fork and spoon. Finger nails must be kept short and clean. Hands should be washed with soap and water before eating. Hand washing facilities must be provided in schools and hostels so that the habit of washing hands thoroughly and often will be developed.

(*b*) Germs get into foods which stand in the open and are exposed to dust and flies. They are in the spray from the mouth of a person who speaks over and across the food kept for sale in the bazaar. The food-seller generally picks up food with hands that may have typhoid or dysentery germs on them. Raw food must always be heated or dipped in hot water before eating. In this way, pathogenic germs that cause cholera, typhoid and dysentery would be destroyed.

2. *Skin* : The skin is a protective covering for the body:

a. When the skin is cut or broken, germs get in and cause local infec-

TABLE 7—*contd.*

Preventive Measures	*Malaria*	*Filaria*	*Typhus*	*Plague*	*Dengue Fever*	*Kala-Azar*	*Encephalitis Jap. 13*
(*c*) Drain stagnant water; build soakage pits ..	x	x		x	x	x	x
(*d*) Sleep under a mosquito net	x	x			x		x
(*e*) Screen your house with fine mesh wire	x	x			x	x	x
2. Destroy rats and other rodents—							
(*a*) Store all grain in metal or mud pots away from rats			x	x			
(*b*) Set traps, catch rats and rodents			x	x			
(*c*) Use rat poison			x	x			
(*d*) Inoculation			x	x			

TABLE 8.

PREVENTION OF DISEASES CAUSED BY DIRECT CONTACT

Preventive Measures	*Syphilis*	*Gonorrhoea*	*Other Venereal Diseases*	*Yaws*	*Leprosy*	*Scabies*	*Empetigo*	*Head and Body Lice*	*Eye Infections*
1. Avoid sexual contact with a person who has any kind of sore on his or her genital parts and mouth	x	x	x	x	x		x		
2. Avoid sexual contact with a person who has any discharge from his or her genital parts ..	x	x	x						
3. Avoid all sexual contact except with your spouse	x	x	x						

TABLE 8—*contd.*

Preventive Measures	*Syphilis*	*Gonorrohea*	*Other Venereal Diseases*	*Yaws*	*Leprosy*	*Scabies*	*Empetigo*	*Head and Body Lice*	*Eye Infections*
Have your and your would-be spouse's blood tested before marriage									
5. Secure professional medical treatment when any sore or discharge develops ..	x								
6. Secure specific treatment from your Health Centre or from a qualified doctor until cured ..	x	x	x	x	x	x	x		x
7. Stay away from other people when you have sores and or discharge from any part of the body	x	x	x	x	x	x	x	x	x
8. Keep clean through frequent washing with soap and water ..	x	x	x	x	x	x	x	x	x
				x		x	x	x	x

TABLE 9

PREVENTION OF DISEASES CAUSED BY CONDITIONS OTHER THAN THOSE LISTED IN TABLE NOS. 5, 6, 7 AND 8

Preventive Measures	*Tetanus*	*Guinea Worm*
1. Avoid injuries from rusty nails and other injuries to the skin ..	x	
2. Use boiled scissors or a blade that has been heated until it is red to cut the cord of the new-born baby	x	
3. Use a boiled thread to tie the cord of the new-born baby	x	
4. Seek medical care if you injure your foot or hand while working in the field	x	
5. Get immunized	x	
6. Drink boiled water		x
7. Avoid stepping into wells and tanks that contain guinea worms ..		x
8. Use safe water from a 'safe well'		x

CHAPTER 8

MOTHER AND CHILD

This chapter deals with the scientific care of the expectant mother and of the baby from its birth to one year. The community worker works with prospective mothers, with mothers and with grandmothers. Expectant mothers and children are among the most important people in any village, and anything done for and with them will add to the Extension worker's prestige. People will have a greater confidence in her work if she has an understanding of children and can help in keeping them healthy. The objective of this chapter is to describe, very briefly, (*i*) the essentials of maternity and child care, (*ii*) the basic problems of mothers and children, and (*iii*) what the community worker should teach about maternity and child care.

The community worker should study government bulletins and other publications about the normal child, and about antenatal care, so that she will have a more complete and correct knowledge about mothers and children.

ESSENTIALS OF MATERNITY CARE

In India, as in many other countries, services for mothers and babies were started by the Red Cross and other volunteer groups. The early services provided medical supervision for the mother during pregnancy and home services by midwives and health visitors. Today, the Government provides a nation-wide service for mothers and babies. There is a Director of Maternal and Child Health at the Centre and a Director of Maternal and Child Health in the Public Health Departments of most states and large cities. To cooperate fully and to help in promoting the programme of national and child health, the Extension worker should understand the goals and objectives of the programme which are as follows:

1. To provide an organized programme of service in each village, town and city.
2. To provide adequate facilities for medical supervision during pregnancy and childhood.
3. To provide trained personnel to render effective services.
4. To bring every expectant mother under medical supervision.
5. To provide complete services to all mothers and babies.
6. To teach mothers the methods of caring for themselves and their children.
7. To administer the programme as an integral part of the total health programme.
8. To conduct research in the field of maternal and child health.
9. To train midwives, *dais*, health visitors and public health nurses.
10. To make policies, establish standards, plan legislation and enforce regulations.
11. To provide an active educational programme of disease prevention.
12. To help in providing adequate food for mothers and babies.

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Some basic essentials of maternity care include:

1. Advisory services for girls in high schools and colleges for community groups. This is designed to explain to expectant mothers and fathers:
   (*a*) the responsibilities of parenthood,
   (*b*) the importance of family planning,
   (*c*) the physiological function of the reproductive system, and
   (*d*) the community resources for mother and child care.
2. Facilities:
   Clinics, health centres, hospitals and maternity homes are located in various parts of each State and city; here mothers and children can have continuing medical supervision to prevent sickness and to provide treatment when needed.
3. Personnel:
   The Government has plans to provide enough doctors, nurses, health visitors and midwives to render health services and education to the whole family. The following additional health personnel are needed: doctors, nurses, health visitors, midwives, trained *dais* and sanitarians. The village worker can be of great assistance in this programme by helping to recruit personnel, by teaching mothers, and by cooperating with the health visitors, midwives and others.
4. Birth registration for every child.
5. To help all mothers and children get enough of the right kind of food to maintain health.
6. Cooperation with the total health programme to ensure a safe environment for mothers and babies. The infant death rate is an index of the efficiency of the sanitary services in the community.
7. Other essentials of a maternal and child health programme dealing with administration, legislation and research.

BASIC PROBLEMS OF MATERNITY

Maternal and child health problems are generally related to (*i*) ignorance, (*ii*) superstition and (*iii*) poverty.

Most village women are intelligent. They are also greatly interested in everything that makes them feel better particularly during the maternity cycle. They are ignorant only because they have never had a chance to learn the scientific truths about themselves. About 10 to 12 mothers die for every 1,000 live births due to ignorance, superstition, traditional practices and the absence of maternity centres or adequately trained midwives. The delivery itself is often considered to be unclean.

The woman is placed in a dark corner of the room. Old dirty saris and other clothes that are not clean are used during the delivery. Germs that are on the dirty clothes infect the birth canal and cause the fever that many women develop after delivery. Many deaths are caused by such infection. Many women do not come to the mater-

nity centre or clinic until they are in the ninth month of pregnancy. They are ignorant of the importance of medical supervision which will prevent swelling and fits during and after pregnancy. There are many other examples of the ignorance which causes mothers to die. The community workers must find out the prevalent beliefs, practices and superstitions about maternity and infant care before she gives advice and help.

In India, about 120 to 150 babies die out of every 1,000 babies born alive. Many of these deaths are due to ignorance, superstition and such faulty health practices as those discussed in the preceding paragraph. Many babies are weak and die because they are immature at birth. Most babies are strong at birth. The main health problems during childhood are bad nutrition, dysentery, diarrhoea, whooping cough and diphtheria. Many children are sick and weak because they do not get enough of protective foods like eggs and groundnuts. Most Indian babies are breast-fed. This is the best food for young babies but they also need additional foods that build and protect their bodies during this period of rapid growth.

SOME FACTS ABOUT MATERNITY

The community worker should have a good knowledge about maternity and child care and use it to the benefit of the people among whom she works. Some facts about maternity are given below:

Maternity refers to a cycle that begins when the male and female cells unite to form a new life. There are two kinds of cells, namely, body cells and reproductive cells. Body cells keep the body alive. Reproductive cells are concerned with the unborn children.

During sexual intercourse, sperms from the father are deposited in the vagina of the mother; sperm cells then travel up through the cervix and the womb to the tube where one of the sperm cells enters the ovum. This is called fertilization. The whole process is discussed in the following pages in the form of a dialogue.

1. Where do the female cells come from ?
   The female eggs are stored in the ovaries. There is one ovary located under each tube.
2. What do ovaries do ?
   (*i*) From the ages of 12 or 13 up to the time a woman is 45 to 50 years old, the ovaries, in addition to other functions, discharge one egg each month.
   (*ii*) The egg travels through the Fallopion tube to the womb. It takes about eight days for the egg to reach the womb. It is during this period that the woman may get pregnant. If pregnancy does not take place, then she menstruates.
3. Where do the male cells come from ?
   Sperm cells are formed in the testicles, located in the scrotum which is located behind the penis.
4. What do the testicles do?
   (*i*) The testicles are made up of little tubes.

(*ii*) When the boy is about 14 or 15, sperm cells form along the inner side of these tubes. Thousands of sperm cells are formed at a time. Sperm cells are discharged through the seminal fluid.

5. What is seminal fluid ? — The seminal fluid is a creamy white substance containing the sperm cells. The seminal fluid quite frequently overflows at night. This discharge often frightens the young boy unless he understands to what it is and why it comes out. When it begins flow, it means that the boy is ready to be a father.

6. How do the female and male cells get together? — When a man and his wife 'mate' or unite, the sperm cells enter the mother's body through the vagina. Then they travel up through the cervix and the womb to meet the female egg in the tubes. This is called fertilization.

7. What happens next ? — The fertilized cell divides into two cells, then four, then eight and continues to multiply. This is called cell division.

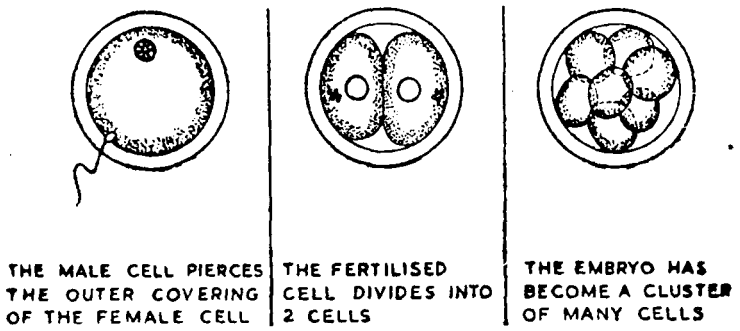


FIG. 4. DIFFERENT STAGES OF FERTILIZATION

8. Where does the baby come from ? — (*i*) The fertilized cell travels from the tube to the womb, where it continues to grow and develop into the baby.

(*ii*) The fertilized egg attaches itself to the lining of the womb where two protective coats are formed. The outer coat is a tough bag attached to the wall of the womb. The inner coat is filled with a watery fluid to protect the baby from getting bruised or hurt.

9. How does the baby get food and air? — (*i*) In the second week after conception, many little finger-like structures (like the roots of a plant) grow from the outer covering into the lining of the womb. These small roots, together with the place in the womb where they attach

themselves, from the placenta.

(ii) The placenta and cord grow as the baby grows.

(iii) The 'roots' grow down into the wall of the uterus and lie near blood vessels.

(iv) Blood vessels from the baby's body run through the navel cord out into placenta.

(v) Food from the mother passes through the walls of blood vessels into the placenta.

(vi) Food is carried to the baby by the blood vessels in the cord.

(vii) Waste products from the baby pass through the blood vessels in the cord to the placenta, and from there to the mother.

(viii) The baby gets oxygen from the mother's blood. He does not use his lungs till he is born.

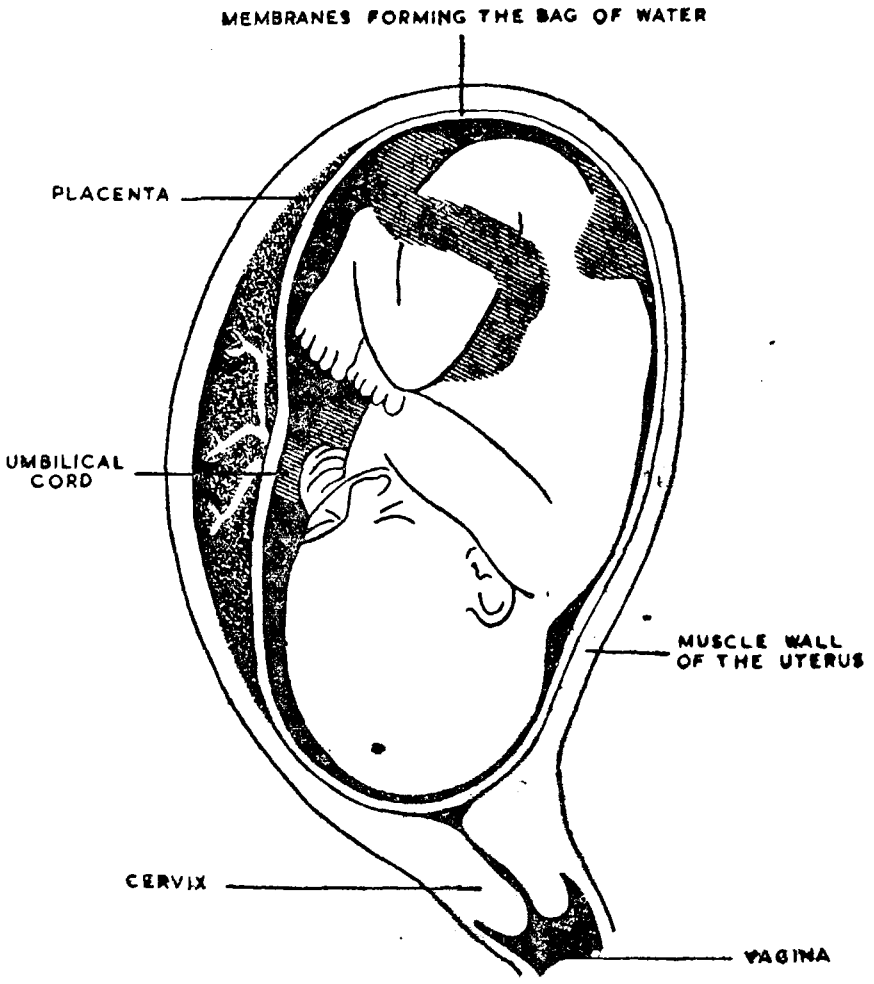


FIG. 5. A FULL-GROWN CHILD IN UTERUS

10. How is sex determined ? — Scientific studies indicate that the male cells determine the sex of the baby.

11. How fast does the baby grow ? — Growth depends on a number of factors.

SIGNS OF PREGNANCY

1. How can one tell that a woman is pregnant ?
   (*i*) Menstruation or the monthly period stops.
   (*ii*) There may be slight nausea and vomiting early in the mornings.
   (*iii*) She will have to pass water oftener than usual.
   (*iv*) Movements of the baby begin at about the fourth month.
   (*v*) Swelling of abdomen.

The following Table describes the developmental stages of the child before birth:

TABLE 10

DEVELOPMENTAL STAGES BEFORE BIRTH

Weeks	*Length in Inches*	*Weight*	*Development*
End of 4th week	1/6	—	Heart, liver, digestive tract, brain and lungs are being formed.
5th to 6th week ..	—	—	Backbone and head develop faster than other parts; legs and arms begin to grow; abdomen is large due to rapid growth of internal organs.
7th week	—	—	Ears and eyelids are being formed.
8th to 12th week ..	2½	½ oz.	Placenta and membranes around the baby have been completely formed.
12th to 16th week ..	4-5	4 oz.	Hair begins to grow; teeth are under formation; external sex organs have been formed; muscles become active.
17th to 21st week ..	8	12½ oz.	Heart beat can be heard by the doctor; mother feels fluttering in the abdomen.
22nd to 38th week ..	17-18	5-7 lb.	Abdomen enlarges rapidly (the mother should gain about 15 to 20 lb. during this time).
6th to 7th month ..	—	—	Movements are felt as the baby moves around. Baby takes one position (usually) either head up or down and may keep this position until birth.
8th to 9th month ..	—	—	The baby's body forms and it rounds out into normal proportions.

A woman who has conceived will suffer from mouth watering, morning sickness,

constipation, muscle cramps, heart burn and backache. To overcome these the following precautions should be taken.

1. Mouth watering	Eat small amounts of dry foods frequently. This will stop mouth watering after a short time.
2. Morning sickness	(*i*) This does not always happen and usually stops in three months. Discuss with the doctor if vomiting continues.
	(*ii*) Rest more, but do not stay in bed all day. Move about slowly. Eat a little dry bread or parched gram before you get up in the morning. Do not eat fried foods and sweets.
	(*iii*) Eat six or eight small meals a day. Continue your usual work and activities.
3. Constipation	(*i*) Eat extra fruit and vegetables.
	(*ii*) Drink 8 to 10 glasses of boiled water daily.
	(*iii*) Go to the latrine at the same time every day to form a regular habit.
4. Muscle cramps	(*i*) Cramps may be caused by the pressure of the baby on the large blood vessels resulting in a slowing up of circulation in the legs.
	(*ii*) Cramps may be relieved by rubbing the legs gently and by bending the foot forward. Hot applications may also help.
5. Heart burn	(*i*) Heart burn is a kind of indigestion.
	(*ii*) Discuss with the doctor. Do not take soda or other medicines unless the doctor tells you to do so.
6. Backache	(*i*) Backache is due to the increased weight and pull on the back muscles. This causes a shift in body balance.
	(*ii*) Rest more; consult the doctor.

DIET DURING PREGNANCY

Teaching the mother what to eat and helping her to get the right variety and amount of food is probably one of the most important jobs that the community worker can accomplish. Many women are anaemic (have insufficient red blood) during and after pregnancy. Anaemia is a serious factor in the high maternal death-rate in India.

The importance of eating a balanced diet cannot be over-emphasized. The baby gets his food through the mother's body. Therefore, what the mother eats influences the development of the child as well as the general fitness of the mother during and after delivery. A new life is being built during pregnancy and, therefore, the mother must have foods that are rich in protein, iron and calcium and all the vitamins. This

subject has been discussed in detail in the following section.

Every pregnant and lactating mother needs the following food every day;

Milk

One seer of milk, in the form of fresh or powdered milk or the equivalent in curd or cheese is needed daily. Milk supplies protein and nearly all the calcium needed to build the baby's teeth and bones. Milk also provides vitamin B complex. The health centre may provide some milk and calcium tablets for expectant mothers.

Fruits and Vegetables

Some raw fruits and vegetables should be eaten each day. Raw carrots, tomatoes, some citrus fruits and leafy vegetables supply the vitamin needs of the mother and the baby.

Body-building Foods

Butter supplies the vitamin A that is needed for health. Groundnut, beans and other protein vegetables, fish, poultry and lean meat are also necessary. Fish and the dark parts of all meat are needed to supply building material for the baby and to maintain the mother's strength and resistance. Liver and kidney are especially rich in blood-building materials.

Eggs

Three eggs a week will furnish the necessary iron to build blood.

Energy Foods

Par-boiled rice, *Chapati* and bread are needed to supply energy and vitamin B.

Water and other liquids are needed to keep a good body balance. Drink six to eight glasses of water each day. If the feet and hands are swollen, the mother must see a qualified doctor at once and follow his instruction about fluids.

The important thing about diet in pregnancy is to eat, every day, some foods that build and repair (fish, nuts and beans), some foods that maintain the body balance (water and vegetables), and some energy foods (rice and bread). The mother's and the baby's life and well-being depend on the diet of the mother before and after the baby comes.

DANGER SIGNALS IN PREGNANCY

Nature has a way of warning us of danger during pregnancy. Most people do not have trouble. Some women do have serious trouble which may cause death unless treated by a competent doctor. The community worker must talk with each married woman and advise her to register with the centre for medical supervision as soon as pregnancy is suspected. This is the greatest service that the community worker can do for improving maternity care in the country. Signs of trouble during pregnancy might not be found until the doctor, midwife or health visitor examines the woman. Every woman should be examined by the doctor at regular intervals throughout the pregnancy, and as often as the doctor and health visitor say. The following signs of trouble should be treated as emergencies and the community worker should act according to the following instructions:

TABLE 11

DANGER SIGNS DURING PREGNANCY

Signs of Trouble	*Remedies*
1. Bleeding from the vagina at any time during pregnancy	(*i*) Advise the person to lie down. (*ii*) Find out how much blood is passed off and of what colour. (*iii*) Send word about the bleeding to the trained mid-wife, health visitor or doctor (if available). (*iv*) Help make arrangements to take the woman to the health centre, if advised to do so. The trained doctor can diagnose the trouble and properly treat the patient.
2. Severe vomiting	Urge the woman to see the doctor and to follow his instructions.
3. Headache, dizziness, spots before the eyes or swelling	(*i*) When a woman has any of these signs she is in danger of very serious trouble. These are signs of toxaemia, the condition that causes many deaths. (*ii*) See the doctor at once and follow his instructions.
4. Pain or burning while passing urine	Consult the doctor immediately.
5. Sudden gain in weight, or swelling of ankles, hands or any other part of the body	(*i*) The patient should be weighed regularly, as a sudden gain in weight is a sign of toxaemia. (*ii*) Help the mother to go to the health centre.

GETTING READY FOR THE BABY

Most babies are born at home. Many babies are delivered by untrained *dais*. The Government is providing maternity beds in the health centres where mothers can deliver babies more safely than in many homes. The doctor will decide if a woman should go to the health centre. Women who have any signs of trouble during this pregnancy or have had during previous ones should be taken to the hospital or to the maternity centre. This is one of the many reasons why mothers should have continuous medical supervision during pregnancy. Find every pregnant woman and help her to get registered at the health centre or village clinic for maternity care.

The following steps should be taken as soon as pregnancy is known :

FIG. 6. DEVELOPMENT CHART OF A CHILD

1. Register with the trained midwife at the health centre or village clinic.	(*i*) A trained midwife will deliver the baby more safely than an untrained *dai*. She can prevent infection and excess of bleeding. (*ii*) She can get help if trouble arises, as she knows early signs of trouble. (*iii*) She works under the supervision of the Health Visitor and the doctor.
2. Select a clean working area for the delivery.	(*i*) White-wash the walls and make the floor clean (*ii*) Cleanliness helps in preventing child-bed fever.
3. Make the delivery area light and airy. (This may be a good time to get the home ventilated.)	(*i*) The trained midwife needs light to work and to recognize signs of trouble as soon as possible. (*ii*) The mother and baby need light and air for good health. (*iii*) The family keeps the mother 'isolated' from 10 to 40 days after delivery.
4. Wash several old absorbent saris, sheets or other clothes to be used during the delivery. Wash them with soap and hang them out in the sun to dry. Fold them and put them in a clean box.	Only clean clothes or articles should be used for the delivery. Dirty things have germs on them. These germs may cause child-bed fever or lockjaw.
5. Have boiling water ready when the trained midwife comes to assist in the delivery.	(*i*) The midwife will need boiling water to sterilize the scissors, the cord ties, and the forceps. (*ii*) Sterilized scissors, cord ties and forceps prevent tetanus (lockjaw) and other infections. Many babies die of lockjaw because unsterilized scissors and cord ties are used.
6. Have a warm blanket ready to receive the baby.	(*i*) The new-born baby gets a shock when he is born; for his mother's body is very warm and the air outside is cool in comparison. (*ii*) The new baby must be kept very warm to prevent chill and pneumonia.

CHAPTER 9

ACCIDENTS AND EMERGENCIES

First aid is the immediate care given to a sick or injured person before the services of a doctor can be obtained. Every community worker should own a copy of the Red Cross First Aid Book. This chapter covers very briefly a few first aid measures. The purposes of first aid instruction are (*i*) to develop skills that will enable one to do the right thing, in the right way, at the right time, and (*ii*) to prevent additional injury.

The kind and amount of first aid supplies needed in the school or village depend on whether there is a dispensary or health centre nearby and on the availability of hospital services.

First aid supplies for each village should include: (*i*) Hot water bottles and hot sand bags; (*ii*) absorbent cotton; (*iii*) gauze squares, sterile if possible ; (*iv*) bandages; (*v*) blunt scissors; (*vi*) soap; (*vii*) flat boards for splints; (*viii*) snakebite kit; (*ix*) iodine; (*x*) Dettol; and (*xi*) a lamp.

The speed of action is determined by the condition of the patient. Emergency cases include those that have severe bleeding, those that are badly burnt, those that stop breathing and need artificial respiration, and those that have been bitten by a snake or have been poisoned in some other way. The person's life may depend on how well first aid is rendered. In many cases, hasty action may do more harm than good.

HOW TO RENDER FIRST AID

The following directions are designed to help the community worker approach the problem intelligently:

1. Judge the condition of the patient by the following indications:
   - (*a*) Look for *bleeding*—note the colour and amount of the blood, if any.
   - (*b*) Look at the *breathing*—laboured, shallow or absent.
   - (*c*) Look at the *colour*—blue, pale or flushed.
   - (*d*) Look for *wounds, burns* and *fractures.*
2. Make the person lie down with his head on level with his body or with his feet elevated; and ensure the following things:
   - (*a*) The crowd should be kept away from the patient so that the patient can get as much air as possible.
   - (*b*) Provide protection from the hot sun.
   - (*c*) Remove tight clothing.
3. Keep the person warm:
   - (*a*) Warmth helps prevent shock.
   - (*b*) Avoid overheating; otherwise the patient may sweat and lose body fluid.

4. Observe signs of shock.
   Look for weakness; moist skin; cold sweat beads on the forehead and upper lip; weak and shallow pulse and unconsciousness.
5. Send someone to fetch a doctor, nurse or other professionally trained person.
   (*a*) The messenger should be able to tell the doctor the nature of the accident; the extent of injury; and all that has been done for the patient.
   (*b*) If the patient is unconscious, there is a likelihood of brain injury.
6. Keep the patient quiet and do not move him unless absolutely necessary.
   (*a*) Any movement may cause additional injury.
   (*b*) Allow time for the patient to recover from the first shock of the accident.
   (*c*) The doctor should direct movements.
7. Never give water to an unconscious patient. Water may cause the patient to choke.
   Give hot tea or coffee if the patient is conscious and if there is no sign of abdominal injury.

The following brief outline of emergency care may be used as a guide by the community worker after she has had demonstration and has practised each procedure under supervision and after she has successfully passed a test.

SHOCK

Most injured persons suffer from some degree of shock. Shock means that the body and mind have undergone some damage and are unable to function normally. Shock occurs when a person gets burnt, when a person bleeds too much, when bones are broken, when a person is shot or stabbed, and in cases of snake bite or poisoning.

Causes of severe shock: Wounds or injuries to the chest and head, bleeding, burns, crushing injuries or fractures of bones.

Signs of severe shock :Weakness, faintness, dizziness and nausea.

The *skin* looks pale; hands, face and feet feel cold, clammy and moist with perspiration.

The *eyes* appear vacant and the pupils may get larger.

The *pulse* is fast and weak.

The *breathing* is shallow and rapid.

First aid care of the patient is discussed in the paragraphs that follow:

BLEEDING

1. In all cases of bleeding, apply pressure with your washed hands around the point of bleeding.
2. Apply a clean cloth (hold the cloth over a flame to kill germs) at the site of bleeding; press firmly for 5 to 10 minutes.

3. After 5 to 10 minutes, release pressure and see if bleeding has stopped.
4. Leave the dressing on the wound and apply a tight bandage.
5. Look at the wound frequently to see if the bleeding has stopped. If bright red blood continues to flow, apply pressure again.
6. Elevate the part, if possible.
7. Send for the doctor.

BURNS

Burns are not uncommon in homes where open fires are used for cooking. Shock and infection are the chief dangers from burns. First aid emergency care for *small burns* is as follows:

1. Hold a piece of clean cloth over a flame to kill any germs.
2. Place the flamed side of the cloth over the burn.
3. Take the patient to a health centre, to a private doctor or to the dispensary.

The treatment for *bigger burns* is as follows:

1. If the patient is conscious, give him as much water and sweetened or warm tea as he can drink (small amounts at a time). Add exactly 1 teaspoonful of salt and exactly ½ a teaspoonful of baking soda to each quart of liquid that you make him drink.
2. Take the patient to hospital as quickly as possible:
3. Wrap the patient in a blanket to keep him warm and to lessen shock.

DROWNING

There are many accidents and deaths due to drowning. Many people lose balance and fall into open wells, tanks or rivers.

First aid for an apparently drowned person is as follows:

1. Remove the person from the water and start artificial respiration at once. Send for a doctor.
2. Keep the person warm. The body cools very rapidly, even on the hottest day, when it is covered with wet clothing.

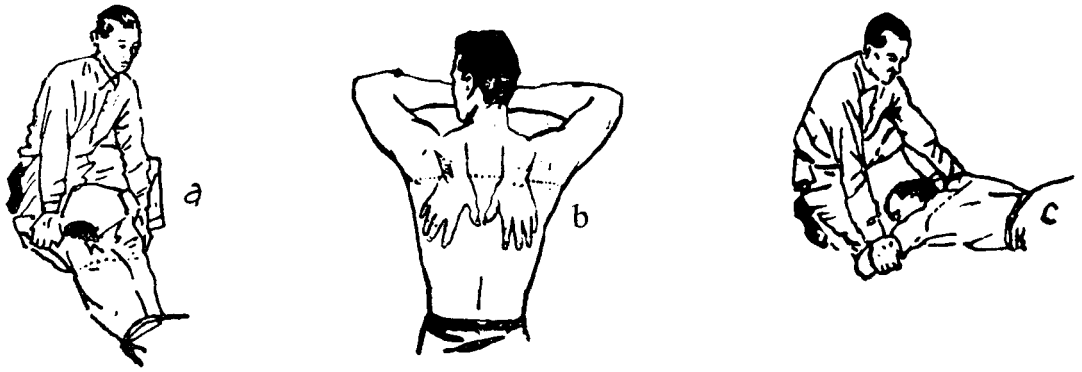


FIG. 7. TECHNIQUE OF ARTIFICIAL RESPIRATION

Artificial Respiration

There are several methods of giving artificial respiration. The method described here has been scientifically tested and found to be the most effective. In normal

respiration, the lungs automatically expand (take in air) and contract (let air out) at regular intervals. In artificial respiration, you stimulate this action.

The following steps should be taken for artificial respiration.

1. Place the person on his abdomen.
2. Bend his elbows and place one of his hands on top of the other.
3. Turn his face to one side and place his cheek on his hands.

Position of the First Aid Operator

1. Face the patient and kneel down close to his head, with one knee on each side of it.
2. Place your hands on the patient's back with the tips of your thumbs touching and the fingers spread out.

Compression Phase

1. Rock forward until your elbows are straight and allow the weight of your upper body to exert a slow, steady and even pressure downward upon your hands. This forces air out of the lungs (like breathing out). You should keep your elbows straight and exert pressure almost directly downward on the back.

FIG. 8. ARTIFICIAL RESPIRATION : a. COMPRESSION PHASE b. EXPANSION PHASE

Position for Expansion Phase

1. Rock backward slowly to release the pressure gradually.
2. Place your hands upon the person's arms just above his elbows.

The Expansion Phase

1. Draw his arms upward and towards you. Lift the elbow just enough to feel resistance at the patient's shoulder.
2. Keep your elbows straight as you rock backward.
3. Lower the patient's arms to the ground.

This completes the cycle. The chest expands when the arms are lifted (the pull on the chest muscles, arching of the back, and the relieving of weight from the chest causes the chest to expand).

Repeat the full cycle 12 times per minute at a steady, regular and uniform rate. Persons have been known to revive after one hour's application of artificial respiration.

Additional Instructions

1. Start artificial respiration as soon as the person is removed from the water.

2. The patient's head should be placed a little lower than his body to allow water to flow out of the mouth more easily.
3. Keep the head extended so that the neck will be straight. If the head falls forward or if the chin falls on the chest, the air passages may be cut off.
4. Remove false teeth and see that the tongue is not blocking the air passage.
5. Keep the patient warm.
6. Have one or two more first aid operators on hand so that each person will work in relays of 10 to 20 minutes each. Maintain the rhythm when changing operators.
7. Keep the crowd away from the patient.

POISON CASES

A poison is a substance that may cause death if taken in a sufficient quantity either accidentally or intentionally. A poison may enter the body: (*i*) through the mouth with food or a drug, (*ii*) through the air passage as when gas from a deep well, mine, pit or fire is inhaled, or (*iii*) through the skin as in the case of a snake-bite.

The symptoms of poisoning are nausea; vomiting; pain; red and swollen tongue and lips (acid and alkali burns); diarrhoea and unconsciousness. The person may be given the following treatment by way of first aid:

1. Find out the kind of poison that has been taken. Find out when the accident occurred and what has been done for the patient.
2. Send someone for a doctor or for any other professionally trained person.
3. Put three tablespoonfuls of salt and baking soda to a quart of water and force the patient to drink it. This will make the patient vomit.

When the mouth appears burnt or when the person is reported to have taken acid or alkali, do the following things:

For corrosive acids (Sulphuric acid or oil of vitriol, hydrochloric acid or spirit of salt, nitric acid; lysol or dettol)—give two tablespoonfuls of powdered baking soda or chalk in a pint of soapy water. Give the white of an egg.

For corrosive alkalies (Caustic soda, strong ammonia)—give two tablespoonfuls of vinegar or juice from four limes in a pint of water. Give milk.

For iodine—Give a pint of thin starch paste.

For kerosene—(Vomiting not indicated).

In the case of children, the above mentioned doses have to be reduced. For infants up to 2 years divide the above mentioned quantity by 4, for toddlers of 2 to 6 divide the quantity by 2.

SNAKE BITE

When a poisonous snake strikes a person, it injects venom into the body, and this venom may cause death in a very short time. There are many varieties of poisonous snakes in India, namely, the cobra, viper, coral snake and krait. It is reported that many people die from snake bite. Snakes usually strike in self-defence and they generally strike the foot, legs, hands or arms. Snakes are more

prevalent during the monsoon season. As a precaution, the villager usually carries a long stick and strikes it against stones as he walks along to give the snakes a warning.

The symptoms of snake bite are immediate pain; severe and rapid swelling ; and two clearly seen puncture points made by the fangs (in some cases, there is only one puncture).

As the poison is absorbed, there is great weakness, shortness of breath, faintness, rapid pulse, nausea and vomiting, unconsciousness, collapse and bleeding. First aid for a victim of snake bite is as follows:

Send for a doctor or medically trained person. Immediate action is needed to save the patient's life.

Emergency care is as follows:

1. Reassure the patient.
2. Tie a band firmly around the limb just above the bite to keep the poison from spreading. The veins will stand out on the skin. Release the band every two hours long enough for the skin to return to normal colour.
3. Wash the area to remove any venom that may be on the skin and to cleanse the area for the next step.
4. Sterilize a knife blade or some other blade by heating it over a flame until it is red. Allow the blade to cool.
5. Make a cross-cut incision (1″ long, ½″ deep) through each fang-mark.
6. Allow the cuts to bleed freely.
7. Apply suction. Every village first aid kit should have a suction cup for this purpose.
   In case a cup is not available, suction may be carried out by the mouth. The tongue and lips of the person who sucks the venom out should be free of cuts, sores and other abrasions.
8. Antivenin is given by the doctor and is available from government laboratories. Antivenin is now available in a dry form (not needing refrigeration as formerly) and should be available in every dispensary, health centre and doctor's office.
9. Keep the patient warm.
10. Give the patient hot, sweetened tea.

The scientifically proven treatment for snake bite is blood transfusion, shock treatment and antivenin injection.

BONE FRACTURES

A broken bone may remain inside the skin (simple fracture) or may break through the skin (compound fracture).

A compound fracture is more dangerous because there is danger of infection through the wound.

Symptoms

All symptoms are not present in all bone fractures. However, these are as follows:

1. Pain and tenderness at the point of fracture.
2. Inability to move or use the injured part normally.
3. Swelling at the point of fracture.
4. Irregular shape at the broken point. (This symptom will not appear when the bone is merely cracked.)
5. Tenderness.
6. There may be signs of shock also.

Improper handling of a simple fracture may result in the puncture of a blood vessel or in a compound fracture.

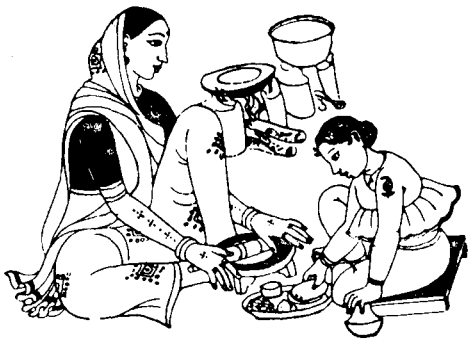
Simple Fracture Treatment

1. Get a doctor or other professionally trained person.
2. Prevent further damage. Do not move the injured part.
3. Apply a splint to the injured part. If you are in doubt about the part being broken, splint the part before moving the patient.
4. Look after the patient. Keep him warm but provide some shade if the sun is very hot. Give a drink of hot tea; keep him lying down.
5. Remove clothing. Cut them off if necessary, but do not move the patient until the splint has been applied.

Compound Fracture Treatment

1. Send for a doctor or some other professionally trained person.
2. There may be bleeding from the wound when the bones break through the skin.
3. Hold a cloth over a flame to kill the germs and press the cloth gently but firmly over the bleeding point.
4. Treat the patient for shock.

As soon as the patient recovers from the shock, you should help him in reaching the nearest hospital, health centre or dispensary.



SECTION III

NUTRITION

CHAPTER 10

NUTRITION, HEALTH AND HUMAN WELFARE

Nutrition has been defined as that condition which permits the development and maintenance of the highest state of fitness. Fitness implies good health, maximum capacity for work, the ability to undertake mental and physical tasks, and the power to withstand physical, physiological and psychological stresses.

Man can live in happiness without many earthly possessions, but not without good health. A healthy and well-maintained body becomes the instrument for the highest of human achievements. And in the promotion and maintenance of health, the food we eat, the way in which it is cooked and consumed, and the various factors which establish food habits and constitute the nutritional status have a vital part to play.

A well-fed individual grumbles less and normally does not fret over small things. Experiments with school children have shown that children taking good food are more alert and learn their lessons better than those getting insufficient or badly combined food.

There must be adequate food for all people—adequate both in quantity and quality. However, today, although a few fortunate countries do produce more than they consume, the world in general suffers from a shortage of food. In India, according to Sir John Boyd Orr, there is enough food for only two mouths out of every three. Malnutrition, arising out of deficiencies in both food and nutritional knowledge, is the cause of many diseases. While it is true that there is not enough food in our country to feed all the people, it is also true that the food being produced is not used in the most profitable manner.

A faulty diet decreases vitality, vigour, longevity and resistance to infection. It is the primary cause of many a disease, mental depression or abnormal psychological state. Diet is an important factor in determining the position of a race in the scale of mankind. The race whose diet is mixed and well-balanced has tall, broad-shouldered, well-built and stalwart men. The application of the principles of dietetics in our daily food raises the standard of health, prevents disease and promotes psychological well-being.

Many of the evil consequences of malnutrition can be overcome if the existing diet is replaced by a properly planned one. An understanding of the fundamental principles of dietetics and the nutritional processes going on in the human body is necessary for the planning of diets.

Since good food is essential for building up healthy bodies, for keeping them healthy and for curing diseases, the home science Extension worker should understand what food is good for her and for the people with whom she works. Nutrition and dietetics are therefore of great significance to her. She should be able

to interpret the meaning of good food habits to the families in the villages where she works and to educate them in food nutrition. She must know what constitutes an adequate diet, what the defects in present dietaries are, in what way these defects affect health and happiness, and how she can help in increasing the nutritional level of the rural people.

CHAPTER 11

WHAT FOOD DOES FOR US

Food is defined as anything solid or liquid which, when swallowed, digested and assimilated, nourishes the body in one or more of the following ways:

1. By furnishing fuel for energy to work
2. By providing materials for building the tissues and repairing them, *i.e.*, for growth
3. By supplying substances for regulating body processes

Thus, foods can be classified into three main groups according to their functions

1. Energy-giving foods
2. Body-building and repairing foods
3. Protective and regulatory foods

ENERGY-GIVING FOODS

The human body requires fuel for the production of energy. The body needs energy for its activities just as a railway engine needs coal to make it go. The human body is never at rest—it is always engaged in work. Even when we sleep, the heart beats, the chest walls move, the temperature of the body is kept constant and digestion goes on. The energy needed for doing all this work is provided by foods.

Cereals are the main energy-giving foods. They have been called 'the staff of life.' Cereals are the cheapest and one of the best foods in the world for supplying energy. They are stable, and can easily be stored, transported or prepared. Therefore, they predominate the poor man's diet. Energy-giving foods include rice, *ragi*, wheat, *bajra*, *jowar* (*cholam*), maize (*makai*), sago, tapioca, starchy vegetables like the potato, sugars and fats. Energy is also supplied by foods like pulses or dals, meat, eggs and fish. But these are more expensive.

BODY-BUILDING AND REPAIRING FOODS

Just as a house is built of wood, brick, mortar, cement, nails, rods and other materials, so is the human body built of the many substances supplied by food. It is difficult to say which of the building materials is more important than the others, since all are essential and since the absence of any one of them weakens the entire body structure. The soft tissues of the body like the muscles or blood are chiefly composed of proteins, water and minerals.

Protein is the element in food mainly responsible for building up the body and for repairing worn out parts. The foods which contain protein include milk, dals or pulses, grams, legumes, groundnut and other nuts, meat, fish and eggs. Milk, eggs and flesh foods are very expensive. The lower income groups depend on legumes, pulses, grams and groundnut for the supply of protein. Fortu-

nately, groundnut which is easily available and widely used in all parts of our country is almost as good a source of protein as meat. Protein is also needed for the formation of blood and antibodies. The antibodies fight the disease-producing germs which invade the body .

PROTECTIVE AND REGULATORY FOODS

Besides supplying energy-giving and body-building factors, food also provides the factors which regulate the functions of the body and protect it from injury and disease. These factors are water, minerals and vitamins.

The vitamins and minerals, although needed in small amounts, are very essential to the health and normal working of the body. The importance of a food material cannot be judged by the amount in which it is required by the body. The bulk of nails used in building a house may be very small compared to the amount of bricks, but nails are nevertheless an indispensable part. In the same way, the amount of iron, for example, needed daily by the human body is smaller than a pin-head, but no other food substance can take its place.

Water is necessary in large amounts for regulating digestion, excretion, maintenance of temperature and other body processes.

Calcium helps in strengthening bones, controlling muscular contractions and heart-beats, and the clotting of blood. Iodine is necessary for regulating, through the thyroid glands, the speed of body movements. Many other minerals determine and regulate the composition of body fluids.

Vitamins also play a great role in regulating growth, muscular coordination, eyesight, health of skin and teeth, digestion and other body processes. Several vitamins have been discovered during the last few years—vitamin A, vitamins of the B Group, vitamin C, vitamin D, vitamin E and vitamin K. The green leafy vegetables which one can easily get every day are the cheapest and richest store-house of vitamins for the poor man. They supply iron for blood and are also rich in minerals which build some of the tissues of the body. They contain carotene (vitamin A), vitamin B complex and vitamin C. Tomatoes are a good source of vitamin C. Other vegetables, such as green beans, cabbages or peas, also furnish vitamin C and carotene. Milk is rich in vitamin A and riboflavin, an important member of the B Group.

There are some 'internal' glands in the human body which secrete minute quantities of juices called harmones which, when poured into the blood stream, control and regulate the speed of body processes. These glands are rightly designated 'glands of destiny.'

EFFECTS OF NUTRITIONAL DEFICIENCY

A nutrient is any substance which functions in one or more of the three ways already mentioned. Shortage of essential nutrients makes a difference in our health and well-being, resulting in what is known as 'hidden hunger' or malnutrition. Health may be disturbed by several types of nutritional disorders, such as eating

insufficient amounts of food, eating more than what is needed, the absence or insufficiency of nutrients in the food, inability to digest or metabolize the nutritive material, and lack of appetite.

The weight of the body is determined largely by the balance between the amount of food we eat and the muscular work (exercise) we do. If we go on eating too much food in relation to the amount of work, we will gradually become overweight, because the excess food is stored in the body as fat. This condition is called obesity. Obesity puts a strain on the body and makes it an easy prey for high blood-pressure, heart trouble, kidney disease or diabetes. If, on the other hand, we do not eat enough food, we shall gradually become thin. Unnecessary or excessive slimming is also undesirable since it leads to many a disease.

The diseases caused by the deficiency of essential nutrients are called 'nutritional deficiency diseases.' They should be regarded as the danger signals which warn us of the hidden hunger of the body. Some signs of hidden hunger are :

1. Underweight (or in children, failure to gain weight regularly)
2. Overweight
3. Poor posture
4. Defects in bone formation
5. Rough skin
6. Flabby muscles
7. Pale skin
8. Lack of strength
9. Lack of energy
10. Laziness
11. Fatigue
12. Lack of mental alertness
13. Feeling of depression
14. Irritability
15. Poor appetite
16. Chronic constipation
17. Frequent colds and sore throat
18. Spongy, bleeding gums
19. Night blindness
20. Over-sensitiveness of eyes to light
21. Dullness of eyes
22. Disturbances in digestion
23. Low resistance to diseases.

CHAPTER 12

THE CONSTITUENTS OF FOOD (PART I)

CARBOHYDRATES, FATS, PROTEINS, MINERALS AND WATER

Functionally, carbohydrates, fats and proteins supply energy. Proteins and mineral salts build and repair body tissues. Mineral salts, vitamins and water regulate body processes. Roughage aids in proper bowel movements and all the nutrients help to keep the body in a dynamic state of health.

Carbohydrates

Carbohydrates consist of sugars, starches, glycogen (animal starch) and cellulose. They are made up of carbon, hydrogen and oxygen. Hydrogen and oxygen are present in carbohydrates in the same proportion as they are in water (H_2O).

Sugars are soluble in water. They can be classified into simple sugars, double sugars and complex sugars according to the number of carbon and hydrogen atoms in their composition.

Glucose, fructose (fruit sugar) and galactose are simple sugars.

Maltose (malt sugar), sucrose (cane sugar) and lactose (milk sugar) are double sugars. Cane sugar is the most commonly used sugar in our dietaries. Jaggery or *gur* is also cane sugar.

Starches, glycogen and cellulose belong to the group of complex sugars. Starch is stored as a reserve food in the leaves, tubers and fruits of plants. Starch forms the largest part in human and animal diets. It is not soluble in water and has to be cooked before consumption. When heated in water, the starch granules swell, burst and release the contents, thus becoming edible and digestible. Cellulose is derived from the fibrous portion of foods and is necessary for normal intestinal movements. It cannot be digested by the human body and is therefore not a source of nutrition. However, it is helpful in maintaining intestinal hygiene.

Among the foods available in India, cereals, pulses, nuts, starchy vegetables and fleshy fruits like bananas supply the major portion of carbohydrates. The carbohydrate content of some important foods is given in Table 12.

Functions of Carbohydrates

Carbohydrates supply the necessary energy for the activities of the body. As they are cheaper than the proteins, they make the diet less expensive. Cereal grains have some valuable vitamins and minerals in their outer coatings. They should, therefore, be consumed without much milling or polishing. Beriberi is a deficiency disease due to the extreme deficiencies of vitamin B_1 (Thiamine) which is found in good quantities in the bran of rice. It occurs commonly in areas where highly milled raw rice is consumed. Refined carbohydrates, such as *maida*, *sooji* or white sugar, while being very attractive in appearance, are nutritionally less valuable than unrefined foods.

TABLE 12

CARBOHYDRATE CONTENT OF SOME IMPORTANT FOODS*

(Percentage)

Cereals	
Ragi	76·3
Maida	74·1
Jowar	74·0
Atta	72·2
Rice	70—74
Barley	69·8
Bajra	67·1
Maize	66·2
Oats	62·8
Roots and tubers	
Sweet potato	31·0
Yam (ordinary)	27·0
Yam (elephant)	18·4
Potato	22·9
Colocasia	22·1
Artichoke	16·0
Onion (small)	13·2
Onion (big)	11·6
Sugars	
Sugar	100 (nearly)
Jaggery	95·0
Honey	79·5
Other vegetables	
Singhara	23·9
Plantain (green)	14·7
Double beans	12·3
Broad beans	10·0
Cluster beans	9·9
Jack (tender)	9·4
Green leafy vegetables	
Agathi	11·8
Curry leaves	16·0
Drumstick leaves	13·4
Milk and milk products	
Milk (cow)	4·8
Milk (buffalo)	5·0
Skimmed milk powder	51·0
Cheese	6·3

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

Dentists are of the opinion that dental troubles can be lessened by minimizing the use of refined carbohydrates in the diet. The All India Cottage Industries Board (Gramodyog) is encouraging the use of home-pounded rice, honey and home-made *gur* because of their high nutritional qualities. Extension workers should promote the use of these foods in village homes.

Carbohydrate Requirements

Carbohydrates should supply 50 to 60 per cent of the Calories in a balanced diet.

Fats

Fats are the most concentrated form of all energy giving foods. They are obtained from vegetable oils, oilseeds, nuts, milk, butter, ghee and fatty meat. Excess carbohydrates and proteins are stored in the body as fat. Fats are not soluble in water. They form soap when mixed with caustic potash or soda. All fats have about the same fuel value. Being concentrated fuels, fats reduce the total bulk of food in a meal. They are stored in the body to be used as reserve, and are utilized in times of need or emergency, such as starvation or sickness. Fats act as padding material and give protection against injuries to the liver, heart, kidneys and other vital organs. Being insulating materials, they guard the body from the effects of exposure to cold or heat. They give roundness, beauty, shape and contour to the body. The fats present in food keep the appetite appeased for a longer period than any other single constituent because of their slow digestion and absorption. They are solvents for vitamins A, D, E and K. They add to the taste and flavour of the diet.

It is usually recommended that about two ounces of fat should be provided daily in the diet of an adult.

Proteins

Proteins are an important constituent of plant and animal cells. All living organisms have them. Plants can utilize the nitrogen in the soil and air to build amino acids and proteins which in turn are consumed by animals to produce animal proteins.

The protein content in the diet varies from country to country. So does the ratio of animal proteins to vegetable proteins in the diet. In economically well-to-do countries, the average intake of proteins is high, with almost half the total protein content being made up of animal proteins. In under-developed countries, both the quantity of proteins in the diet and the proportion of animal proteins to the total protein content are low. Proteins in different foods have different nutritive values.

Functions of Protein

Muscles need protein for growth and for movement, *i.e.*, contraction and relaxation of muscles. Children must have protein for growth and development. Grown-up people need protein to maintain their bodies in good health. Protein is used for repairing muscles and other tissues. It is needed for the formation of blood and the healing of wounds. It is also needed for the production of antibodies which fight disease-causing bacteria and thus build up the body's resistance against infection. The tissues which cement one part of the body with another and

keep them in their places are made of protein. Even the bones, teeth, hair and nails require a certain amount of protein for their functioning. Enzymes and harmones are composed of protein. Protein also supplies energy, but it is too costly to be used as fuel.

Effects of Protein Deficiency

When the body runs short of protein, children fail to grow and succumb easily to infection. Prolonged deficiency of protein during and after the weaning period results in a condition known as Kwashiorkar in the child. This condition is characterized by diarrhoea, anaemia, irritability, oedema, enlarged liver, reduced resistance to infection, dry skin, lustreless hair and cessation of growth. Protein deficiency in adults results in the thinning of blood and in the reduction of weight. The muscles shrink and become flabby. Oedema of the feet, anaemia, liver trouble, decreased strength in muscles and reduced resistance to infection follow.

Different Types of Protein

There are different kinds of proteins and all of them are needed for the body. All proteins are made up of a number of nutrients called amino acids. So far, 22 amino acids are known to be present in food. Although all of them are necessary for tissue formation and other body functions, only ten are very essential for human life and growth. They cannot be synthesized in the body. Therefore, they are called 'essential or indispensable amino acids.' The rest are not so important for life but are necessary for building the body and can be synthesized by the body. Therefore, they are called 'non-essential or dispensable amino acids.' The essential amino acids determine to a large extent the nutritive quality of proteins.

Depending upon the kind and amount of amino acids present, the different proteins are classified as 'first class or complete,' 'second class or partially complete,' and 'third class or incomplete' proteins.

The first class or complete proteins contain all the essential amino acids in balanced proportions and are absolutely necessary for maintaining life and promoting growth. They are found in animal foods, some pulses and some nuts.

The second class or partially complete proteins are deficient in one or more essential amino acids and can maintain life, but cannot completely promote growth. Most of the proteins in the vegetable kingdom belong to this group.

The third class or incomplete proteins are deficient in one or more essential amino acids and can neither maintain life nor promote growth; but they are useful for building tissues. Zein, a protein of maize, and gelatin are examples of this group. The good quality proteins are generally found in milk, egg, meat, fish, soyabean and groundnut. Soyabean provides the only vegetable food containing, in a balanced proportion, practically all the essential amino acids. Cereals provide only a limited quantity of good quality protein.

Proteins are also divided into animal and vegetable proteins according to their source. Animal proteins are obtained from meats of all kinds, egg, fish, milk and milk products. Vegetable proteins are derived from pulses, grams, seeds, nuts, yeasts, cereals and vegetables. Most of the first class proteins belong to the animal group.

Digestibility of Protein

Besides the amino acid composition, another important factor in determining the nutritive value of a protein is its digestibility. The proteins that are most easily available for absorption are animal proteins; those from dry legumes are the least available. Table 13 gives the digestibility of proteins from different food groups in mixed diets.

TABLE 13

DIGESTIBILITY OF PROTEINS*

Food group	*Coefficient of digestibility (per cent)*
Animal foods	97
Cereals	85
Fruits	85
Vegetables	83
Legumes (dried)	78

Supplementary Value of Proteins

Foods differ in the nutritive value of the proteins they contain. Except gelatin, all foods contain more than one kind of protein and, therefore, the number and quantity of amino acids in them vary. Some foods contain limited quantities of certain essential amino acids and generous amounts of others. Consequently, a combination of foods in which the amino acids contained in the different foods supplement each other is of a higher nutritive value.

Proteins from two or more sources can make up the amino acid deficiencies in each other. For example, proteins of pulses, nuts and oilseeds supplement those of cereals. All animal proteins supplement cereal proteins to a marked extent. Even a small quantity of animal proteins when mixed with a large quantity of vegetable proteins, exerts a supplementary influence and improves the nutritive value of the mixture. Therefore, it is of advantage to mix milk, buttermilk, curds, eggs and similar foods with cereals and pulses for obtaining the maximum benefit. It is also beneficial to consume mixtures of different dals and mixtures of dals and cereals.

Interrelationships among Amino Acids and Other Nutrients

The interrelationships among certain amino acids, and between certain amino acids and vitamins are important. Cystine has a sparing action on methionine, while tyrosine has a sparing action on phenylalanine. The requirement of tryptophan is increased when nicotinic acid is not sufficient to meet the body's needs. Vitamin B_{12} has a sparing effect on both methionine and choline. The absence of any one of the essential amino acids in the diet produces a negative nitrogen balance. Therefore, the protein in the diet should not only contain adequate amounts of the essential amino acids, but these must be present in a balanced proportion. For example, the requirement of triptophan is enhanced in the presence of large quantities

* 'Principles of Nutrition,' Wilson, Fisher and Fuqua.

of threonine and phyenylalanine. Therefore, if a protein contains large amounts of these two amino acids, but has only the marginal value of triptophan, the risk of triptophan deficiency would be far greater than it would have been if the protein contained moderate amounts of those two amino acids.

Protein Requirements

The amount of proteins needed varies according to age, physiological state, sex and activity. Growing children need a larger amount in proportion to their weight than adults, because of growth. Infants need a minimum of three grams of protein a day for every kilogram of their body weight. The need increases till the age of 15 for girls, and 20 for boys, when girls need about 70 grams of protein and boys 80 grams daily. Adults need about 60 to 70 grams of protein per day (one gram per kilogram of body weight). This requirement is increased in times of physiological stress, such as pregnancy, lactation or convalescence. A protein allowance making up 14 per cent of the total Calories is adequate to meet the requirements of this group.

Animal and Vegetable Proteins

Although the difference in biological value between vegetable and animal proteins is not great, the growth promoting value of vegetable proteins seems to be less than that of animal proteins. The superiority of animal proteins is mainly due to the presence of the essential amino acids, methionine, triptophan and leucine in larger amounts and in better balanced proportions than in vegetable proteins.

Two or more proteins of vegetable origin can be so combined that the amino acid deficiency is mutually made up, thus resulting in a mixture containing proteins of a superior nutritive value. Generally, protein deficiency arises from the following factors :

(i) Inadequate intake of proteins.
(ii) Improper balancing of amino acids.
(iii) Inefficiency in utilization.
(iv) Secondary effects of associated components.

Therefore, if the supplements are of the right types, suitable combinations of vegetable proteins are as good as animal proteins. Oilseed cakes, cereal bran and similar little known foods seem to have protein-rich factors. Rice proteins possess a far higher growth-promoting value than wheat proteins and also have a higher biological value than other cereal proteins. They are highly digestible.

For vegetarians and for those who cannot afford to eat protein-rich animal foods, legumes are the most important sources of proteins in the diet. Legume proteins provide certain essential amino acids in which the cereal proteins are deficient and thereby enhance the overall nutritive value of the proteins in the mixed diet. Therefore, inclusion of legumes in processed foods like the multipurpose foods improves the quality of the food. Raw groundnut contains 25 to 30 percent protein. The limiting amino acid in groundnut is methionine. In digestibility, the proteins of groundnut compare well with other proteins, and they can be regarded as being on a par with other oilseed proteins.

Food Sources of Protein

Protein is widely distributed in nature. Only a few foods, however, have high amounts of protein. Cereals supply the largest amount of proteins in the diet in under-developed areas. The only foods which have no proteins are sugars, fats and oils. While animal foods provide proteins which are high in nutritive value, soyabean, groundnut, some pulses and some nuts also contain proteins of a high quality. Cereals also provide a limited amount of good quality protein. The percentage of protein in some commonly used foods are given in Table 14.

TABLE 14
PROTEIN CONTENT OF SOME IMPORTANT FOODS*
(percentage)

Cereals	
Bajra (cumbu)	11·6
Barley	11·5
Cholam (jowar)	10·4
Italian millet	12·3
Maize (corn)	11·1
Oatmeal	13·6
Ragi	7·1
Rice, raw, home pounded	7·5
Rice, raw, milled	7·0
Samai	7·7
Wheat, whole	11·8
Refined wheat flour (*maida*)	10·2
Nuts and oilseeds	
Almond	20·8
Cashewnut	21·2
Coconut, fresh	4·5
Gingelly (sesamum)	18·3
Groundnut	26·7
Pistachio	19·8
Walnut	15·6
Flesh foods	
Egg (hen's)	13·3
Egg-white	13·3
Egg-yolk	13·7
Fish	21·5
Mutton	18·5
Liver	19·3
Chicken	25·9
Pulses	
Bengalgram dal	22·5
Bengalgram	17·1
Blackgram dal	24·0
Cowgram	24·6

*'Our Food' by M. Swaminathan and R. K. Bhagwan.

TABLE 14—*contd.*

Field bean (dry)	24·9
Greengram dal	24·0
Horsegram	22·0
Lathyrus pea dal	28·2
Lentil (*masur*) dal	25·1
Peas, dried	19·7
Redgram dal	22·3
Soyabean	43·2
Milk and milk products	
Milk (cow)	3·5
Milk (buffalo)	4·3
Milk (goat)	3·7
Milk (human)	1·0
Milk powder (skimmed)	38·0
Milk powder (whole)	25·2
Cheese	24·1
Curds	2·9

Table 14 gives a comparative statement of the protein content of some commonly used dals, meat, fish and eggs. From this Table, it can be seen that groundnut and dals are the nearest sources of good quality proteins for a vegetarian.

Mineral Salts

There are about 30 mineral elements present in the body. Out of these, the following are regarded as being absolutely essential for the proper functioning of the body: calcium, phosphorus, potassium, sodium, magnesium, iron, manganese, copper, iodine, cobalt and zinc. They play two roles in the body—as blood substances and as regulatory substances.

As structural constituents of the body, they regulate several physiological processes in at least three ways :

1. They give strength, rigidity and permanence to the hard tissues, such as bones and teeth. Calcium, phosphorus and magnesium take part in this function.
2. As constituents of soft tissues, such as tissue proteins, cell bodies and muscles, they are responsible for their proper functioning. Muscle tissues contain sulphur and phosphorus. Nerve tissues contain phosphorus.
3. They are found in compounds essential for the functioning of the body, *e.g.*, iodine in thyroxin, zinc in insulin, cobalt in vitamin B_{12}, sulphur in thiamine and iron in haemoglobin and some others in various tissue cells.

M13 D of A/64—8.

As constituents of body fluids, the minerals have such important regulatory functions as the following :

(1) They contribute to the osmotic pressure of body fluids. Sodium salts and potassium salts are present in the intracellular fluids and influence their osmotic pressure. Consequently, they aid in the movement of water in and out of the tissues. This exchange of water is of fundamental importance, because the absorption and transportation of nutrients, the excretion of waste, and the functioning of muscles and nerves are dependent on it.

(2) They contribute to the maintenance of neutrality in blood and body tissues by preventing the accumulation of too much acid or alkali. The normal reaction of the blood is neutral, slightly on the basic side. The chief base forming elements are sodium, potassium, calcium and magnesium. The acid forming elements are chlorine, phosphorus and sulphur.

(3) They make possible the normal rhythm in the heart beat. The presence of the minerals calcium, potassium and sodium in proper proportions makes possible the characteristic rhythm of the heart beat.

(4) They help nerves in maintaining a normal response to stimuli. Calcium is mainly responsible for this action.

(5) They are essential for the clotting of blood. Calcium is one of the chief factors responsible for clot formation.

Calcium

There is more calcium in the body than any other mineral. Most of the calcium is found in combination with phosphorus in the bones and teeth. Calcium is necessary for the normal clotting of the blood and functioning of the muscles. It helps in the contraction of the heart muscle, while potassium favours its relaxation. Adequate amounts of calcium are needed for the growth of children. Unless sufficient calcium salt is deposited in the growing bones, they will not be rigid but will tend to become soft and easily bent, thus resulting in rickets. Vitamin D is essential for the proper absorption and deposition of calcium and phosphorus. When the diet does not supply enough calcium, it is withdrawn from the bones into the blood. If this loss continues, the bones become soft and susceptible to fractures. The optimum amount of calcium in the diet ensures vigour in new-born babies, maximum vitality, and long life through successive generations.

Milk is one of the best sources of calcium in the daily diet. Among the cereals, *ragi* is richest in calcium. Leafy vegetables, specially amaranth and drumstick leaves, *methi* (fenugreek) leaves, curry leaves, vegetables like drumsticks and cluster beans, gingelly seeds, egg yolk, bones of animals and fish are good sources of calcium. The daily requirement of calcium is about 1 to 1·5 grams for children, 0·7 to 1 gram for adults and 1·5 to 2 grams for pregnant or lactating women. The calcium content of some important foods is given in Table 15.

TABLE 15

CALCIUM CONTENT OF SOME IMPORTANT FOODS*

(mgm. per 100 gm.)

Milk and milk products	
Milk (cow)	0·12
Milk (buffalo)	0·21
Milk (goat)	0·17
Curd from cow's milk	0·12
Milk powder (skimmed)	1·37
Milk powder (whole)	0·95
Cheese	0·79
Cereals	
Oatmeal	0·38
Bajra	0·35
Ragi	0·33
Wheat	0·32
Cholam	0·28
Pulses	
Bengalgram	0·19
Blackgram	0·20
Greengram	0·14
Redgram	0·14
Nuts and oilseeds	
Gingelly seed	1·45
Almond	0·25
Green leafy vegetables	
Amaranth	0·50
Agathi	1·13
Carrot leaves	0·34
Curry leaves	0·81
Mint	0·20
Neem leaves	0·51
Spinach	0·18
Water cress	0·29
Drumstick leaves	0·44
Fenugreek leaves	0·47
Flesh foods	
Small fish (dried)	1·8

Phosphorus

Phosphorus, along with calcium and vitamin D, helps in building the bones and teeth. Phosphorus is an integral part of every living cell and plays an important role in releasing energy from the food for the use of the body. Phosphorus also helps in maintaining the composition of body fluids which are responsible for many life processes.

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

Milk and milk products, eggs, meat, fish, whole cereals, green leafy vegetables, legumes and nuts are good sources of phosphorus. The phosphorus content of some important foods are given in Table 16.

TABLE 16

PHOSPHORUS CONTENT OF SOME IMPORTANT FOODS*

(mgm. per 100 gm.)

Milk and milk products	
Milk (cow)	0·09
Milk (buffalo)	0·13
Milk powder (skimmed)	1·00
Milk powder (whole)	0·73
Cheese	0·52
Curds	0·19
Cereals	
Bajra	0·35
Barley	0·23
Jowar	0·28
Italian millet	0·29
Maize (corn)	0·33
Oatmeal	0·38
Ragi	0·27
Rice	0·23
Pulses	
Bengalgram	0·31
Blackgram	0·37
Field beans	0·45
Greengram	0·28
Lentil	0·25
Peas (dried)	0·30
Soyabeans	0·69
Nuts and oilseeds	
Almond	0·49
Cashewnut	0·45
Gingelly seed	0·57
Groundnut	0·39
Flesh foods	
Egg	0·22
Fish	0·41
Mutton	0·24
Liver (sheep)	0·38
Other foods	
Yeast	1·49

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

Iron

Iron imparts the red colour to blood. There are less than five grams of iron in the body of an adult and seventy per cent of it is present as haemoglobin (the red colouring matter) in blood. Iron is stored in the liver, kidneys and spleen. Iron is also found in the tissues where it plays a leading part in tissue oxidation.

Normally, we need only very small quantities of iron in the food, about 15 milligrams per day, except under some such special circumstance as an accident involving long and continued loss of blood. Women need to compensate for the regular monthly loss of iron in menstruation. During pregnancy, there is an additional need for iron, since the mother has to supply iron to the foetus. Infants, children and adolescents experience continuous growth which increases their blood volume proportionately. Therefore, larger quantities of iron should be supplied to them through food during those periods. Since milk is poor in iron, the new-born infant has a reserve of iron in its liver which can last up to six months. Before that reserve is exhausted, iron-rich foods like green leafy vegetables, *ragi*, liver and egg yolk should be included in the baby's diet along with milk.

Insufficient quantities of iron in the diet will result in nutritional anaemia. It should not, however, be concluded that all anaemias are of nutritional origin.

Among the animal foods, liver, kidney and egg yolk are good sources of iron. *Ragi* is the best source of iron among the cereals. Whole wheat also contains considerable amounts of iron. Among the vegetable foods, all types of green leafy vegetables including edible wild greens, green peas, dry fruits like raisins and dates, gingelly seeds and vegetables like drumsticks, cluster beans, bitter gourds or onion stalks are rich in iron. The iron content of some important foods is given in Table 17.

TABLE 17

IRON CONTENT OF SOME IMPORTANT FOODS*

(mgm. per 100 gm.

Leafy uegetables	
Amaranth	21·9
Gram leaves	28·3
Garden cress	28·6
Neem (tender leaves)	25·3
Bengalgram leaves	23·8
Manathakkali	20·5
Mint	15·6
Coriander leaves	10·00
Drumstick leaves	7·0
Carrot leaves	10·0
Spinach	5·0
Water cress	4·6
Agathi	3·9
Curry leaves	3·1

*Health Bulletin No. 23, Manager of Publcations Government of Indla, Delhi.

TABLE 17.—*contd.*

Other vegetables	
Bitter gourd	9·4
Cluster beans	5·8
Tomato	2·4
Pulses	
Bengalgram	8·9
Blackgram	9·8
Greengram	8·4
Redgram	8·8
Soyabeans	11·3
Peas (dried)	4·4
Cereals	
Bajra	8·8
Jowar	6·2
Ragi	5·4
Wheat (whole)	5·3
Rice raw (husked)	4·5
Rice raw (hand pounded)	3·8
Rice (milled)	2·8
Nuts and oilseeds	
Pistachio	13·7
Mustard seed	17·9
Gingelly seed	10·5
Cashewnut	5·0
Walnut	4·8
Almond	3·5
Fruits	
Karwanda (dry)	39·1
Tamarind pulp	10·9
Dry dates	10·6
Raisins	4·0
Strawberry	1·8
Peaches	1·7
Flesh foods	
Egg	2·1
Liver (goat)	6·3
Mutton	2·5
Fish	2·3
Other foods	
Gur	11·4
Yeast (dried, brewer's)	43·7
Sugarcane (preserves)	14·3
Betel leaves	5·7

Iodine

Iodine is a constituent of the thyroid gland which controls the rate at which energy is used up in the body. It influences growth and regulates the speed of various body processes such as metabolism. Although only 25 milligrams of iodine are present in the human adult, this quantity is very essential for the proper functioning of the thyroid gland. In its absence, growth will be retarded; cretinism, which is a form of dwarfism and where the individual does not show any signs of intellectual maturity or physical development will result in the young; and hypothyroidism, as reflected in the form of single goitre, which is the enlargement of the thyroid gland showing up as swelling in the throat, will occur in adults. Subnormal basal metabolism, sometimes associated with overweight, lowered mental ability, nervousness and sluggish movements are symptoms of iodine deficiency.

Iodine is obtained from drinking water, sea fish, oysters, sea-weeds and vegetables grown on soils containing iodine. Wherever the water or soil or both lack iodine, as in certain parts of Himachal Pradesh, goitre is evident. It will be possible to avoid such manifestations by adding salts of iodine to the food or drinking water. In the West, common salt is iodized and used as a regular ingredient of the daily diet.

Copper

Copper is needed in very, very minute quantities in the body, along with iron for the formation of red blood cells. There are only about 7 milligrams of copper in the body of an average adult but they are vital. Copper helps in the conversion of iron into haemoglobin, although it is not present in haemoglobin or red cells. About 1 to 2 milligrams of copper are needed in a day by an adult. A child needs 0·5 milligrams a day.

Manganese

Manganese seems to have a part in the gradual release of energy from foods in metabolism. It has also a part to play in blood formation and in the functioning of certain endocrine glands.

Cobalt

Cobalt is a component of the anti-pernicious anaemia factor—vitamin B_{12}-which is necessary for the formation of red blood cells.

Sodium and Chlorine

All the body fluids contain 0·9 per cent sodium chloride which is very important for life. Muscular cramps are caused if there is a shortage of common salt. Additional quantities of common salt should be taken in such parts of India as Punjab, Uttar Pradesh, Madhya Pradesh and some places in Maharashtra, where the summer temperature runs even up to 120°F and causes a tremendous depletion of water and salt from the body through perspiration leading to heat cramps and heat fatigue.

water

Water is very important since several body processes are being carried out in a fluid medium. Seventy per cent of the total weight of the body is water. The body gets water from the fluids taken, from the food consumed and as a by-product of

the oxidation of food-stuffs in the body. Water is excreted from the body through the kidneys, intestines, lungs and the skin. In normal persons, there is a balance between the intake and the output of water. That balance is one of the factors which control and maintain body temperature. Water regulates the body temperature also by controlling the loss of heat through evaporation from the skin.

Water is an important part of the digestive juices. It helps in the absorption of digested foods and assists in their transportation to the different parts of the body. The presence of water is absolutely essential for the utilization of absorbed food in the cells. Excretion is possible because water dissolves the waste products which are carried away by the blood streams.

A person should take six to eight glasses of water every day.

CHAPTER 13

THE CONSTITUENTS OF FOOD (*PART II*)

VITAMINS

In the olden days, it was assumed that only one type of nutritive factor was present in all the foods and was responsible for nourishing the body. But in the 19th century, it was found out that there were many kinds of nutrients in foods, namely, carbohydrates, fats, proteins and mineral salts.

In 1757, British sailors overcame scurvy, a dreaded disease causing considerable pain in joints, by eating fresh limes. In the early 19th century, Dr. Eijkman found in the East Indies that chickens suffering from a fatal disease called polyneuritis could be saved if bran was added to their ration of polished rice. In 1884, the sailors of the Japanese navy were very ill with a disease called beriberi. Their diet consisted mainly of white rice. With the addition of vegetables, meat and fish, beriberi disappeared.

Sir Frederick Gowland Hopkins of England showed by experiments in 1906 that animals could not live on a mixture of pure carbohydrates, fats and minerals. However, the addition of even a few drops of milk to the pure diet mixture made a great difference to the maintenance of life and promotion of growth in animals. He thus proved that when natural foods are purified, some things very essential for life and growth were removed, and that milk was able to supply those factors. Further work proved that both the fat and water parts of milk contained those factors. Hopkins first called them 'accessory factors,' and divided them into the 'fat soluble-A,' and the 'water soluble-B.'

In 1912, Dr. Casimir Funk, a Polish biochemist, tried to find out what it was in foods that prevented beriberi. He too came to the conlusion that there were some unknown substances present in some foods which were able to prevent diseases like scurvy, beriberi and pellagra. Since he believed that those factors were similar to 'amines' or nitrogen containing substances, he coined the word 'vitamine' for the 'accessory factors'. 'Vita' means 'essential for life' and 'amine' indicates their chemical structure. Later, it was found that all the 'vitamines' were not amines and thus the name 'vitamin,' without an 'e' at the end, came into existence.

Since 1912, a great deal of work has been done and is still being done on the mysterious and wonderful vitamins. The discovery of vitamins still goes on. The different vitamins and the years in which they were discovered are given below:

Year	*Vitamin*
1925	Vitamin D
1926	Vitamin B
1928	Inositol

Year	*Vitamin*
1931	Vitamin A
1932	Vitamin C
1933	Riboflavin; Pantothenate
1935	Biotin
1936	Anti-white factor Vitamin C
1938	Nicotinic acid as pellagra preventing
1939	Vitamin K
1940	P—Aminofenzoic acid
1945	Folic acid
1948	Vitamin B_{12}

Although vitamins are newcomers to the science of nutrition, for many years people in different parts of our country had known that some foods had the power of curing certain diseases and conditions. For example, to prevent vomiting in pregnancy, bran was given; sore tongue was cured by eating raw leafy vegetables; and raw liver or liver juice was consumed when jaundice occurred.

Vitamins are organic substances present in minute quantities in foods. They are necessary for life, growth and the normal health of the body. The body cannot synthesize them and therefore they have to be provided in the diet. They are regulatory substances, each of them performing a special function. They are carried in the blood stream to all parts of the body.

Vitamins differ from proteins, fats and carbohydrates in that they do not supply energy. Neither do they supply body-building material, as the proteins and minerals do. Their general function is to act as regulators or catalysts, assisting the body in utilizing other nutrients. The human body has been compared to an engine which needs fuel to make it go. The engine also needs oil to keep it working smoothly. The function of the vitamin in the body can be compared to the lubricating action of oil in an engine.

Measurement of Vitamins

The vitamins found in natural foods cannot be seen or tasted. We cannot smell them either. The yellow colour in vegetables and fruits is mostly due to the pigment known as carotene from which the body makes vitmain A. The actual amount of each of the vitamins needed in the daily diet is very small. Therefore, they cannot be measured in terms of the usual units of weight such as ounces or grams, but only in terms of much smaller units of weight known as milligrams (mg.) and micrograms (11g). A milligram is one thousandth of a gram or 1/28,000th of an ounce, while a microgram, also known as gamma, is 1/1000th of a milligram. The term 'International Units' is used for the measurement of vitamin A and vitamin D. This indicates how very potent the vitamin must be as it is so useful even in such small quantities.

Effects of Vitamin Deficiency

A total or pronounced lack of one or more of the essential vitamins will result in serious illnesses, such as rickets, osteomalacia, night blindness, scurvy and pellagra. A partial lack of vitamins in the diet will lead to conditions that may not be recognized as ailments, but will nevertheless disturb the state of complete health or well-being. There are many degrees of vitamin deficiency. Easily getting tired, loss of sleep or inability to sleep, nervousness, irritability, defects in eyesight, cracking of finger nails, lips or hair, dryness or roughness of the skin and lack of interest in sports may be some symptoms of vitamin deficiency. In general, if the diet lacks any one vitamin, it is likely to be deficient in other vitamins too. When sufficient amounts of vitamins are included in the diet along with other nutrients, a person will be healthy, strong and efficient in work.

Sometimes, people do not get enough vitamins because they do not eat enough food. Some people consume less food due to sickness, a lack of appetite or a desire to reduce, this reduces their intake of minerals and vitamins. Such reduction leads to a further loss of appetite and vitamin deficiency, and eventually results in greater complications.

Nomenclature of Vitamins

When vitamins were first discovered, they were arbitrarily named A,B,C,D, and so on. Now, since the chemical composition of vitamins are known and their functions have been defined,vitamins have been given names indicative of their properties and functions. For example, vitamin A is called anti-xerophthalmic vitamin, Vitamin B_1, anti-neuritic; vitamin C, anti-scorbutic; and vitamin D, anti-rachitic.

The Fat Soluble Vitamins

The fat soluble vitamins known so far are the vitamins A,D, E and K.

The Water Soluble Vitamins

The water soluble vitamins are more numerous, comprising vitamins of the B group and vitamin C. Because of their solubility in water, vitamin C and the vitamins of the B group are likely to be lost through such faulty cooking procedures as using too much water for washing food or throwing away the water in which food has been cooked.

For many years, vitamin B was thought of as being a single factor. Since 1920, several studies have revealed that there were many factors in the water-soluble vitamin B. It is now known that there are at least 12 vitamins in what is known as 'vitamin B complex.' Three of them, thiamine, riboflavin (vitamin B_2 or G) and niacin are indispensable to human nutrition. The other members of the B complex include vitamin B_1 (formerly called pyridoxine), pantothenic acid, biotin (vitamin B_4), folocin (formerly called folic acid and vitamin M), vitamin B_{12}, inositol, para-aminobenzoic acid, vitamin B_{10} and Vitamin B_{11}. While the fat soluble vitamins can be stored in the body to some extent, specially in the liver, most of the B vitamins are not stored in the body and have therefore to be supplied daily in the diet. When they are taken in excess of the body's needs, they are excreted. It has been shown

recently that certain types of useful bacteria living in the intestines can produce some of the B vitamins.

As many foods contain several of the B complex vitamins together rather than separately, deficiency diseases due to the insufficiency of a single member of the B vitamins are rare. Thus a person who has some degree of thiamine deficiency, is also likely to show some symptoms of riboflavin and niacin deficiencies.

The quantity of vitamins present in highly refined starchy and fat foods is very neglible. Therefore, a diet consisting of refined foods is likely to be deficient in vitamins.

Sources of Vitamins

Plants make and store vitamins in their leaves, fruits seeds, tubers and stems. Animals derive their vitamins from sunshine and by eating plants and fruits. Human beings, in turn, get their vitamins from animal and plant products and by exposure to sunlight.

Today, vitamins are made in laboratories synthetically and are sold as medicines and protective foods. However it is not easy to make vitamins in the laboratory and, consequently, they are expensive. It is not necessary to include vitamin pills in the diet, if we use natural foods properly. Moreover, synthetic vitamins, besides being costly, may not be available in rural areas. It is possible to obtain balanced diets from natural foods, if only we understand what contitutes a balanced diet, and use that knowledge while planning our diet. Vitamin pills should be used only in such special conditions as illness, food shortages, infancy, old age, pregnancy or lactation. Vitamin pills have to be used when extreme deficiencies are developed, because such conditions cannot be cured through the normal diet. They may be necessary also when due to deficiency in the soil or difficulty in procuring adequate food supplies, sufficient amounts of vitamins are not available. Even under such circumstances, it will be desirable to use a natural vitamin-rich food source such as yeast or cod-liver oil instead of synthetic vitamins.

Tge Important Vitamins in Human Nutrition

Vitamin A, vitamin D, thiamine (aneurin), riboflavin, niacin (nicotinic acid), vitamin C (ascorbic acid), vitamin B12, folacin, vitamin B6 and panthothenic acid are the more important vitamins. The properties, functions, effects of deficiencies, requirements and sources of these vitamins are discussed below.

Vitamin A

Functions

Sometime, we come across persons who cannot see well after dark or in dim light. They suffer from night blindness which is one of the signs of vitamin A deficiency. Vitamin A is needed for maintaining the eyes in a healthy condition for proper vision in dim light, and for the growth and proper development of teeth and bones in children. It helps us in fighting infection by maintaining the normal vitality of the epithelial cells of the skin which lines the nose and other openings, as well as parts like the throat and intestines. Vitamin A helps in reproduction, since the reproductive cells are also epithelial cells.

Effects of Deficiency

Insufficient vitamin A in the diet will result in retarded growth, lack of vigour, poor appetite, roughness of skin and night blindness. In case of chronic deficiency, greyish patches called 'psitot spots' appear in the sclerotic of the eyes; and the person also suffers from a condition known as phrynoderma in which small pin point projections appear, specially on the elbows, knee caps, shoulders and the back of legs giving the appearance of 'toad skin.' These skin symptoms are due to the deficiency of both vitamin A and of some essential fatty acids. In cases of extreme deficiency, the eyes become sore due to the outer layers of the eyeball becoming dry and itchy. A burning sensation along with redness, inflammation and difficulty to see in glare (photophobia) follow, leading to conditions known as 'xeropthalmia' and 'keratomalacia' resulting in blindness. In India, many children suffering from keratomalacia become permanently blind because they are not getting proper treatment in time.

Defective teeth formation, reduced resistance to infection and a tendency to form kidney stones in the urinary tract are also the results of vitamin A deficiency. An acute deficiency of vitamin A leads to sterility.

Vitamin A is not easily destroyed by heat. Carotene, also called pro-vitamin A, is the yellow pigment found in many plants and fruits and is converted to vitamin A by the body. It is an inexpensive source of vitamin A. Since vitamin A can be stored in the liver, it is advantageous to consume liberal amounts of foods rich in vitamin when they are in season.

Food Sources

Many common foods are rich in vitamin A. It should be possible for all of us to include these foods in our diet. Since vitamin A is stored in the liver, animal liver is one of the best sources of this vitamin. Some important food sources of carotene are given in Table 18.

TABLE 18*

IMPORTANT FOOD SOURCES OF VITAMIN A (CAROTENE)

(International Units (I.U.) per 100 gm.)

Green leafy vegetables	
Drumstick leaves	11,300
Agathi leaves	9,000
Curry leaves	12,600
Coriander leaves	10,600
Amaranth	11,000—25,001
Turnip greens	9,540
Gram leaves	6,700
Mustard greens	6,560
Khesari leaves	6,000

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

TABLE 18—*contd.*

	Celery	5,800—7,500
	Safflower leaves	5,500
	Neem leaves	4,600
	Spinach	2,600
	Lettuce	2,200
Fruit		
	Mango	4,800
	Papaya	2,020
	Jack fruit	540
	Red plantain	350
	Orange	350
	Tomato (ripe)	320
Milk and milk products		
	Butter	2,500
	Ghee	2,000
	Cheese	273
	Milk (whole)	180
	Curds	130
Flesh foods		
	Liver	22,300
	Cod-liver oil	20,000—60,000
	Halibut-liver oil	3,900,000
	Egg yolk	3,200
	Egg	1,000

The amount of vitamin A in butter varies according to the season and the food which the cow eats, and is less when no green grass is available.

When butter is converted into ghee by heating it to a high temperature, much of the vitamin A is lost. Fish liver oil and shark-liver oil are very rich sources of vitamin A. Nature has blessed India with a vast coastal area from where fish liver oils can easily be produced.

Requirements

Vitamin A is measured in terms of International Units. One I.U. of vitamin A is equivalent to 0·6 micrograms (or gammas) of carotene. The average adult needs 5,000 International Units while children under one year need 1,500 International Units of vitamin A daily. Two ounces of carrot or of any of the green leafy vegetables, or one tablespoonful of cod-liver oil or six cups of milk can supply the daily need of vitamin A. A greater amount of vitamin A is required during the growing period, pregnancy, lactation, illness and convalesence,

Hypervitaminosis A

Excessive consumption of vitamin A may lead to toxic symptoms constituting hypervitaminosis such as skin lesions, itching, rash, coarsening of the skin, thinning of the hair, pain in joints and haemorrhage between the bone and its covering. The toxic dose is variable in different individuals. There is definite harm if more than 50,000 I.U. of vitamin A are consumed daily.

Vitamin D

Functions

Vitamin D is also known as the 'sunshine' vitamin because it is obtained not only from certain foods but also from exposure to the ultra-violet rays of the sun. Vitamin D is essential for the normal development of bones and teeth. Bone deformities known as rickets in children and osteomalacia in adults result when an insufficient amount of vitamin D is present in the diet. Rickets are characterized by irregular dentition, stunted growth, soft and curved bones, knock-knees, enlargement of the lungs and jaw bones, curvature of the back, and pigeon chest. Osteomalacia is characterized by softened bones and pelvic deformity in women. Vitamin D is not soluble in water and cannot be destroyed by heat.

Sources

Sunshine, from which our skin forms vitamin D, is freely available in almost the whole of India. There is a fatty substance called ergosterk in the skin which becomes changed into vitamin D due to the action of the ultra-violet rays present in sunlight. Ultra-violet rays produced in the laboratory can also effect similar changes. Many kinds of fish store the vitamins A and D in their livers. Shark-liver oil which is produced in large quantities on the west coast is an excellent source of the vitamins A and D. Plants do not supply vitamin D. Only when they are exposed to ultra-violet rays is there some vitamin D in them. Milk, cream and butter contain vitamin D. The best way to get vitamin D is to allow sunshine to fall on the exposed skin.

Requirements

It is estimated that we need 400 International Units of vitamin D daily. One International Unit is the amount of anti-ricketic activity brought about by 0.025 mcg. of pure crystalized vitamin D.

Hypervitaminosis D

A daily intake of over 1,800 International Units of vitamin D may start the toxic conditions due to hypervitaminosis D. The early symptoms include thirst, lassitude and loss of appetite; these are followed by nausea, vomitting, diarrhoea, abdominal discomfort and loss of weight. Cells in various organs and arteries and arterioles become susceptible to an abnormal deposition of calcium.

Some important foods containing Vitamin D are given in Table 19.

TABLE 19
IMPORTANT FOOD SOURCES OF VITAMIN D*
(International Units per 100 grams)

Foods	
Eggs	100
Fatty fish	50—100
Butter	40
Liver	40
Milk powder (whole)	16
Milk (fresh whole)	2
Fish liver oils	
Halibut-liver oil	1,200
Shark-liver oil	50—100
Cod-liver oil	100

Vitamin E

The chemical name for vitamin E is tocopherol. This vitamin occurs as a yellow viscous oil which is insoluble in water but soluble in fat. It is stable to acids and heat in the absence of oxygen, but is readily destroyed by ultra-violet light, alkalies and oxygen. It is a naturally occurring anti-oxidant. An anti-oxidant is a substance which delays oxidation in biological materials in which hydrogen atoms are missing in the carbon chain.

Functions

Vitamin E protects vitamin A and vitamin C from oxidation, both in the digestive tract and in the body cells. Thus it helps the body to make better use of vitamin A and ascorbic acid. It also activates certain enzyme reactions.

Effects of Deficiency

In rats, vitamin E deficiency leads to permanent sterility in the male and temporary sterility in the female, due to the degeneration of the cellular material of the reproductive organs. In rabbits, muscular degeneration takes place. However, there is no conclusive evidence that vitamin E is essential to human beings.

Requirements

Because vitamin E is widely distributed in foods normally included in the diet, vitamin E deciency is not likely to develop.

Sources

It occurs mainly in plant materials, the richest sources being green leafy vegetables, whole grain cereals and vegetable oils like wheatgerm oil. Among the animal products, liver, heart, kidney, milk and eggs have some amount of this vitamin.

Vitamin K

In 1929, Dam, a Danish scientist, observed chickens developing haemorrhage under the skin, which could not be relieved by the addition of ascorbic acid to their diet. Prolonged blood clotting was also noted. These symptoms disappeared when a mixture of cereals and natural foods was given to the chickens. The anti-

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

haemorrhage factor present in the cereal mixture was located in the fat parts and was later called vitamin K from the danish term 'koagulation faktor.'

Vitamin K is a yellow coloured vitamin stable to heat and unstable to alkalis. strong acids, oxidation or light. There are two anti-vitamins K, dicoumarol and hydrocoumarol. These are used in the relief of human thrombosis, a disorder in which blood clots are formed abnormally in the blood stream. An anti-vitamin functions in a manner opposed to the vitamin.

Functions

Vitamin K is essential for the synthesis of pro-thrombin which is a precursor of thrombin needed for normal blood clotting.

Effects of Deficiency

Vitamin K deficiency in man generally results fro' .lty absorption of the vitamin or from liver disorders which interfere with the .hesis of pro-thrombin, rather than from a dietary lack of nutrients. Vitamin is supplied to the body through food. It is also made by microorganisms .ie intestinal tract. Thus there is always an adequate supply of this vitamin in .ne body. Sometimes the intake of large amounts of sulpha drugs and other antibiotics may destroy the micro-organisms which synthesize this vitamin. In cases of obstructive jaundice where bile is blocked, vitamin K is not properly absorbed.

Requirements

In the absence of liver disease, there is no need to supplement the diet with vitamin K.

Food Sources

Vitamin K occurs in plants. The best sources are lucerne, cauliflower, cabbage, spinach and other leafy vegetables. Cereals and animal products have no vitamin K.

Vitamin B_1—Thiamine

About 40 years ago, Dr. Eijkman, a Dutchman, was in charge of the health of the prisoners in a jail in Java. He had to treat several patients suffering from beriberi. One day, Dr. Eijkman noticed that the hens in the jail compound were showing symptoms of beriberi, such as weakness in the legs and incoordination in movements. He found that these hens were consuming the left-over food of the prisoners, who were also suffering from beriberi. The meals in the jail were composed of very highly polished white rice. This observation led Dr. Eijkman to come to the conclusion that both the prisoners and the hens were sick because something was wrong with their diet. Since their rations consisted mainly of polished rice, Dr. Eijkman gave unmilled rice to one group of hens and white rice with bran to another group. He found that both the groups remained healthy. Thus, it was established for the first time that beriberi resulted when bran was removed from the rice, and that bran contained some essential nutrient factors in minute quantities. This factor was identified as Vitamin B_1.

Functions

Vitamin B_1 or Thiamine is also known as the 'appetite vitamin.' It promotes growth, stimulates appetite and aids digestion. It helps in the protection of nerves and in the release of energy from carbohydrates.

Effects of Deficiency

Insufficient quantitites of thiamine in the diet result in poor appetite or loss of appetite (anorexia) , constipation, other digestive disturbances, fatigue, nervousness, vague neuritic pains, insomnia (lack of sleep) and mental depression in some cases. In extreme deficiency conditions, beriberi occurs. Beriberi is of two types, (*i*) dry beriberi and (*ii*) wet beriberi. In dry beriberi, the legs and hands become paralysed; the feet droop; tingling and numbness of legs result; and loss of appetite occurs. Aching pains develop all over the body. In wet beriberi, oedema of legs and abdomen, and enlargement of the heart result. Finally, the heart becomes weak; palpitation and breathlessness follow, leading to signs of heart failure. Beriberi has been very common in some parts of India. Wherever rice is eaten in a highly milled and polished form, without being supplemented by other protective foods, this disease manifests itself.

Requirements

Since thiamine helps in the utilization of starch and sugar, the more carbohydrates we eat, the more vitamin B_1 we need. The amount of thiamine needed daily is 0·4 milligrams for babies under one year, 0·6 to 1·2 milligrams for children, 1·3 milligrams for adolescent girls, 1·7 milligrams for adolescent boys, 1·5 milligrams for adult men, 1·2 milligrams for adult women, 1·5 milligrams for pregnant women and 1.8 milligrams for lactating mothers.

Like all other B vitamins, thiamine is also soluble in water. When vegetables and cereals are soaked in water for a long time, thiamine is extracted. This vitamin is therefore lost when the water in which they have been washed or soaked is thrown away. Thiamine is not destroyed by heat. It cannot be stored in the body.

Sources

The best sources of thiamine are whole grains, bran, hand-pounded rice, dry legumes, liver, groundnut and yeast. Other sources are eggs, fish, fresh legumes, peas, beans, milk and green leafy vegetables.

Effects of Milling on Rice

Paddy has an outer covering called husk. When the husk is removed rice grains are obtained. The rice grain has three parts:

(*i*) The little germ from which the new plant comes;

(*ii*) The outer layer covering the grain called bran which gives rice the slightly brown colour; and

(*iii*) The starchy inside called endosperm.

During milling, the germ and almost all the bran are removed. The germ and bran of paddy and other cereals contain most of the vitamins, specially thiamine. Therefore, when people consume, as in Orissa and Andhra Pradesh, large quantitities

tion. Common examples are summer boils. If the germs get into the blood stream, a general infection results. For example, many babies die from tetanus because the village *dai* cuts the umbilical cord with a grass cutter or with some other sharp thing that has not been boiled or put to the flame.

b. Organisms get into the body when they are injected into it. The malarial mosquito injects the malarial parasites into the skin.

c. Some parasites burrow through the skin. The scabies mite burrows under the skin, lays her eggs and causes irritation and itching. When scratching the fingers and other affected areas, the skin breaks and other germs enter the body.

d. Hookworms make their way into the body through the moist and soft skin between the toes. Hookworms live in warm and damp sand.

e. Germs that cause infections of the lungs, such as pneumonia, cold and tuberculosis, enter the body through the nose. Germs spreading many less common diseases also enter the body through the respiratory tract.

f. Germs such as those which cause syphilis and gonorrhoea enter the body by direct contact with the infected part of a person who has the disease.

Exit of Germs

Germs leave the body through the waste products of the body, mainly through faeces, sputum and spray from the mouth, pus and mucus that drains from sore eyes and from sores. Scales from small-pox sores contain the small-pox virus.

Most communicable diseases can be controlled by the safe disposal of all body waste. Body waste from a healthy person may contain germs that will cause disease in another person. Some people harbour and manufacture certain germs that do not make them sick but cause disease in other susceptible people. Such persons are called 'carriers' of the disease. Latrines in villages and sewage disposal plants in cities are designed to control disease.

Spread of Germs

To cause disease, germs must travel either directly, or indirectly through some agent, from a person suffering from the disease to a person susceptible to that disease. A few examples of the spread of germs are given below.

A person has active tuberculosis. He coughs and spits. The sputum contains tubercule bacilli. Somebody is near him and breathes in the contaminated air and develops the disease.

A second person has malaria. The malarial (Anopheles) mosquito sucks up some blood from his body. The malarial parasites continue to develop in the body of the mosquito. The disease is then spread further when the mosquito bites a person who does not have malaria.

Another person has typhoid or dysentery. He deposits his bowel motions on the field near the well. Two things may happen.

(*i*) Flies may sit on the motion, get their legs loaded with faeces containing germs and then fly to the food in the market and in the home. The germs would get deposited wherever they sit. When some person eats the food on which the flies have sat, the germs go into his body and he too gets the disease.

(*ii*) The filth may seep or get washed into the well, and the germs will then spread through the water in the well.

BODY REACTIONS

Nature provides the body with both chemical and physical means of protection against disease. For example, tears keep the eyes washed so that germs cannot usually lodge there to cause infection. The mucous membranes of the nose, throat and mouth are moist with a substance that destroys most bacteria. The digestive juices in the stomach and small intestines destroy many germs that reach this part of the body. The body has a general defence against disease through inheritance, nutrition, health, safety practices and other factors in the physical and social environment.

When pathogenic organisms gain entry into the tissues, a localized or a generalized infection, or both, may develop. Blood contains white cells that are known as the soldiers or protectors of the body. When disease germs enter the body, the white blood cells increase in number to fight the invading organisms. Some organisms that cause diseases like measles, chicken-pox or smallpox, set up a generalized infection in which the whole body reacts to the invading organisms. In these conditions, there is first a period of incubation in which the organism develops. The infected person may feel well during the first few days of the incubation period. Then he may feel chilly and feel like staying in bed. He may also have signs of a cold, and then have fever and a rash. Recovery is usually rapid after the rash develops, specially if he had good, sound health before the attack. The body develops a certain immunity during the course of some of the communicable diseases.

DISEASE IMMUNITY

Immunity refers to the reaction of cells and tissues to an infection. It generally refers to protection against a specific disease.

It may be developed in several ways as follows:

a. *By having the disease :* During the course of some diseases, the body manufactures 'antibodies' that protect the body from that disease. For example, a person who has had smallpox once will not have it again.

b. *By vaccination or inoculation* : This is called artificial immunization.

An injected substance stimulates the cells to produce 'immune agents' that protect the body against a specific disease. Typhoid inoculation protects a person against typhoid, while tetanus toxoid protects the body against tetanus. Immunity may last for life or it may last from six months to six years. For example, if a child has been vaccinated for smallpox when he was three months old, he should be re-vaccinated when he enters school, or if he is exposed to a person suffering from smallpox. Immunity obtained from smallpox vaccination may not last more than three to seven years, or it may last a lifetime.

PREVENTIVE METHODS

Here we have described very briefly the communicable diseases most commonly found in the villages and some simple methods of preventing them. Most of these diseases can be prevented by establishing and practising personal and environmental hygiene. Control requires cooperation between the health officials and the public. One family in the village may have a very clean home and practise good personal hygiene; but if flies breed in and around the open drains near its house, it is not safe from such diseases as typhoid, cholera and dysentery.

No single activity will prevent disease. A combination of many methods is needed. For example, to control such filth diseases as cholera, typhoid and dysentery, safe water, safe disposal of body waste, safe food, hand washing and fly control are essential.

Tables 5 to 9 indicate the diseases spread through different agencies.

TABLE 5

DISEASES SPREAD BY FAECES AND OTHER FILTH

	Preventive Measures	*Typhoid*	*Dysentery*	*Jaundice*	*Cholera*	*Hookworm*	*Other Intestinal Parasites*	*Scabies*
1.	Drink safe water to prevent	x	x	x	x			
2.	Use properly constructed latrines to prevent ..	x	x	x	x	x	x	
3.	Destroy flies to prevent	x	x		x			
4.	Wash hands with soap and water to prevent	x	x	x	x	x	x	x
5.	Wear shoes to prevent					x		
6.	Immunize to prevent	x			x			

TABLE 6

DISEASES SPREAD BY AIR (OR PARTICLES OF DUST AND SPRAY)

Principal Preventive Measures	*Tuber-culosis*	*Cold*	*Pneu-monia*	*Small-pox*	*Diph-theria*	*Measles*	*Whoop-ing cough*	*Chic-ken-pox*
1. Sleep, work and study at least five feet away from all other persons to help prevent ..	x	x	x	x	x	x	x	x
2. Avoid contact with a person sick with the disease to help prevent	x	x	x	x	x	x	x	x
3. Burn sputum to help prevent	x	x	x	x	x		x	
4. Wash hands with soap and water often and before eating to help prevent	x	x	x		x		x	
5. Cover and catch a cough or sneeze to help prevent	x	x	x		x	x	x	
6. Have an X-ray examination of chest every year to help prevent	x							
7. Immunize to prevent	x		x		x		x	

TABLE 7

INSECT-BORNE DISEASES

Preventive Measures	*Mala-ria*	*Fila-ria*	*Typhus*	*Plague*	*Dengue Fever*	*Kala-Azar*	*Ence-phalitis Jap.* 13
1. Destroy mosquito—							
(*a*) Spray the house with D.D.T. or Gammexane every six months and after the monsoons	x	x	x	x	x	x	x
(*b*) Spray mosquito breeding areas	x	x			x	x	x

of milled rice from which bran has been removed without adding protective foods to the diet, beriberi occurs.

Parboiling of Rice

In Madras and Kerala, parboiling of rice is a common practice. In this process, paddy is soaked in water for a night, boiled for a short time, dried and husked. A similar procedure has been adopted in the U.S.A. for the preparation of 'converted rice.' During parboiling the vitamins in the husk and bran penetrate into the starchy endosperm. The vitamins are thus conserved. Beriberi is therefore not prevalent even amongst the very poorly nourished people of Madras and Kerala. Consumption of parboiled and hand pounded rice should be promoted in all the rice-eating areas.

TABLE 20

SOME IMPORTANT FOOD SOURCES OF THIAMINE*

(mgm. per 100 gm.)

Cereals	
Wheat (whole)	0·5
Barley	0·5
Oatmeal	0·5
Ragi	0·4
Bajra	0·3
Italian millet	0·59
Parboiled rice	0·27
Rice (raw, unmilled)	0·28
Rice (raw, hand pounded)	0·24
Rice (puffed from paddy)	0·22
Rice (parboiled, milled)	0·21
Pulses	
Bengalgram	0·3
Greengram	0·5
Redgram	0·4
Blackgram	0·4
Lentil (*masur*)	0·5
Soyabeans	0·73
Field beans	0·5
Flesh foods	
Liver	0·4
Meat	0·2
Egg	0·27
Nuts and oilseeds	
Gingelly seed	1·00
Groundnut	0·90
Cashewnut	0·63
Pistachio	0·67
Walnut	0·45
Almond	0·44
Other foods	
Brewer's yeast	6·0

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

Riboflavin—Vitamin B_2

Functions

Riboflavin is a yellow substance possessing a green florescence. It is concerned with the oxidation of carbohydrates, proteins and fats. It is found in every living cell. It promotes growth and general health. It prolongs the life span and is essential to nerve tissues and for cell respiration.

Being water-soluble, riboflavin is likely to be lost when the water in which vegetables have been washed is thrown away. The vitamin is destroyed by light. Foods containing riboflavin like milk and milk products should not, therefore, be exposed to light. This vitamin cannot be stored in the body and must be supplied daily in the diet.

Effects of Deficiency

Digestive disturbances, impaired growth, lack of vigour, dimness of vision and defective release of energy from foods result when the diet does not provide sufficient quantitites of riboflavin. Two types of diseases are associated with the deficiency of riboflavin; one is of the skin and the other, of the eyes. Sores on the lips, scaliness around the nose and ears (dermatitis), cracks or fissures in the corners of the mouth (cheilosis and angular stomatitis) and inflammation of the tongue (glossitis) are some of the skin manifestations. Due to the deficiency of riboflavin, there is a burning sensation in the eyes; blood vessels grow into the cornea, causing inflammation and resulting in a condition called 'corneal vascularization.' In extreme conditions, this may lead to the formation of cataract.

Sources

Food sources of riboflavin include yeast, liver and other animal organs, eggs, milk and milk products, whole wheat *atta*, fish, green beans and peas, dried legumes, oatmeal and leafy green vegetables such as *agathi*, amaranth, drumstick leaves, *methi* leaves, mustard leaves, lettuce, cabbage, spinach, etc. Some important foods containing ribofavin are given in Table 21.

TABLE 21
IMPORTANT FOOD SOURCES OF RIBOFLAVIN*
(mgm. per 100 gm.)

Pulses	
Bengalgram	0·5
Lentils (*masur*)	0·5
Peas (dried)	0·5
Redgram	0·5
Greengram	0·38
Soyabean	0·32
Cereals	
Cholam	0·36
Barley	0·24
Wheat (whole)	0·12
Rice(raw, hand pounded)	0·12

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

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TABLE 21—*contd.*

Green leafy vegetables	
Amaranth	0·10
Fenugreek	0·16
Spinach	0·11
Nuts and oilseeds	
Groundnut	0·3
Other foods	
Yeast	4·00
Liver	1·7
Egg yolk	0·35
Cow's milk	0·20

Requirements

The requirement of riboflavin ranges from 1·5 to 2·00 milligrams per day for adults and adolescents, and from 0·7 to 1·4 milligrams per day for children.

Niacin—Anti-Pellagra Vitamin

Niacin was formerly called nicotinic acid. The word 'niacin' is derived from 'nicotinic acid vitamin.'

Functions

Niacin promotes growth and health. It helps the digestive glands and the skin in functioning normally. Niacin, like the other B vitamins, takes part in the metabolism of carbohydrates, fats and proteins and helps the body in obtaining energy from food. It is stable to air, light and heat. However, since it is soluble in water, cooking methods should be such as to keep its loss to the minimum. It is not stored in the body.

Effects of Deficiency

Severe deficiency of niacin leads to a disease called pellagra, meaning 'rough skin.' In pellagra, the early symptoms are forgetfulness, insomnia, irritability, fear, depression, loss of appetite and poor utilization of food. The mouth and tongue become sore and the skin gets affected with dark pigmentation and dermatitis in the exposed parts. Diarrhoea and anaemia result if the disorder progresses. Manifestations of partial deficiency of niacin are red tongue, roughness of skin, indigestion and weakness. The skin becomes red, specially along such symmetrical portions of the body as the palms or cheeks which are exposed to the light. Dermatitis is aggravated by sunlight and heat, and then the lesions itch and burn. Lack of niacin also produces acute mental depression, confusion and disorientation. Finally dementia and paralysis occur. Because of all these manifestations, pellagra is called the disease of three D's—diarrhoea, dementia and dermatitis.

Sources

The food sources of niacin are mutton, liver and other animal organs, bran, groundnuts, beans, potatoes, milk and milk products, eggs, and green leafy vegetables

such as amaranth, *agathi*, drumstick leaves, *methi* leaves, mustard leaves, lettuce, cabbage, spinach, etc. Groundnut is an excellent source of niacin.

TABLE 22
CONTENT OF NIACIN IN SOME IMPORTANT FOOD SOURCES*
(mgm. per 100 gm.)

Cereals	
Bajra	3·2
Barley	4·7
Rice (hand pounded and parboiled)	4·0
Rice (raw and husked)	2·3
Rice (raw, home pounded)	2·3
Whole wheat	5·0
Pulses	
Bengalgram	2·6
Redgram	2·4
Soyabean	2·4
Blackgram	2·0
Vegetables	
Curry leaves	2·3
Drumstick	0·8
Potatoes	1·2
Nuts and oilseeds	
Groudnut	14·1
Gingelly seed	4·4
Almond	2·5
Cashewnut	2·1
Flesh foods	
Liver	17·6
Meat	6·8
Fish	3·0
Other foods	
Brewer's yeast	40·0

Requirements

The requirement of niacin seems to be 6 to 15 milligrams for children, and 10 to 18 milligrams for adults.

Other Members of the B Group of Vitamins

Vitamin B_6

Vitamin B_6 has been called 'pyrodoxine.' It is associated with several enzyme systems which aid in metabolism, the utilization of amino acids and fatty acids in the body, and the release of energy.

The three symptoms of vitamin B_6 deficiency observed in human beings are skin lesions, anaemia and convulsive seizures.

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

Requirments

The human requirement of vitamin B_6 has not been definitely estimated; but it is suggested that a daily intake of 1 to 2 milligrams is necessary. Since this vitamin is widely prevalent in plant and animal foods, there is no likelihood of its deficiency.

Food Sources

Liver, green chillies, brewer's yeast, fish, lettuce, egg yolk, wheat and lemons are good sources of this vitamin.

Pantothenic Acid

Pantothenic acid is needed for the metabolism of carbohydrates, fats and proteins.

Functions

Pantothenic acid functions as part of the enzyme systems (coenzyme A) connected with the metabolism of carbohydrates, fats and proteins.

Requirements

The daily requirement for pantothenic acid is not yet known. It has been suggested that about 10 milligrams per day would be adequate for adults.

Sources

The word 'pantothenic' is derived from Greek and means 'from everywhere.' It is found in all plant and animal tissues. The richest sources of this vitamin are liver, kidney, yeast, egg and fresh vegetables. Milk, meat, grains, fruits and nuts are also good sources of pantothenic acid. However, egg-white, beet, maize and rice are poor sources.

Biotin

Functions

Biotin also appears to be an essential part of certain coenzymes involved in the metabolism of carbohydrates, fats and proteins.

Effects of Deficiency

Biotin is widely distributed in foods. It is also synthesized in the intestinal tract. Therefore, it is very unlikely that biotin deficiency will occur in man. Biotin deficiency, induced experimentally by feeding low biotin diet to male subjects, resulted in the development of a fine scaliness in the skin in all the subjects by the end of one month. Two months later, mild depression, extreme weariness and sleepiness and a high degree of sensitiveness of the skin, anorexia and nausea also developed.

Requirements

The human requirement of biotin has not yet been established. Probably 1·5 to 3 milligrams per day will meet the needs of an adult.

Sources

The richest food sources are kidney, liver, eggs, milk, fresh vegetables and some fruits.

Folacin

Functions

Folacin was formerly called Folic acid. It is necessary for normal blood formation (hematopoiesis). It stimulates the red blood cell formation in the bone marrow, and also the formation of white blood corpuscles. It appears to be involved in the metabolism of the amino acids, tyrosine and phenylalanine. It also seem to have a sparing action on choline.

Effects of Deficiency

Since folacin functions in the maturation of the red blood cells, the deficiency of this vitamin may lead to a certain type of human macrocytic anaemia. After the red blood cells are produced in the bone marrow, they msut undergo a process of growth and development called 'maturation' before they can be discharged into the blood stream. The mature blood cell is called an 'erythrocyte.' The process of maturation is dependent on the action of some enzyme systems, and it is in this way that folacin functions as part of a coenzyme.

Requirements

The actual human requirements of folacin are not known. It has been suggested that a daily intake of less than a milligram will meet the requirements of an adult.

Food Sources

Chicken, liver, leafy vegetables and legumes are good sources of this vitamin. Milk and eggs contain it in very small amounts.

Vitamin B_{12}

Functions

Vitamin B_{12} is one of the most recently discovered vitamins. It is effective in relieving pernicious anaemia. Pernicious anaemia is a chronic disease characterized by macrocytic anaemia, glossistis, and neurological disturbances. Stiffness of legs, irritability, drowsiness and depression are some typical neurological symptoms experienced by pernicious anaemia patients.

It is known that the gastric juice of pernicious anaemia patients lacks a substance present in the gastri secretions of normal persons. It is called 'intrinsic factor'. This, along with a substance present in foods and called 'extrinsic factor,' is effective in the treatment of pernicious anaemia. Vitamin B_{12} is the 'extrinsic factor'. Vitamin B_{12} also stimulates the formation of red blood cells and promotes growth in animals and human beings.

Effects of Deficiency

Pernicious anaemia is the result of Vitamin B_{12} deficiency.

Requirements

Between 0.5 and 2 milligrams of vitamin B_{12} per day per person are recommended, depending on age and physiological state.

Sources

Animal foods are the chief sources of vitamin B_{12}. Liver, kidney, beef, milk, meat and fish are good sources of vitamin B_{12}, while cereals, vegetables and legumes are poor in it.

Choline

Choline helps in the metabolism of proteins, in the synthesis of amino acids and in fat metabolism. It also serves as the precursor of the 'acetyl choline which is necessary for the transmission of nerve impulses in the nervous system. Choline is found in large amounts in the human body. Therefore, no human requirement for choline has been suggested. The richest animal sources of choline are egg yolk, glandular meats and brain. Among the plant sources, wheat germ and legumes are the richest.

Inositol

Inositol occurs with the B complex group of vitamins in foods. More research needs to be done on its role and requirements in human nutrition. Heart, liver, wheat germ, yeast and whole grain cereals are the food sources of inositol.

There are some other members of the vitamin B complex also whose functions in human nutrition are yet to be defined.

In general, brewer's yeast, groundnut, wheat germ, milk, egg yolk and leafy vegetables are good sources of the B vitamins. When a diet is sufficient in thiamine, riboflavin and niacin, it is likely to be adequate in all the other B vitamins also.

Vitamin C (Ascorbic Acid)

A few centuries ago, scurvy was commonly prevalent in northern and central Europe. It usually occurred in the very early spring before fresh fruits and vegetables were available. For several hundred years, when sea-faring men and explorers used to go out to the sea, they could not get varied diets. Lack of fresh foods, specially vegetables, was the chief defect in their meals. They gradually developed scurvy. They complained of getting tired easily. Their legs began to swell and their joints ached as if they had rheumatism. Purple patches appeared in several parts of the body, the gums bled and the teeth become loose. The sailors became depressed and quarrelsome. During many explorations of the world in the fifteenth and sixteenth centuries, including the voyage around the Cape of Good Hope in 1497 of Vasco da Gama, several hundreds of the crew died of scurvy. In 1747, James Lind, a ship's surgeon in the British Navy began to experiment with lime juice to prevent scurvy on the sailors of the ship HMS Salisbury and succeeded in arresting its occurrence. This gave rise to the nickname 'limey' for British sailors. In 1933, the anti-scurvy factor was identified as ascorbic acid.

Functions

Vitamin C is essential for the formation of teeth and bones, the repair of tissues, and the healing of wounds and fractures. It is necessary for all the connective tissues and blood, and for the formation and maintenance of the intercellular cementing substance between the cells. It seems to be necessary also for the maturation of blood cells. It is water-soluble and is very easily destroyed by exposure to air, heat or water. It is stable in acid solutions but is sensitive to alkalies. Therefore, when soda is added while cooking food, vitamin C is lost. Exposure to air also destroys it because of oxidation. Vitamin C foods should always be kept covered. To conserve vitamin C in foods, cutting them into tiny pieces must be avoided, the minimum water should be used for cooking them, and the foods should be kept covered. Cooking under pressure is desirable since the cooking time will be saved in the procedure. The body cannot store this vitamin. Therefore, foods rich in vitamin C must be included in the daily diet.

Effects of Deficiency

Insufficiency of vitamin C makes the gums soft, tender and bleed readily. Cuts and wounds take a long time to heal. The skin bruises easily. The body is less resistant to diseases and infections. Jaws become swollen and tender. Premature signs of old age appear in the young. In the case of acute deficiency, scurvy characterized by the following symptoms develops: weakness, irritability, bleeding under the skin and in the joints, bleeding gums, failure to heal or delay in the healing of wounds, anaemia and weak bones.

Sources

There are many food sources of vitamin C, the most important ones being citrus fruits like limes , lemons, oranges, *mosambis*, grape fruits and tomatoes. Vitamin C is found in considerable amounts in fresh mangoes, papayas and other fruits. Cauliflowers, green leafy vegetables, raw cabbages, green chillies and other vegetables also supply vitamin C. Guavas and sprouted gram are valuable sources of vitamin C. *Aonla* (*nelli kayi*) is the richest known food providing vitamin C. An *aonla* contains the same amount of vitamin C as an orange or half a cup of sprouted gram or three limes or an ounce of green leafy vegetables or half a guava.

Milk is a very poor source of vitamin C and, therefore, infants should have their diets supplemented with vitamin C foods. Orange or tomato juice should be included in their diets.

TABLE 23
IMPORTANT FOOD SOURCES OF VITAMIN C*
(mgm. per 100 gm.)

Fruits	
Amla	600
Guava	299
Orange	68
Lime juice	63
Pineapple	63

*Health Bulletin No 23, Manager of Publications, Government of India, Delhi.

TABLE 23—*contd.*

Gooseberry	49
Cashew fruit	60
Papaya	46
Lemon	43
Tomato (ripe)	32
Green leafy vegetables	
Amaranth leaves	173
Neem (tender)	281
Drumstick leaves	220
Ipomoea leaves	137
Coriander leaves	135
Cabbage	124
Lettuce	120
Brussels sprouts	72
Spinach	66
Celery	62
Manathakkali	11
Other vegetables	
Drumstick	120
Bitter gourd	88
Beetroot	88
Knol-khol	85
Cauliflower	66
Cluster beans	49
Turnip	43
Flesh foods	
Liver	20

Requirements

Children under one year need 30 milligrams of vitamin C daily; others need between 50 and 70 milligrams.

How to Prepare Sprouted Grams

Soak greengram or any other gram in water for 12 hours; remove the water; spread the soaked gram on a damp cloth; and tie it into a bundle. Cover it with a utensil and keep it aside for 24 to 36 hours. During dry seasons, water may be sprinkled on the damp cloth from time to time. The gram will sprout within 24 to 36 hours. It should be consumed raw, separately or as an ingredient of salads, or with lime juice, salt and shredded coconut.

Interrelation between Vitamins

More and more evidence is now available that vitamins and other nutrients are interdependent for their activities in the body. The members of the B group assist each other in utilizing food and releasing energy from it, i.e. in the metabolism of carbohydrates, fats and proteins. Vitamin A and vitamin C work together for normal bone development and a smooth skin. Vitamin A and riboflavin maintain

growth, healthy skin and reproduction. Thiamine deficiency lowers the retention of riboflavin in the body. Vitamin E helps in the utilization of carotene.

Some foods contain factors which work against the vitamins present in them. They are known as anti-vitamins. The avidin of egg white works against Biotin. Dicoumerol, present in some leafy vegetables, reacts against vitamin K.

Since all the vitamins work in cooperation with other nutrients in the body, an excess or deficiency of a single vitamin might upset the balance in the body and lead to complications. Nature has provided many vitamins in the best possible combinations in certain foods—milk, leafy green vegetables, eggs and groundnut. It is always desirable to depend on the natural foods for the daily supplies of vitamins.

Antibiotics in Nutrition

Antibiotics are therapeutic agents in the treatment of certain diseases. The term antibiotic comes from Greek and means 'against' life. This term is used for compounds which function to destroy bacteria.

Recently, antibiotics have been recognized as having some nutritional values, particularly for domestic animals. Antibiotics such as terramycin, aureomycin and penicillin are found to stimulate growth when added to diets containing sub-optimal levels of certain B vitamins (thiamine, riboflavin, vitamin B_6 and panthothenic acid).

The kind of protein in the diet influences the effectiveness of antibiotics in stimulating growth. Precisely how antibiotics function to stimulate growth and spare certain dietary nutrients, remains to be explained. The mode of action seems to be in the control of the harmful bacteria in the environment. They may act to reduce the level of the harmful bacteria in the intestinal tract or increase the level of the organisms that help synthesize nutrients and decrease the level of those bacteria which compete with the animal for the essential nutritive factors.

CHAPTER 14

ENERGY REQUIREMENTS—HOW MUCH FOOD ONE NEEDS

One of the important functions of food is to supply energy to the body. The body uses energy every moment for the never-stopping heartbeat, respiration, work of kidneys, muscular tonus and other activities. It has been estimated that the heart alone does an amount of work each hour equivalent to that of lifting the entire body about a hundred feet in the air.

When one is asked the question, 'how much food should be consumed?' the answer can be given in terms of the number of Calories needed per day; for the fuel value of food is measured in terms of Calories.

THE CALORIE

Since the energy spent by the body appears in the form of heat, scientists have worked out methods by which the amount of food required can be measured through the heat produced by them. A Calorie in nutrition is spelt with a capital 'C' and is a thousand times larger than the calorie used in physics. It is the amount of heat required to raise the temperature of 1 kilogram (2·2 pounds) of water through one degree centigrade.

One gram of carbohydrate or protein makes available four Calories in the body while one gram of fat releases nine Calories. If an ounce of milk contains 0·9 grams of proteins, 1·1 grams of fats and 1·4 grams of carbohydrates, a cup of milk measuring eight ounces will give

$8 \times 0{\cdot}9 \times 4 = 28{\cdot}8$ Calories through proteins
plus $8 \times 1{\cdot}1 \times 9 = 79{\cdot}2$ Calories through fats
plus $8 \times 1{\cdot}4 \times 4 = 44{\cdot}8$ Calories through carbohydrates

Total $= 152{\cdot}8$

After several years of experimentation, nutritionists have made available to us the Calorie value of most foods. All foods except water, salts and vitamins yield Calories. The Calorie value of a few commonly used foods are reproduced below.

TABLE 24

CALORIE VALUE OF SOME IMPORTANT FOODS*

Foods	*Per ounce*	*Per 100 grams*
Cereals		
Oatmeal	106	374
Bajra	102	360

*Health Bulletin No. 23, and 'Food Composition Tables—Minerals and Vitamins—for International Use' by F.A.O.

TABLE 24—*contd.*

Jowar	101	355
Rice (raw, home pounded)	100	351
Rice (flakes)	99	350
Rice (raw, milled)	99	348
Rice (parboiled, milled)	98	346
Wheat (refined)	99	349
Wheat (whole)	99	348
Pulses		
Soyabean	123	432
Bengalgram (without outer husk)	106	372
Blackgram	100	350
Peas (dried and roasted)	102	358
Khesari	100	351
Field beans (dry)	130	347
Lentil	98	346
Greengram	95	334
Redgram (masur)	95	333
Roots and tubers		
Tapioca	45	159
Sweet potato	37	132
Colocasia	29	101
Potato	28	99
Canna (edible)	28	97
Yam (ordinary)	33	115
Yam (elephant)	22	79
Beetroot	18	62
Onion (small)	18	61
Banana root	15	52
Carrot	13	47
Other vegetables		
Jack fruit seed	52	184
Singhara	33	117
Peas (English)	31	109
Double beans	40	89
Artichoke	22	79
Leeks	22	77
Bitter gourd (small variety)	17	60
Plantain (green)	19	66
Broad beans	17	59
Cluster beans	16	56
Aonla	17	59
Jack, (tender)	14	51
Cauliflower	11	39
Brinjal	10	34

TABLE 24—*contd.*

Mango (green)	11	39
Onion stalk	12	41
Turnip	10	34
Snake gourd	6	22
Pumpkin	8	28
Nuts and oilseeds		
Walnut	195	687
Almond	186	655
Pistachio	178	626
Cashewnut	169	596
Gingelly seed	160	564
Groundnut (roasted)	159	561
Coconut	126	444
Fruits		
Raisin	91	319
Dates	80	283
Tamarind pulp	80	283
Pear (avocado)	61	215
Custard apple	30	105
Plantain (ordinary)	30	104
Plantain (red variety)	29	101
Jambu fruit	24	83
Pomegranate	18	65
Wood apple	28	97
Guava	19	66
Zizyphus	16	55
Lime	17	59
Pineapple	14	50
Mango	14 to 16	50 to 55
Loquat	13	46
Rose apple	12	43
Papaya	11	40
Pear (country)	13	47
Milk and milk products		
Milk (cow)	18	65
Milk (buffalo)	33	117
Curds	14	51
Skimmed milk	4	29
Skimmed milk powder	101	357
Cheese	99	348
Butter	210	716
Ghee	256	879
Cream (thin)	59	208
Cream (double)	107	377

TABLE 24—*contd.*

Flesh foods		
Mutton	55	194
Egg (hen)	49	173
Liver	43	150
Chicken	31	109
Fish (Mangalore, small)	28	100
Green leafy vegetables		
Amaranth	13	47
Agathi	26	93
Gram leaves	25	87
Curry leaves	27	96
Drumstick leaves	28	97
Miscellaneous food-stuffs		
Cod-liver oil	256	900
Halibut-liver oil	256	900
Red palm oil	256	900
Jaggery	109	383
Sago	100	351
Makhana	99	348
Singhara (dry)	95	336
Arrowroot flour	95	334
Brewer's yeast (dried)	91	320
Sugarcane preserve	90	370
Pine vegetable oil	264	924

FACTORS WHICH DETERMINE ENERGY NEEDS

The four factors which determine the total energy needs of an individual are the basal metabolism, the physical activity, the maintenance of body temperature and the specific dynamic action of foods.

Basal Metabolism

The term 'metabolism' denotes broadly all the changes which take place in the living cells of the body. Some activities are concerned with creating or constructing new substances from food (growth and repair); others are involved in maintaining the normal composition of body tissues (health and balance); while yet others are responsible for breaking down food for extracting energy.

The term 'basal metabolism' may be defined as the amount of heat given off by a person during rest—physically, emotionally and in digestive processes. It represents the amount of energy needed to carry on the vital life processes of the body, *i.e.*, the activity of the heart, kidney and other organs as well as the metabolic process within the cells.

'Basal energy metabolism' is thus the measurement of the rate of energy expenditure of a person who is awake but lying still and who has not taken any food

during the previous 12 to 14 hours, so that little digestion or absorption of food materials is taking place at that resting stage. The basal metabolism of an individual may be measured either by direct or indirect Calorimetry. In indirect Calorimetry, which is the procedure universally used, the amount of oxygen consumed is measured and computed in terms of Calories, since a unit measure of oxygen is known to be equivalent to a given number of Calories, when certain foods and food nutrients are oxidized. The machine used most widely to measure basal metabolism is known as the 'Benedict Roth Apparatus' which measures the amount of oxygen used by an individual. Basal energy metabolism excludes the energy needed for physical activity, the maintenance of body temperature and the specific dynamic effect of food.

Computation of Basal Metabolism

In a healthy, grown-up individual, the 'Basal Metabolic Rate' (B.M.R.) is approximately a Calorie per kilogram (2·2 lb.) of body weight per hour. Thus if a man weighs 70 kilograms, his basal metabolism energy need per day will be $70 \times 24 = 1,680$ Calories. This means that 1,680 Calories are needed by this man to maintain his basic functions such as heart-beat, breathing, pulse rate, elimination, etc.

Physical Activity

To get the total energy requirement, we must add to the basal metabolic figure the energy needed for work and for additional activities. Any physical activity increases the energy expenditure above the basal Calorie need. Next to the energy expenditure for basal metabolism comes the energy expenditure for physical work for a moderately active man or woman but the very active athlete will spend more energy on physical activity than on basal metabolism. A normal person, however sedentary he or she may be, spends much more energy than the basal requirement, because even an activity like sitting involves almost double the expenditure of energy required for lying still.

The Basal Metabolic Rate (B.M.R.) is useful in medicine as a tool in diagnosing certain disorders and diseases. Conditions of hypothyroidism and hyperthyroidism can be recognized from the measurement of the basal metabolism.

Factors which Affect Basal Metabolism

The factors which may affect the basal metabolism are body size, sex, type of body composition, age, climate, status of health (fever, malnutrition, semi-starvation, etc.), secretions of hormones, pregnancy, lactation and growth.

ıdy Size

Basal metabolism is proportionate to the surface area of the body. The basal metabolism of two persons of the same height and age, or of the same weight and age, may differ because of the variation in the body form of the individuals. For example, let two blocks A and B represent two men who are of the same age and body weight but are different in shape, A being tall and B being short. Even though both blocks are identical in volume and weight, the surface area of block A is about 1/3

larger than that of block B. Thus, the tall man will have a higher basal metabolism per unit of body weight than the shorter man of the same weight.

Again let block C represent a thin man and block D represent a stout man, the two men being of the same height and age, but the thin man weighing only half as much as the stout man. Here also the surface area of the stout man is only about 1/4 times greater than that of the thin man, not twice as great. These examples show the important relationships that the size and shape of the body bear to the actual basal heat production of an individual.

Types of Body Composition

The types of tissues which constitute the body influence basal metabolism. In muscle tissues, where oxidative changes are taking place constantly, more energy is spent than in fatty tissues. Therefore, the athletic type of man with his well-developed muscles will have a higher basal metabolism than a non-athlete of equivalent body surface.

Sex

Men seem to have five per cent higher heat production than women of proportionate age and body size. However, this higher value is not due to the sex difference, but because of the smaller amount of fat tissue found in men, as compared to women.

Age

The Calorie requirement reaches its highest point at about 18 months of age. Thereafter, there is a slight decrease until the period of adolescence, when the need rises again. After the completion of growth, from the age of 20 onwards, there is a gradual decline in the basal heat production throughout life. Thus, the basal metabolism of a 75-year-old man appears to be lower by about 20 per cent than that of 20-year-old man.

Climate

There are indications that people living in the tropics have lower metabolic rates.

Status of Health

During fever, malnutrition or semi-starvation, the basal metabolism is affected. In fevers where there is an elevation of body temperature, there is an increase in the basal heat production. For each rise by one degree Fahrenheit above the normal temperature, the basal rate is increased by about seven per cent. For example, when the body temperature is 103·6° F, which is five degrees above normal, the basal metabolism will be increased by 35 per cent. Malnutrition lowers the basal metabolism. Under-nourished children whose diets are very inadequate in Calories, have lower metabolic rates.

Secretion of Ductless Glands—Hormones

The secretion of the thyroid gland has more influence on the regulation of metabolic rate than the secretions of any other endocrine gland. When the thyroid gland oversecretes (hyperthyroidism), the Basal Metabolic Rate increases, and when it undersecretes (hypothyroidism), the Basal Metabolic Rate decreases. Increases

in basal metabolism from 75 to 100 per cent have been found in cases of exophthalmic goitre (hyperthyroidism), whereas in cases of myxedema (hypothyroidism), the metabolic rate may be lowered by as much as 40 per cent. Adrenalin causes a temporary rise in heat production. Certain fractions of the pituitary secretion stimulate the thyroid and adrenal glands.

Pregnancy, Lactation and Growth

During pregnancy, because the total active tissues increase, due to the development of the foetus and the enlargement of maternal tissues, there is a corresponding increase in the Basal Metabolic Rate. Pregnant women have been observed to register as much as a 15 to 23 per cent increase in the metabolic rate just before delivery. The same increase may not occur during lactation.

In children, the periods of rapid growth are associated with increased basal metabolism, the most rapid growth period being infancy. A baby doubles its weight during the first five or six months of its life and triples it by the end of twelve months. At the end of the first year of life, the Basal Metabolic Rate, per square meter of body surface, is the highest in the lifetime of an individual. At adolescence, there is again a rapid increase in the Basal Metabolic Rate. Because of his more active growth, the growing child has a higher rate of energy expenditure per unit of his weight than the adult.

The following Table gives the rate of energy expenditure for the various physical activities.

TABLE 25

ENERGY EXPENDITURE PER HOUR UNDER DIFFERENT CONDITIONS OF MUSCULAR ACTIVITY*

Form of activity	*Calories per hour per kilogram of body weight*
Sleeping	0·93
Awake, lying still	1·10
Paring potatoes	1·20
Sitting	1·43
Reading aloud	1·50
Standing relaxed	1·50
Hand sewing	1·59
Book binding	1·60
Standing at laboratory work	1·63
Knitting	1·66
Dressing and undressing	1·69
Singing	1·74
Driving an automobile	1·90
Typewriting rapidly	2·00

*'Essentials of Nutrition' by Henry C. Sherman and Carolin Sherman Lanford, New York, Macmillan Co.

ENERGY REQUIREMENTS

TABLE 25—*contd.*

Form of activity	*Calories per hour per kilogram of body weight*
Dish washing	2.06
Ironing (5 pound iron)	2.06
Laundry (light)	2.30
Sweeping	2.41
Walking (2·6 miles per hour)	2.86
Carpentry metal working	3.43
Bicycling, (moderate speed)	3.50
Dancing, light	4.00
Walking (3.75 miles per hour)	4.28
Dancing briskly	4.80
Walking down stairs	5.20
Horse riding	5·30
Sawing wood	6.86
Swimming	7.14
Running (5.3 miles per hour)	8.14
Playing Pingpong	8.80
Walking (5.3 miles per hour)	9.28
Walking up stairs	15.80
Rowing	17.00

The Maintenance of Body Temperature

The body maintains its normal temperature at about 98·6° F or 37° C by biochemical and physical means. The biochemical regulation involves the production of heat within the cells from the metabolism of the energy nutrients; the physical regulation involves the heat loss or conservation.

The Specific Dynamic Effect of Food

The increased heat production brought about by the ingestion of food is referred to as the 'specific dynamic effect.' On an average, the energy expenditure on the specific dynamic effect is six to eight per cent of the total energy expenditure of the basal metabolism and physical activities.

TOTAL CALORIE REQUIREMENT

From the above considerations, the total daily energy requirement of individuals can be calculated as follows:

(*a*) Energy needed for the basal functions $\frac{\text{Weight of the person in } kg. \text{ } i.e., \text{ wt. in lbs.}}{2{\cdot}2} \times 24$

(From this figure, ·07 × the number of hours spent in sleep should be deducted, as the energy expenditure in sleep is less than the B.M.R.)

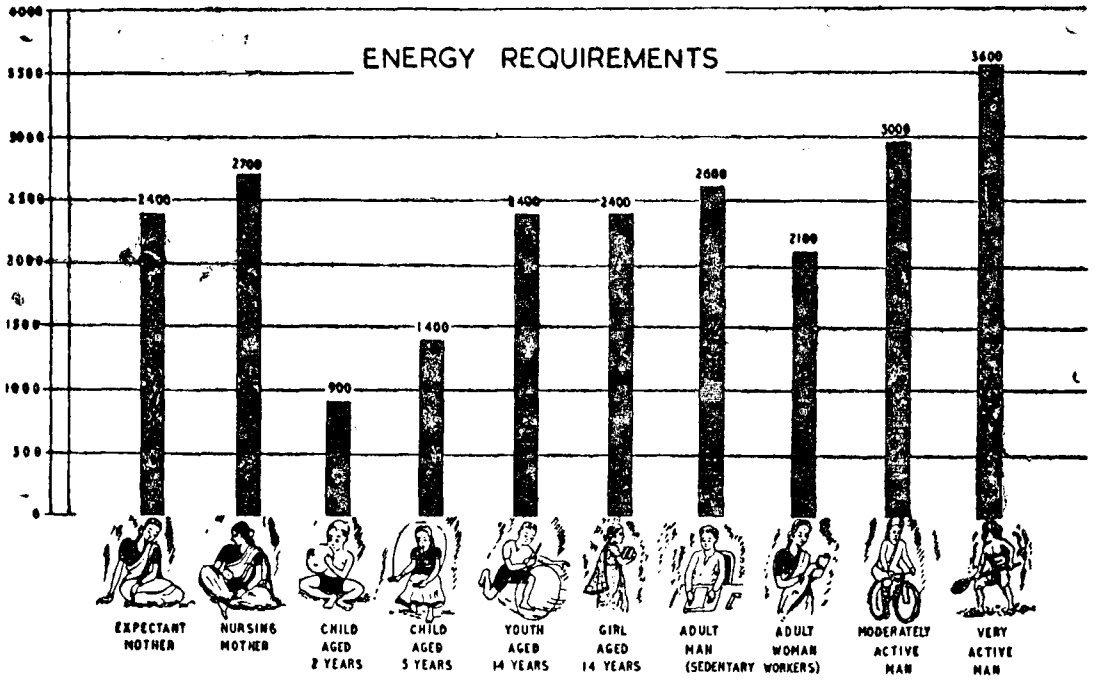

FIG. 9. CALORIE REQUIREMENTS OF AN INDIVIDUAL

(*b*) Energy needed for the ordinary daily activities = Weight of the person × No. of hours engaged in activity × the rate for activity.

(For this, list the activities and the time taken for each, calculate the energy expenditure for each activity and add them up.)

(*c*) Energy needed for specific dynamic effect $\frac{(6 \text{ to } 8)}{100} \times (a+b)$.

Total Calorie requirement is a+b+c.

COMPARISON OF THE TOTAL ENERGY REQUIREMENT AND THE CALORIE INTAKE

From the record of the daily intake of food, the number of Calories consumed daily can be calculated and that figure compared with the number of Calories actually required. If a person consumes more food than is needed for his activities, some of that food will naturally be deposited as extra fat in the body. In the same way, people become thinner when the energy intake is less than the energy output.

An average man needs 2,400 Calories and a woman 2,000 to 2,100 Calories daily. The following supplements for muscular activity should be added to this basic requirement :

Moderate work : up to 75 Calories per hour of work.

Hard work : 75 to 150 Calories per hour of work.

Very hard work : 150 to 300 Calories per hour of work.

Table 26 summarizes the daily nutritional requirements of Indians living under different conditions of life. The minimum requirements for maintaining normal health are specified. While using these figures, our aim should be to get optimum amounts of foods for not only maintaining health but also for a state of buoyant well-being.

CHAPTER 15

NUTRITIONAL REQUIREMENTS

The daily dietary requirements or allowances in terms of the essential nutrients are summarized in Table 26.

The figures given in this Table were first prepared in November 1944 by the Nutrition Advisory Committee of the Indian Research Fund Association, now known as the Indian Council of Medical Research. These figures have been subsequently revised. They are based on the knowledge obtained from experiments carried out in India and abroad. Information on a few nutrients is, however, not yet available.

RECOMMENDED DAILY DIETARY ALLOWANCES

These figures are denoted as 'Recommended Daily Dietary Allowances,' indicating that this Table should be used as a nutritional 'yard stick' or 'guide' for planning satisfactory diets. The Table can help us to know how adequate our diet is and how its deficiencies can be corrected through a better choice of foods. The quantities given are planned to provide the optimum requirements, necessary to ensure good health and to protect against deficiency diseases. These allowances will have to be revised again and again as new knowledge is made available through experimentation. At the moment, the amounts given in the Table are the ones recommended.

TABLE 26

RECOMMENDED DAILY DIETARY ALLOWANCE PER INDIVIDUAL*

	Calories	*Protein (gm.)*	*Calcium (gm.)*	*Iron (mgm.)*	*Vitamin A (I.U.)*	*Thiamine (mgm.)*	*Riboflavin (mgm.)*	*Nicotinic acid (mgm.)*	*Vitamin C (mgm.)*	*Vitamin D (I.U.)*
Men (55 kg. or 120 lb.)										
Light work	2,400	70	0·8	15	5,000	1·2	1·4	12	50	....
Moderate work ..	3,000	70	0·8	15	5,000	1·5	1·6	14	50	....
Hard work	3,500	70	0·8	15	5,000	1·7	1·8	16	50	....
Very hard work ..	3,800	70	0·8	15	5,000	1·9	2·0	18	50	....
Women (45 kg. or 100 lb.)										
Light work	2,100	65	0·8	20	5,000	1·0	1·2	10	50	....
Moderate work ..	2,500	65	0·8	20	5,000	1·2	1·4	12	50	....
Hard work	3,000	65	0·8	20	5,000	1·5	1·7	14	50	....
Pregnancy	2,100	90	1·5	30	6,000	1·5	1·7	14	60	400
Lactation	2,700	100	1·5	25	8,000	1·8	2·0	14	70	400

*'Our Food' by M. Swaminathan and R. K. Bhagwan

TABLE 26—*contd.*

		Calories	*Protein (gm.)*	*Calcium (gm.)*	*Iron (mgm.)*	*Vitamin A (I.U.)*	*Thiamine (mgm.)*	*Riboflavin (mgm.)*	*Nicotinic acid (mgm.)*	*Vitamin C (mgm.)*	*Vitamin C (I.U.)*
Children											
1—2 years	.. ..	1,000	35	0·7	8	2,000	0·6	0·7	6	30	400
3—4 „	.. ..	1,100	40	0·8	9	2,200	0·7	0·8	7	35	400
5—6 „	.. ..	1,200	45	0·8	10	2,500	0·7	0·8	8	40	400
7—8 „	.. ..	1,400	50	0·9	12	3,500	0·8	0·9	9	45	400
9—10 „	.. ..	1,700	60	1·0	12	4,000	1·0	1·1	10	50	400
11—12 „	.. ..	2,000	70	1·0	15	5,000	1·2	1·4	15	50	400
Adolescents											
13—16 years	Boys ..	2,500	80	1·0	20	5,000	1·5	1·6	15	50	400
	Girls ..	2,400	75	1·0	20	5,000	1·3	1·4	13	50	400
17—20 years	Boys ..	3,000	85	1·0	20	5,000	1·8	1·9	18	50	400
	Girls ..	2,500	80	1·0	20	5,000	1·4	1·5	14	50	400

Some nutrients which are known to be essential have not been included in this Table because of the lack of information about the quantity in which they are present in foods. However, foods which supply the ten nutrients listed in the Table are known also to supply the nutrients which have not been included.

While suggesting the amounts in Table 26, allowance has not been made for the vitamin or mineral losses which are likely to occur in cooking. Therefore, when calculating the actual amounts of foods required, it is necessary to make provision for such losses.

It can be seen from the Table that the allowances are the same for both boys and girls up to the age of 12.

The amounts suggested are for healthy normal people of an average build. In the case of adults, the allowances are recommended for men weighing 55 kg. or 120 lb. and for women weighing 45 kg. or 100 lb.

An Expert Commission of the League of Nations has made the following statement about energy requirements.

An adult, male or female, living an ordinary life in a temperate climate and not engaged in manual work is taken as the basis on which the needs of other age-groups are reckoned. A net allowance of 2,400 Calories per day is considered adequate to meet the requirements of such an individual.* The needs of the people who are ill will vary considerably from these figures.

Because physical activities among adults vary greatly, allowances for such activities should also be made. The activities are classified according to the nature of the muscular work involved.

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

'Light and sedentary work' includes office work, writing, typing, sitting and talking, light housekeeping and any other work which requires little muscular work.

'Moderate work' includes walking, carpentry, routine farm work, serving food, factory work and household work in a large home.

'Hard work' means hard manual labour such as cycling, sawing wood, very heavy housework, vigorous playing, drawing water from a well, ploughing, stone mason's work, light blacksmithery and harvesting.

'Very heavy work' includes coal mining, heavy blacksmithery, carrying heavy loads, wood cutting and plumbery.

The following supplements for muscular activity should be added to the basic requirements given above:

Light work : up to 75 Calories per hour of work.

Moderate work : 75 to 150 Calories per hour of work.

Hard work : 150 to 300 Calories per hour of work.

Very hard work : 300 Calories and upwards per hour of work.

The F. A. O. Committee on Calorie requirements recommended that for persons living in a tropical climate, a reduction of 10 per cent should be made in the above allowances.

The allowances also vary proportionately to a person's weight.

CALCULATION OF INDIVIDUAL FOOD REQUIREMENTS

Food requirements of women and children are usually assessed in terms of those of the average man by using various coefficients for the different age groups and sex. Health Bulletin No. 23, published by the Manager of Publications, Government of India, gives the following scale of coefficients.

Adult male	1·0
Adult female	0·9
Adolescents : 12 to 21 years	1·0
Children : 9 to 12 years	0·8
Children : 7 to 9 years	0·7
Children : 5 to 7 years	0·6
Children : 3 to 5 years	0·5
Children : 1 to 3 years	0·4

The Calorie requirements of infants are given below :

1st week	200
1st month	240
2nd month	400
3rd month	450
5th month	600
8th month	700
12th month	800

Using Table 26 and the coefficients (Consumption Units or C.U.), national and individual food requirements can be calculated.

THE REQUIRED AMOUNTS OF VARIOUS NUTRIENTS

Proteins

Animal proteins possess a higher nutritive value than vegetable proteins. A combination of the proteins obtained from cereals, pulses and oilseeds possesses a higher nutritive value than that obtained from any one of these alone. For growing children, pregnant women and nursing mothers, 25 to 50 per cent of the dietary proteins should be derived from milk and other animal foods.

Fats

It is suggested that 15 to 25 per cent of the total Calories needed for adults, 20 to 30 per cent of the calories needed for children, and 30 to 40 per cent of those needed for infants should be derived from fat.

Fats yield more than twice the energy obtained from carbohydrates or proteins. Thus, even in a temperate climate, there is a tendency towards a higher consumption of fats in winter than in summer. As some fats act as vehicles for fat-soluble vitamins, a liberal consumption of fats may provide these nutrients to the body in appreciable quantities.

Carbohydrates

The figures for carbohydrate requirements are not included in Table 26. If the other constituents listed in the Table are obtained from a variety of natural food-stuffs, adequate amounts of carbohydrates will also be obtained.

Calcium

The calcium requirements of children are equal to or higher than those of adults. Therefore, their diets must contain foods rich in calcium such as milk, *ragi* and green leafy vegetables.

Phosphorus

The requirements of phosphorus are closely related to those of calcium, and are generally about 20 per cent higher than the requirements of calcium.

Iron

The daily requirements of iron range from 6 to 30 milligrams. Women require more iron than men because of losses sustained in menstruation, child-birth and lactation. The iron present in vegetable foods is not as well utilized as that in animal foods. Information on the availability of iron from different foods is still incomplete.

Other Elements

A large number of other elements such as sodium, potassium, manganese, magnesium, copper, cobalt, zinc and iodine are also required. In general, well-planned diets which contain adequate amounts of other essential nutrients will also provide these elements in sufficient amounts.

Vitamin A

Carotene is not absorbed as easily as vitamin A. Depending upon the fat content of the diet, 20 to 50 per cent of carotene is absorbed. Therefore, a high allowance of carotene has been suggested in Table 26. Vitamin A requirements are increased during pregnancy and lactation. Growing children need to be given vitamin A from milk, butter, ghee, leafy vegetables and fish liver oils.

Vitamin B_1

The vitamin B_1 requirements vary with energy requirements and age. The optimum intake of vitamin B_1 per 1,000 Calories has been suggested at 0·5 milligrams.

Riboflavin

The riboflavin requirement is also proportional to the Calorie intake. The optimum intake is 0·6 to 0·7 milligrams per 1,000 Calories.

Niacin

The niacin requirement is also proportional to the Calorie intake—4 to 5 milligrams per 1,000 Calories.

Vitamin D

Vitamin D is undoubtedly necessary for children and adults. Exposure to the ultra-violet component of sunlight leads to the formation of vitamin D in the skin and this may supply a part of the vitamin D requirement. No data is available about the quantitative contribution to vitamin D requirements by this source in tropical and subtropical countries.

CHAPTER 16

WHAT HAPPENS TO THE FOOD WE EAT

DIGESTION

'Digestion' is the term used for all the processes by which the complex food factors are broken up into small, simple and soluble units. These units can then be easily absorbed in the digestive tract and diffused through the lining of the digestive tract into the blood, lymph, spinal fluids, organs and tissues. The constituents of food are brought into fluid forms through digestion. The complex starches and sugars are changed into simple sugars; fats are decomposed into mixtures of glycerol and fatty acids; and proteins are reduced to amino acids. These simplest forms of carbohydrates, fats and proteins are known as nutrients or 'building blocks' and are in an absorbable form.

After absorption, the nutrients undergo chemical changes in the body cells. These processes involve further breaking down of nutrients into simpler forms; the synthesis or building up of cellular constituents, *i.e.*, reconstructing their own carbohydrates, fats and proteins according to their unique pattern and needs; and the release of energy for the use of the body. Metabolism is the sum total of these processes.

The simpler components of foods like the sugars, some minerals and water are absorbed directly because of their elementary structure. But the complex foods are digested in the gastro-intestinal tract between the mouth and the end of the small intestine by both mechanical processes and chemical actions.

The Mechanical Aspects of Digestion

In the mechanical phase of digestion, food is mixed, subdivided and moved along the digestive tract. It starts with chewing in the mouth and is continued by the peristalisis or the muscular activities of the walls of the tract itself. The movements of the muscles of the gastro-intestinal tract are affected by nervous factors and anxiety. Therefore, eating while fatigued, worried or hurried may lead to digestive disturbances.

Enzymes in Digestion : the Chemical Phase of Digestion

The presence of some chemical substances known as 'enzymes' in the digestive juices and cells is responsible for the chemical breakdown of food. Enzymes greatly speed up the changes which the food factors undergo during digestion and metabolism. Enzymes are catalysts and are produced in the living cells. They function through 'contact' and facilitate chemical reactions, without themselves undergoing alterations. Even in very minute quantities, they accelerate certain changes in the body, which would otherwise have occurred slowly. They are specific both as to the substance on which they act and with regard to the nature of the change brought about. The enzyme which acts on protein cannot act on fats and *vice versa.*

There are many enzymes in the body helping in various functions, The digestive enzymes are produced by the organs of the digestive tract. They help in the breakdown of carbohydrates into simple sugars, the fats into glycerol, and the fatty acids and proteins into amino acids. These simple, soluble and diffusible forms are used readily as 'building blocks' by the body.

Before the present organized system of naming the enzymes came into practice, certain names such as pepsin and trypsin were chosen. But in the new nomenclature, the name of the enzyme is derived from the substance it acts upon by adding the suffix 'ase.' Therefore, the enzymes which act upon starch are called amylases (amylum means starch); fat-splitting enzymes are known as lipases (lypids means fats); and those which digest proteins are called proteases. They are further differentiated by the adjectives which indicate their sources. For example, salivary amylase is a secretion from the saliva; and pancreatic amylase is from the pancreatic juice. The enzymes acting on disaccharids are named from the sugars themselves, *i.e.*, sucrase, maltase and lactase. Most of the enzymes are made up of proteins.

The Digestive Tract

The digestive apparatus of the human body consists of the alimentary tract which is a tube about 30 feet in length and certain glands whose secretions are poured into the digestive canal to facilitate the changes taking place. The organs of digestion, namely, the mouth, the stomach, the small intestines, the large intestines and glands are suitably fitted for the functions of grinding, chewing and moving the food mass and also for the chemical changes. These functions are regulated and coordinated by both the hormones and the nervous system.

Digestion in the Mouth

Food enters the digestive tract through the mouth. Here it is lubricated, softened, chewed and mixed with saliva which is the secretion of the salivary glands. The saliva contains an amylase called 'ptyalin' which digests starches. In the mouth, the starches are changed to some extent into the simpler dextrins and double sugars.

Digestion in the Stomach

In the stomach, the churning action of the stomach walls stirs the food and mixes it with the gastric juice which is secreted by the lower part of the stomach. Gastric juice contains hydrochloric acid and pepsinogen which, when activated, becomes pepsin (a protease). Gastric lipase which normally breaks up fats is also present in the stomach in an inactive form.

The flow of gastric juice is affected by such factors as presence in the stomach of substances like water, dilute acids from juices, meat extracts, soups and other foodstuffs, freedom from emotional tension, pleasurable sensations while chewing food, and appetite. Beginning a meal with soup or fruit juices is, therefore, beneficial in stimulating gastric secretion.

The hydrochloric acid in the gastric juice has both digestive and antiseptic functions. It activates pepsin which is the protein-splitting enzyme. It creates the optimum acidity required for the digestion of protein. It acts as a bactericide preventing entrance of bacteria into the lower digestive tract. It increases the

solubility of calcium and iron, and thus aids in their maximum absorption in the small intestine.

The protein-splitting enzyme, pepsin, is secreted in its inactive form, pepsinogen, as otherwise the stomach itself would get digested by this enzyme when it is empty of food. Hydrochloric acid activates pepsin which splits protein into smaller units called polypeptides.

Gastric lipase is inactive in the normal acidity of the gastric content. For a long time, it was believed that milk was curdled by rennin, another enzyme found in the human stomach. However, there are indications that rennin is not present in the stomach of an adult, although it may be present in the stomach of an infant.

The food thus acted upon by the various constituents of the gastric juice becomes a creamy mass called 'chyme' and passes on, at intervals, into the small intestines through the duodenum. The movement of food is effected by muscular. contractions.

The stomach serves four main functions. It acts :

(1) As a storage reservoir for food. But for the stomach, it would have been impossible for us to confine our meals to three or four a day. We would be eating continuously.
(2) As a place for the continuation of the salivary digestion of starches.
(3) As the starting point for the digestion of proteins.
(4) As a disinfecting station.

Very little absorption of food takes place in the stomach. How long food remains in the stomach depends on the proportion of carbohydrates, proteins and fats consumed. An ordinary mixed meal leaves the stomach by the end of three to four and a half hours. Fat stays in the stomach for the longest time and carbohydrates for the least. For this reason, fats are said to possess a high satiety value or staying power However, too much of fat retards digestion and leads to discomfort.

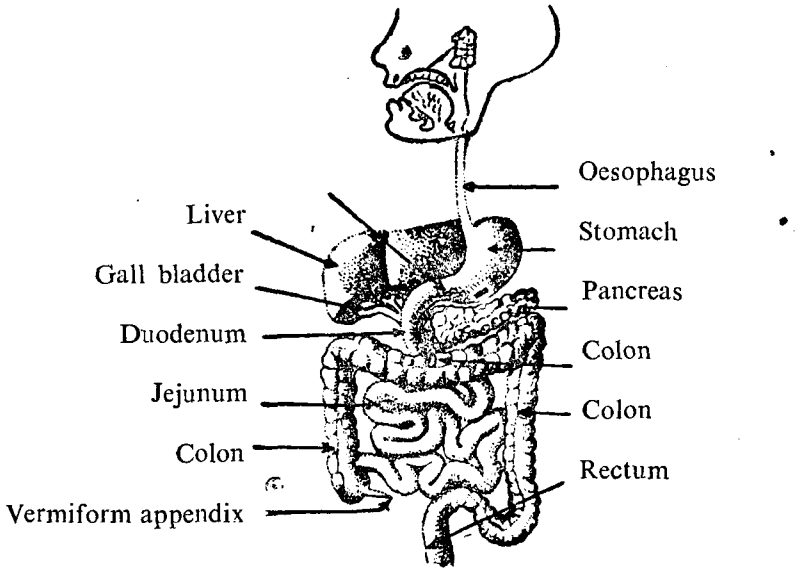

FIG. 10. THE DIGESTIVE SYSTEM OF MAN

Digestion in the Small Intestines

After leaving the stomach, the partially digested food mixture, chyme, enters the duodenum which is the first portion of the small intestines. There it is acted upon by bile, the pancreatic juice and the intestinal juices. Bile is secreted by the liver and released from the gall bladder. It hastens the splitting up of fats by lipases, emulsifies the fats and facilitates their absorption. The pancreatic and intestinal juices contain all the three different kinds of enzymes: the amylases, the lipases and the proteases. They are poured into the digestive tract at the duodenum. Through the action of these juices, all the constituents of food are broken up into the simplest units, completely digested and reduced to a form suitable for absorption.

The digestion of carbohydrates, which had started in the mouth is resumed in the duodenum. The pancreatic amylase which is formed in the duodenum completes the conversion of starch into double sugar and maltose. The three carbohydrases in the intestinal secretion, namely sucrase, maltase and lactase, complete the conversion of carbohydrates into glucose, fructose and galactose.

Trypsin, one of the three protein-splitting enzymes in the pancreatic juice, is secreted in an inactive form as trypsinogen to prevent, as in the case of pepsinogen, the self-digestion of intestinal tissues. All these three proteases digest the proteins and convert them into the smaller units of polypeptides. Finally, the complete digestion of the polypeptides into amino acids is brought about by the three proteases in the intestinal juices.

Digestion in the Large Intestines

The material remaining after absorption in the small intestines enters the large intestines. This material consists of a large amount of undigested residues, bile pigments, other waste materials and water which had escaped absorption in the small intestines. There are no digestive enzymes in the colon. A large proportion of water is absorbed and the unabsorbed residue gradually solidifies into the form of faeces.

About 18 hours elapse between the entrance of the mixture into the large intestines and the elimination of the residual material through the rectum.

Table 27 gives us a summary of the actions of the digestive secretions :

TABLE 27

SUMMARY OF THE ACTION OF THE DIGESTIVE SECRETIONS

Name of Secretion	Saliva	Gastric juice	Pancreatic Juice	Bile	Intestinal juice
Source of secretion (secreted by)	salivary glands	stomach	pancreas	liver	intestinal walls
Site of secretion	mouth	stomach	small intestines	small intestines (duodenum)	small Intestines

TABLE 27—*contd.*

Name of Secretion	Saliva	Gastric juice	Pancreatic juice	Bile	Intestinal juice
Enzymes in the secretion	salivary amylase (ptyalin)	gastric protease (pepsin), rennin, gastric lipase	Pancreatic protease (trypsin), pancreatic amylase (amylepsin), pancreatic lipase (steapsin)	nil	proteases intestinal peptidases (erepsion), sucrase maltase, lactase, intestinal lipase
Reaction	Neutral	acidic	Alkaline	neutral	alkaline
Composition (other than enzymes)	salts, gases, mucin	hydrochloric acid, mucin minerals	Sodium carbonate, sodium bicarbonate	mucin pigments, bile salts, cholesterol	sodium carbonate, sodium bicarbonate, enterokinase
Substances acted upon	starch	proteins, fats	proteins, fats, starches	fats	peptides, sucrose, maltose, lactose, fats
Action and end products	converts starch into dextrins and maltose	splits proteins into proteases and peptones; curdles milk in infants; splits fats into fatty acids and glycerol, to a small extent	splits proteins into proteases, peptones, polypeptides and amino acids; converts starch into maltose; splits fats into fatty acids and glycerol	Emulsifies fats	splits peptones and polypeptides into amino acids; sucrose into glucose and fructose, maltose into glucose; lactose into glucose and galactose. Splits fats into fatty acids and glycerine

ABSORPTION

After digestion, the nutrients are absorbed through the lining of the digestive tract. Most of the absorption takes place in the small intestines. Eighty-five per cent of the digested food is absorbed before it leaves the small intestines. The wall of the small intestines has many tiny finger-like projections called 'villi' which increase the surface area for the absorption of food factors by the blood. Each villus has a lymph vessel surrounded by a network of capillaries.

The nutrients absorbed into the lymph vessels pass into the lymphatic system, and those absorbed by the capillaries enter the portal vein and are carried to the

liver. The lymph vessels are the connecting links between the blood and the tissues, transporting food material to the individual cells.

Most of the simple sugars are absorbed directly into the capillaries and carried to the liver, where unless they are needed immediately for energy, they are converted into glycogen and stored.

The end products of fat digestion, namely, glycerol and fatty acids, pass into the intestinal walls, recombine to form fat, enter the blood stream through the lymph vessels, and are transported directly to the tissues, where they are used for energy or stored as body fat.

The amino acids, end products of protein digestion, are absorbed into the capillaries, passed on to the liver and carried by the blood to the tissues for use.

Minerals and vitamins are absorbed from the small intestines. Water is absorbed from the stomach and both the intestines.

METABOLISM

Metabolism of Carbohydrates

Metabolism, as we have already seen, is the sum total of all the chemical changes that nutrients undergo from the time they are absorbed until they become part of the body or are excreted from the body. The first phase of metabolism is *anabolism* which involves the chemical reactions that nutrients undergo for the construction or building up of body materials, such as muscle tissues, enzymes, hormones, blood or glycogen. The other phase is *catabolism* which involves all the reactions in which various compounds of the tissues are broken down. *Energy metabolism* is the term generally used to describe all the chemical and physical changes that the energy nutrients undergo in the process of releasing energy for the body's use.

During the digestive processes, the carbohydrates of foods are converted into the simple sugars—glucose, fructose and galactose. The portal vein carries them from the intestinal tract to the liver. The liver releases into the blood as much of glucose as is normally needed for the body's immediate use and stores the rest by converting it into glycogen or 'animal starch.' The process by which glucose is converted into glycogen is called glycogenesis. Some glycogen is also stored in the muscles.

The liver can store up to about 100 grams or 10 per cent of its weight in glycogen, whereas the storage capacity of the muscle is only about 2 per cent of its weight.

Insulin is a hormone secreted by the islets of Langerhans of the pancreas in carbohydrate metabolism. It facilitates the oxidation of glucose as well as the formation of glycogen. In diabetes mellitus, a metabolic disease, there is a decrease in the production of insulin, and the liver is not able to store the excess of glucose. Consequently, the glucose level in the blood rises and the body is not able to utilize the carbohydrates. Glucose is therefore secreted in the urine.

Adrenalin also called 'epinephrine' is a hormone and acts in a manner exactly opposed to that of insulin. It stimulates the breakdown of liver glycogen and

causes the withdrawal of glucose from the liver leading to a consequent rise of glucose in the blood. That is why when there is an emotional outburst, such as anger, shock or fear, adrenalin is released to increase the glucose present in the blood and thus supply fuel for some immediate physical action such as fighting or running. When extra energy is required by the body or when it does not get sufficient food as during starvation, under-nutrition and certain diseases, glycogen which is stored in the liver is reconverted into glucose. This process of reconversion from glycogen to glucose is known as glycogenolysis.

Although most of the glucose in the body is derived from the dietary carbohydrates, a small quantity of glucose may be formed in the liver from non-carbohydrate sources, such as lactic acid which is formed by the breakdown of muscle glycogen, the glycerol part of fats, and the deaminized portions of amino acids. The oxidation of glucose or glycogen for release of energy is complex and involves many stages, in which several complex enzymes take part. Glucose or glycogen is first broken down into pyruvic and lactic acids and later on oxidized to release energy, forming carbon dioxide and water. At this stage the deaminized amino acids and the fatty acid parts of fats also enter the metabolism cycle, and undergo the same process.

When carbohydrates are consumed in quantities greater than the energy requirements of the body, the excess is converted into fat and either stored in the tissues or used in the formation of amino acids.

Metabolism of Fats

The end-products of the digestion of fats are fatty acids and glycerol. They are absorbed from the intestinal tract and passed into the lymph vessels on their way to the cells and tissues of the body. They are recombined to form fat molecules which unite with phosphoric acid to form phospholipids which aid in the transport of fatty acids in the body. The blood carries the fat, phospholipids, glycerol and fatty acids, and distributes them to all parts of the body where they are either oxidized for energy or stored as fatty tissue.

In the oxidation of fats, the fat molecules are split into glycerol and fatty acids; and each portion is oxidized separately.

Metabolism of Proteins

Amino acids which are the end-products of protein digestion are absorbed into the blood stream immediately and passed on to the liver from where they are distributed to the various cells of the body. The body uses the amino acids in three ways :

(1) Some amino acids are synthesized into proteins to build new cells, to replace worn-out cells and to form such body regulators as hormones, enzymes, anti-bodies and vitamins. Thus the amino acids are used as 'building blocks.'

(2) Some amino acids exchange their amino group with other amino acids to form new amino acids peculiar to the species.

(3) The remaining amino acids are either converted into fats and carbohydrates, or broken down to be used as fuel after oxidation.

Before the amino acids can be oxidized, their amino groups must be removed. This involves several steps and takes place in many of the tissues of the body, chiefly in the liver and the kidney. The amino group which is removed forms ammonia; this is converted into urea and eliminated through urine.

The oxidation of the non-amino group is similar to that of carbohydrates.

Products of Metabolism of Carbohydrates, Fats and Proteins

All the three food factors, carbohydrates, fats and proteins, are thus burnt in the body to yield energy for external muscular work and internal activity. The products of this burning are carbon dioxide, water, urea and other nitrogenous constituents; these are excreted through the lungs, skin and kidneys. The excess of all of them is stored as fat. When there is a shortage of one food factor, the body can convert the other food factors with the assistance of 'building blocks' into the missing factor.

Digestion and metabolism help towards the maintenance of the dynamic state of the 'internal environment' of the body. The 'internal environment' directly controls all life processes.

CHAPTER 17

DIFFERENT TYPES OF FOOD AND THEIR NUTRITIVE VALUE

Foods are classified in different ways. From the nutritional point of view, they can be grouped into energy-giving, body-building and protective foods. Foods can also be classified as plant or vegetable foods and animal foods according to their origin.

Plant foods can be broadly classified as cereals and millets, legumes and pulses, vegetables, fruits, nuts and oilseeds, and condiments and spices. Animal foods can be classified as eggs, milk and milk products, meat, fish and poultry.

FOODS OF VEGETABLE ORIGIN

Cereals and Millets

Rice, wheat, *bajra* (*cumbu*), *jowar* (*cholam*), *ragi*, barley, rye, maize, etc., fall under this group. Cereals and millets have been the main constituents of human food from very early times all over the world. They supply the bulk of Calories in many national dietaries, particularly in India and several other Asian and African countries. They are the chief sources of proteins for the low income groups. Their protein content varies from 6 to 12 per cent; some of their protein is of a high biological value. Cereals are never complete foods even when taken unpolished. All cereals except *ragi* are deficient in calcium and iron. Rice is the poorest in calcium, while *ragi* is the richest. With the exception of the yellow variety of maize, they are all deficient in vitamin A. All cereals are short in vitamin C too. Therefore, cereals must be supplemented with foods having the vitamins A, C and B_{12}, riboflavin, calcium and iron.

Wheat and Related Cereals

Wheat, rye and barley are closely related and have similar dietary properties. When mixed with water, their proteins swell, forming a glutinous dough. Therefore, they make good bread.

Modern milling processes remove as much as one-third of the outer layer of wheat. The refined wheat flour, *maida*, is therefore less nutritious than the whole wheat flour, *atta*. The germ which contains thiamine and superior proteins is also lost during milling. Wheat-germ oil is one of the richest sources of Vitamin E. To enrich the staple food and replace the losses incurred in the milling process, refined wheat flour is enriched, in the U.S.A. and some other countries, with some minerals like iron, calcium and phosphorus and with vitamins like thiamine, riboflavin and niacin.

Rice

Rice is the main food of more than half of the world's population. In India, more people live on rice than on all other cereal grains put to-

gether. As in the case of wheat, polished rice is less nutritious than whole rice. Therefore, the use of home pounded rice must be encouraged. Rice should be supplemented with other foods to supply the nutrients lacking in it, such as the vitamins A and C, calcium, iron, and protein.

Ragi and other Millets

Ragi is a small-grain millet. It is the richest among the cereals in calcium, iron and the B vitamins. Other millets such as *jowar* and *bajra* contain, besides a large quantity of starch, varying quantities of minerals and vitamins.

Mixture of Cereals

It has been found that a mixture of cereals is more nutritive than any one cereal. The best cereal mixture so far proved is that of rice and *ragi*. When cereals are scarce, starchy vegetables such as the potato, sweet potato, yam, tapioca, banana or jack fruit can be used in the place of cereals. In Kerala, tapioca is widely used in place of rice.

Daily Requirements

About 12 to 16 ounces of cereals per day can be considered as an adequate allowance for adults.

Legumes and Pulses

A great many varieties of pulses are produced in India, such as grams, dried beans, peas and lentils. Pulses are richer than cereals in proteins. They have a 20 to 25 per cent protein content. They are also good sources of the B vitamins and some minerals. Hence, it is very important to include two to four ounces of pulses in our diet every day. This is particularly necessary for those growing children whose diet is made up largely of milled rice. As the proteins of parched Bengalgram dal (*chana ka dal*) are of a high biological value, it can be used as a good supplement to the diets of such children.

When the whole gram is sprouted, vitamin C is made available in the germinating sprouts. It is advisable to include sprouted gram daily in the diet, particularly when fresh vegetables are scarce.

Although pulses supply considerable quantities of proteins, these are not of the 'first class' type. It has been proved that when these proteins are mixed with even a little quantity of an animal food such as milk, the value of the mixture is much greater than that of the components when taken singly.

Daily Requirements

About two to four ounces of pulses ought to be taken everyday by an adult.

Vegetables

Innumerable varieties of vegetables are grown in different parts of our country. The number of vegetables available is so large that it is impossible to consider them individually. Vegetables lend variety and nutritive value to the diet.

Vegetables can be broadly classified into leafy vegetables, seed vegetables, fruit vegetables, stems, bulbs, tubers and roots.

Green Leafy Vegetables

Leafy vegetables are the cheapest among the protective foods. They include amaranth, *agathi*, drumstick leaves, *methi* leaves, mustard leaves, spinach and many other varieties. They are all very rich in minerals and vitamins, such as carotene, riboflavin, folacin, vitamin C, calcium and iron.

People living largely on rice which is short of calcium should take at least four ounces of leafy vegetables daily.

Seed Vegetables

Tender cereals like maize when used as vegetables in the diet are known as seed vegetables. Legumes like beans and green peas when tender are also included in this group. They are valuable sources of roughage, protein and some vitamins like vitamin C and carotene.

Fruit Vegetables

Tomatoes, tender jack fruits and unripe bananas are examples of this group of vegetables. Among these, tomatoes are richest in vitamin C.

Other Vegetables

A large number of the commonly used vegetables such as drumsticks, lady's fingers, brinjals, pumpkins, gourds, etc, come under this category. These vegetables can easily be grown in the kitchen garden and are inexpensive. Every house should have a small plot for growing these. Drumsticks have a high calcium and vitamin C value. Yellow pumpkin is rich in carotene.

Tubers and Root Vegetables

Root vegetables like the potato, white or yellow sweet potato, yam, colocasia, carrot, tapioca, radish, beetroot and turnip contain good amounts of starch. They also contain some vitamin C in the raw state. Yellow sweet potatoes and carrots supply carotene too. Since these foods are starchy, they can take the place of cereals in the diet. Because of the high yield of Calories per acre, sweet potato and tapioca are the cheapest among the energy-giving foods.

There is a popular belief that onions are nutritive foods. They are comparatively poor in proteins, vitamins and minerals; but they are preferred for their flavour and appetizing properties.

At least six to eight ounces of vegetables should be included in the diet every day.

Nuts and Oilseeds

The groundnut, cashewnut, almond, walnut, gingelly seed and mustard seed are rich (contain 18 to 28 per cent) in protein. They are also rich in fat, the B vitamins and some minerals. Coconut is an exception to this. Gingelly seeds are rich in calcium. Nuts and oilseeds do not contain the vitamins A, D, C, and B_{12}. Because of their heavy fat content, they cannot be eaten in large quantities; but when taken in small quantities, they make a valuable supplement of fat and protein to the rice diet.

In view of its rich protein and fat content, groundnut is being used for the preparation of milk substitutes which are suitable for children. Groundnut is

inexpensive and available in all parts of India. Groundnut can be taken roasted, boiled or mixed with jaggery. When roasted, it develops an attractive flavour and is appetizing. It is the usual practice in our country to feed oilcake to animals after the removal of oil. Oilcake should be included in our diet for supplying proteins. Many varieties of chutneys, curries and sweets can be prepared from it.

The coconut is widely used in many parts of the country like Andhra Pradesh, Assam, Kerala, Madras, Maharashtra, Mysore, Orissa and West Bengal. It is not highly nutritive but contains oil and improves the flavour, taste and appearance of the diet.

Oils

The oils of gingelly, mustard, coconut, groundnut and linseed are the common sources of vegetable fats in our country. They are good foods but do not contain vitamins. The only exception is the red palm oil which contains carotene Vegetable oils are energy-giving foods.

About two ounces of oil can be included every day in the diet.

Fruits

Fruits supply roughage, vitamin C, carotene and mineral salts to the diet. They are useful in keeping the bowels healthy and active. *Aonlas* and citrus fruits are rich in vitamin C. Seasonal fruits like the mangoes, guavas, *jambu* and pears are good sources of vitamin C. Great attention is being paid in the Community Development Programme to the production of several varieties of fruits through small and home-scale gardens and making them available to all people. Papaya can be easily grown and obtained throughout the year for supplying carotene.

Dry fruits are preserved fruits and are useful in increasing the taste and palatability of foods.

Two or more ounces of fruits should be taken daily.

Condiments and Spices

Condiments and spices help enhance the flavour of food. The essential oils present in them have carminative properties and are believed to aid digestion through the stimulation of appetite. Garlic, ginger and asafoetida contain some factors which inhibit the growth of putrefactive bacteria in the intestinal tract.

Indian dietaries use a larger number of spices and condiments than those in any other country. While a minute quantity of condiments is necessary for increasing the flavour and palatability of food, we should be careful not to spend unduly large sums of money on condiments, particularly the dry ones which do not add much to the nutritive value of the foods.

FOODS OF ANIMAL ORIGIN

Milk and Milk Products

Because milk contains body-building materials such as proteins, mineral salts, fats and some vitamins in the proper proportion, it is considered to be nature's 'most

complete and most nearly perfect' of all foods. Milk is an efficient supplement to the incomplete proteins of cereals, fruits and vegetables. It makes good many of the deficiencies in rice. It is, however, deficient in iron and vitamin C.

Milk should become an important item in all diets because of the high biological value of its proteins, its easy digestibility, and its richness in vitamin A, riboflavin and other essential factors such as calcium.

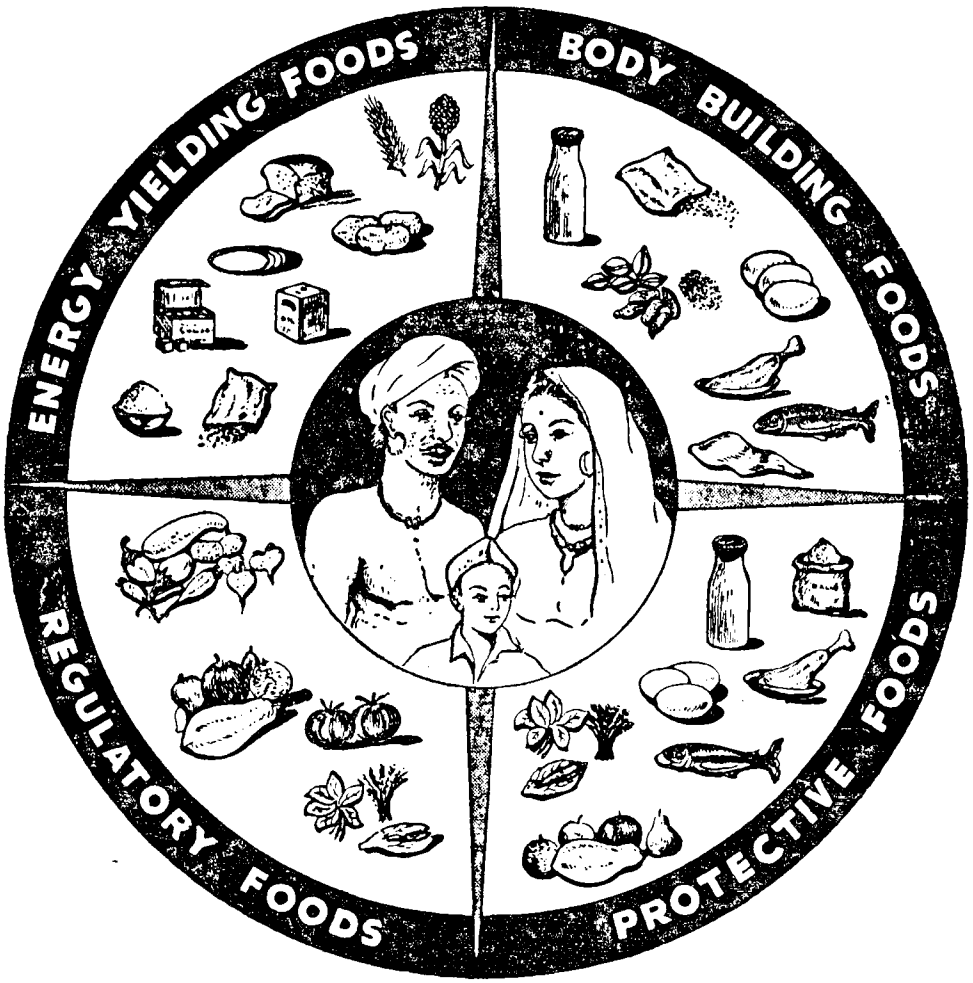

FIG. 11. DIFFERENT GROUPS OF FOODS

Unfortunately, milk is costly and scarce in many parts of India and growing children of the poor never get enough of it. By emphasizing dietaries around milk, other countries have been able to improve the health of their people.

If we can increase milk consumption in India, there will be less sickness, and children will grow stronger and healthier. It is very encouraging to find that milk is now being distributed free to children in many schools and communities.

Whole Milk Powder

Whole milk powder is about eight times as rich as fresh milk and, when reconstituted with seven times its weight of water, has the same composition as that of fresh milk.

Skimmed Milk

Skimmed milk is milk from which fat has been removed. Hence it contains very little fat or vitamin A. Skimmed milk powder is also called non-fat milk solid. Even though it is not as good as whole milk it is richer than whole milk in proteins, mineral salts and the B vitamins. Therefore, wherever whole milk is not available, skimmed milk can be used as a supplement to the diets of children and adults.

Curds and Butter Milk

Curds and butter milk are prepared from milk by seeding lactobacillus. The nutritive value of curds is the same as that of milk. Both curds and butter milk have formed part of the diet in many parts of our country from time immemorial. In warm countries like ours, milk can keep better if fermented in the form of curds. In curds, two-thirds of the milk sugar is broken up and some part of the fat is split into simple forms. Curds are an excellent supplement to the vegetarian diet.

Butter and Ghee

Butter is milk fat and is one of the good sources of the fat-soluble vitamins A and D. When butter is heated to a high temperature, ghee is formed. Butter can be kept without spoiling for a long time in the form of ghee. However, some of the valuable vitamin A is lost in the process of making ghee because of the high temperature.

Cheese

Cheese consists of the proteins and fat of milk. It is prepared by clotting or curdling milk with lime juice, vinegar or rennet. The solid portions of milk separate from the watery portion called 'whey' and are removed by draining. The solid matter is the soft cheese. It is a very valuable source of protein and fat. Cheese is one of the forms in which milk is preserved.

Nutritive Value of Milk

The nutritive value of milk varies with the species of the animal producing it. The common sources of milk are the cow, the buffalo, the goat and, in some parts of India, the camel. The main constituents of the various kinds of milk are given below in terms of percentage composition.

TABLE 28

COMPOSITION OF MILK

(percentage)

Milk	*Protein*	*Fat*	*Carbo-hydrates*	*Ash*
Human	1·0	3·9	7	0·1
Cow	3·3	3·6	4·8	0·7
Camel	4·0	3·0	6·0	0·8
Goat	3·7	5·6	4·7	0·8
Buffalo	4·3	8·8	5·1	0·8

The milk of cows, buffaloes and goats is richer than human milk in all nutrients except carbohydrates (lactose).

Although the new-born baby depends solely on milk and mother's milk is regarded as the best single food for infants, this milk is not a complete or perfect food, for it is deficient in iron and vitamin C. Nature has corrected this failure to some extent by withdrawing these two necessities from the mother during the later months of gestation and placing them as reserves in the body of the developing foetus to meet the needs of the new-born for the first few months.

Milk can be preserved in the form of evaporated milk (*Khoa*), condensed milk, or milk powder. These may be sweetened or unsweetened. Condensed milk can be diluted with water, shaken well and used in place of milk. Except in their vitamin content, preserved milk forms are equivalent to whole milk. However, skimmed milk contains less fat than whole milk. Individuals receiving condensed milk should be given fish liver oil and fruit juices as supplements. When once the container of the preserved milk is opened, the contents must be used quickly as otherwise they will get spoiled and lead to food poisoning unless refrigerated.

It has been estimated that growing children should drink at least eight to twelve ounces of milk everyday.

Eggs

Both the fowl's egg and the duck's egg are used in our country. Table 29 compares their nutritive values. Both are similar in chemical composition but the duck's egg contains, when raw, a trypsin inhibitor which lowers its nutritive value. Eggs contain two portions—the white and the yolk, the latter being more nourishing. An egg contains 13 per cent protein of the first class type which is rich in essential amino acids and of a high biological value. It has also 13 per cent fat. In addition to protein, the white part of an egg contains the salts of sodium and chlorine. The yellow portion contains protein, fat, iron, phosphorus, calcium and large quantities of vitamin A and the B vitamins. Eggs are a fair source of vitamin D. But like milk, they are poor sources of vitamin C.

TABLE 29

THE NUTRITIVE VALUES OF DUCK'S AND HEN'S EGGS*

(per 100 grams)

	Moisture (gm.)	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Carbohydrates (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (gm.)*	*Calorific value (per 100 gm.)*	*Vitamin A (International Unit)*	*Thiamin (micro milli-gram)*	*Niacin (mgm)*	*Riboflavin*	*Vitamin C (mgm.)*
Duck's egg	71	13·5	13·7	1·00	0·7	0·07	0·26	3	180	1,200	130	0·2	—	—
Hen's egg	73·7	13·3	13·3	1·00	—	0·06	0·22	2·1	173	1,200	120	0·1	—	—

NOTE : *Edible portion of hen's egg : 87 grams per 100 grams.***
Edible portion of duck's egg : 85 grams per 100 grams.
An average hen's egg weighs 39 grams (approx.) with 33·9 grams of edible portion.
An average duck's egg weighs 60 grams (approx.) with 51 grams of edible portion.

Requirements

The consumption of eggs is very low in our country and poultry farming rightly deserves a very important place in our planning. We should aim at providing at least one egg a day for each person.

Meat

Meat consists of varying amounts of fat, muscles and connective tissues, depending upon the part of the animal body from which it is cut, and the age and condition of the animal. Meat is rich (18 to 22 per cent) in first-class proteins of a high biological value. It is a fair source of the B vitamins but does not contain vitamins A, C and D. Organs, such as the heart, liver, kidney, brain and the intestines, also contain iron and stored vitamins.

Liver is the richest storehouse of many nutrients in the body. It is rich in the vitamins A, D and B complex and in proteins (18 to 20 per cent) of a high biological value. It is the richest natural source of vitamin B_{12}.

Fish

Fish is a good source of first-class protein of a high biological value (18 to 22 per cent) and a fair source of the B vitamins. Fish livers are rich in vitamins A and D. Fish when taken with bones is a good source of calcium. Fish also contains a fair amount of phosphorus.

*Health Bulletin No. 23, Manager of Publications, Government of India, Delhi.

**Nutrition Notes by the Nutrition Department, Women's Christian College, Madras,

There is a great variety of fish in the coastal areas of our country. The perennial rivers, inland lakes and ponds also furnish fish.

Fish and meat can be preserved as dried foods and can be used throughout the year.

Although a large number of people in India would like to consume non-vegetarian foods, economic limitations compel them to be vegetarian. Therefore, we should attempt to produce more animal foods to increase the nutritional status of our people.

At least two ounces of animal foods should be included every day in the diet of every individual.

CHAPTER 18

SUPPLEMENTARY FOODS

MILK SUBSTITUTES

The minimum daily allowance of milk in a balanced diet has been suggested at 10 to 16 ounces for adults and 16 to 32 ounces for children and infants. However, the availability of milk and milk products in our country is inadequate, only five ounces being available for each person per day. Until we are able to increase the milk production high enough to meet the minimum requirements, some substitutes for milk have to be made available.

The Central Food Technological Research Institute, Mysore, has made detailed studies about the methods of preparing vegetable milk and about its nutritive values. The process of preparing groundnut milk developed by the Institute is as follows :

Preparation of Groundnut Milk and Curds*

1. *Roasting of Groundnut and Removal of the Red Skin :* Good quality groundnut is given a light roasting in a pan. The shells are then removed. If good quality groundnut kernels are available, they are roasted lightly. The red skin from the kernel is removed by rubbing.

2. *Preparation of Milk :* Groundnut kernels (one pound), with their skins removed, are soaked in water for about three hours. The water is drained off. The soaked kernels are ground into a fine paste with the help of a stone grinder. The paste is mixed with 15 cups of cold water. Half a cup of clear lime water (calcium hydroxide solution) is also added. A quarter teaspoon of sodium bicarbonate is dissolved in a little water and then added to the milk to stabilise it. *Excess of lime water and sodium bicarbonate should not be added.* The groundnut milk is strained through a clean thin mull cloth, and boiled for five minutes. Sugar may be added to taste, while drinking the milk.

3. *Preparation of Groundnut Curds :* Two teaspoons of glucose powder, invert sugar or honey are added to four cups of milk. The milk is allowed to cool, seeded with a small quantity of curds made from cow's milk, and allowed to remain overnight to set. The vegetable curds can be used in the same way as milk curds along with rice, and for such preparations as *dahibada, lassi,* etc.

Nutritive Value of Vegetable Milk

The chemical composition of groundnut milk as compared to that of cow's milk is given in Table 30. The corresponding curds have almost the same composition as the milks.

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*Our Food by M. Swaminathan and R. K. Bhagwan.

TABLE 30

THE CHEMICAL COMPOSITION OF GROUNDNUT MILK AND COW'S MILK

Nutrients	*Groundnut milk (value per 100 grams)*	*Cow's milk*
Protein (gm.)	3·0	3·2
Fat (gm.)	5·2	4·9
Carbohydrates (gm.)	3·1	4·6
Calcium (gm.)	0·11	0·11
Phosphorus (gm.)	0·102	0·07
Iron (mgm.)	1·47	0·2
Calorific value	71	75
Riboflavin (mgm.)	0·03	0·17
Thiamine (mgm.)	0·085	0·045
Nicotinic acid (mgm.)	1·11	0·1

NOTE : One teaspoon of shark-liver oil or vitamin A and D concentrate should be used daily along with groundnut milk to supply the vitamins A and D.

MALT FOODS

Since the production of milk in our country is low, supplying nutritious foods to weaning infants and young children has become difficult. Generally the poorer classes feed their children during weaning only on cooked rice or *chapati*, both of which are deficient in many essential nutrients. Therefore, the incidence of protein malnutrition and vitamin deficiency diseases is high among children. The need for finding some supplementary foods for children who are being weaned is, therefore, great. One such effort is the nutritionally balanced malt food, evolved by the Central Food Technological Research Institute. Their method of preparing the malt food is given below :

PREPARATION OF MALT FROM RAGI OR CHOLAM (JOWAR)*

(1) *Cleaning and Steeping of the Grain :* Good quality seed grain (with not less than 95 per cent germination) is first cleaned free of mud, stones and other dirt by winnowing, and washed well in water. It is then steeped in water in a tall vessel, so that the grain is not more than one-third the height of the vessel. The water is changed in the morning and evening.

(2) *Couching* : After the grain is steeped for 24 hours, it is taken out and spread on a clean gunny matting or cloth in a cool dark place. The depth of the grain layer should not be more than two inches. A second wet gunny matting is used for covering the wet grain. At the end of every 24 hours, the cover is removed and the grain piled up in the centre of the bottom gunny and wetted with a little water.

*'Our Food' by M. Swaminathan and R. K. Bhagwan.

The grain is mixed well and spread again as before. The couching period is usually 72 hours.

(3) *Drying :* The grain is then taken out and spread either on trays or on a clean cement floor and allowed to dry in the sun. When the grain is completely dry, it is placed on a dry gunny sack and gently rubbed to separate the vegetative portions from the grains which are then separated by winnowing.

(4) *Roasting, Powdering and Sieving :* The grain is next roasted lightly in an iron pan to develop the characteristic malt flavour. Over-roasting should be strictly avoided as this adversely affects the flavour. The roasted grain is powdered to a fine flour and passed through a 70 to 80 mesh sieve.

The malt flour thus obtained can be preserved in air-tight tins for a period of about one month.

Nutritive Value : During malting, a part of the starch present in the grain is converted into dextrins and maltose. Hence malt is more readily digested by infants than cereal flours. There is also a slight increase in the content of the B vitamins. There is practically no change in the content of proteins and minerals.

Preparation of Nutritionally Balanced Malt Food : One pound of *ragi* malt flour is mixed with one pound of roasted or puffed Bengalgram dal flour* and half a pound of skimmed milk powder. This malt food can be kept in closed tins for a period of one or two months. The chemical composition of the malt food as compared with that of *ragi* malt is given in Table 31 below.

TABLE 31

THE CHEMICAL COMPOSITION OF MALT AND MALT FOOD

Nutrients	*Ragi malt*	*Nutritionally balanced malt food**
	(value per 100 grams)	
Protein (gm.)	6·2	19·0
Fat (gm.)	1·2	1·1
Carbohydrates (gm.)	79·5	68·5
Calcium (gm.)	0·32	0·45
Phosphorus (gm.)	0·28	0·36
Iron (mgm.)	2·5	2·4
Vitamin B_1 (mgm.)	0·36	0·38
Riboflavin (mgm.)	0·11	0·54
Nicotinic Acid (mgm.)	1·8	1·7

NOTE: **A daily supplement of half a teaspoon of shark-liver oil should be given to supply the vitamins A and D.*

**Preparation of roasted Bengalgram flour :* Bengalgram dal is cleaned free of grit and foreign matter and roasted in a pan till a pleasant aroma develops. The roasted dal is powdered in a flour mill.

THE INDIAN MULTI-PURPOSE FOOD

The Central Food Technological Research Institute has developed a food supplement rich in vitamins and minerals, known as the Indian Multi-Purpose Food (M.P.F.). It is prepared from specially processed groundnut flour and Bengalgram flour and is fortified with essential minerals and vitamins. The M.P.F. thus prepared can easily be worked into many commonly used food preparations, enhancing the nutritive value of our diets. It is a good low-cost supplement to the diets of children, pregnant women and lactating mothers. One ounce of M.P.F. costs about four Paise only.

The Indian M.P.F. is available in three forms :

(*a*) *Seasoned :* with salt and spices for use in savoury preparations,

(*b*) *Unseasoned* : for use in sweet dishes, and

(*c*) *Unseasoned with* 20 *per cent skimmed milk powder :* for young children, weaning infants and those suffering from protein malnutrition.

The nutritive value of the Indian M.P.F. as compared with Bengalgram dal and skimmed milk powder is given in Table 32.

TABLE 32

COMPARISON OF THE NUTRITIVE VALUES OF M.P.F., BENGALGRAM DAL AND SKIMMED MILK POWDER*

Nutrients	*Indian M.P.F.*	*Bengalgram dal*	*Skimmed milk powder*
Protein (gm.)	42·9	22·3	35·6
Fat (gm.)	8·5	5·2	1·0
Carbohydrate (gm.)	35·8	58·9	52·0
Calcium (gm.)	0·665	0·07	1·3
Phosphorus (gm.)	0·820	0·31	1·03
Iron (mgm.)	5·1	8·9	0·6
Thiamine (mgm.)	1·3	0·32	0·35
Nicotinic Acid (mgm.)	14·3	2·3	1·1
Vitamin A (I.U.)	3000	—	40
Vitamin D (I.U.)	300	Nil	Nil
Calorific value	387	372	395
Riboflavin (mgm.)	3·0	0·21	1·96

It will be noted that the M.P.F. contains twice as much protein, and two to four times as much calcium, thiamine and riboflavin as Bengalgram and other pulses. Further, it is a good source of the vitamins A and D, in which pulses and skimmed milk powder are deficient. The Central Food Technological Research Institute has also standardized several recipes using M.P.F. Through feeding experiments, they

*'Our Food' by M. Swaminathan and R. K. Bhagwan.

have shown that supplementing the usual diets of children with two ounces of M.P.F. daily for a period of five months produces a significant increase in their growth and nutritional status.

OTHER SUPPLEMENTARY FOODS

To overcome the shortage of cereals in the country, it is necessary to supplement diets by other foods rich in Calories. Those foods should be such that they give larger yields per acre than cereals and can be cultivated easily both on a small and large scale.

Tapioca and sweet potato are two such important foods. They contain less protein than cereals and can therefore be used only as sources of energy. They should be supplemented by foods rich in protein. Using tapioca with protein-rich foods, the Central Food Technological Research Institute has developed many recipes which are of help in making up the deficiencies in Indian diets. A mixture of 75 parts of tapioca and 25 parts of groundnut flour has been found to be successful. Tapioca macaroni prepared from such a mixture has become popular.

CHAPTER 19

BALANCED DIETS

An 'adequate diet' or a 'balanced diet' provides all the essential nutrients in sufficient quantities and proper proportions to meet the needs of the body. The 'balanced diet' is therefore, one which is balanced both in quantity and quality, and which caters to the requirements of growth, development, maintenance of health and regulation of body functions.

The important factors to be considered in the formulation of a balanced diet are (1) knowledge of the daily nutritional requirements; (2) selection of foods which will supply the daily nutritional requirements; (3) planning of meals; (4) preparation of meals; and (5) serving of meals.

KNOWLEDGE OF THE DAILY NUTRITIONAL REQUIREMENTS

We have already discussed the nutritional requirements of people at different stages of life, *i.e.*, the food factors essential for human nutrition and the amount required by an individual according to his age, occupation and level of health (Chapter 15). This information should be applied in terms of daily food while formulating balanced diets.

SELECTION OF FOODS WHICH WILL SUPPLY THE DAILY NUTRITIONAL REQUIREMENTS

After finding out how much of proteins, minerals, vitamins etc., are required, we should find out which foods will supply those factors in the amounts adequate to meet the needs. We must also see what types of foods are available in the locality during the different seasons, how much of those can be purchased with the money that we can spare for food, the types of food that we can include in our diet according to our habits (*e.g.*, vegetarian or non-vegetarian), cultural background, pattern of living, religion, the part of the country from where we come, etc.

We have already seen that all the foods can be classified into energy-giving foods, body-building foods and protective-regulatory foods. We have also seen that foods providing carbohydrates, fats and proteins are the energy-giving foods; that foods providing proteins and mineral salts are the body-building and body tissue-repairing foods; that foods providing proteins, vitamins and minerals are protective foods; and that foods providing cellulose, vitamins, minerals and water are regulatory foods. The food sources of some essential nutrients are given below.

Food Sources of Carbohydrates

Rice, maize (*makai*), oats, barley, wheat, *jowar* (*cholam*), *bajra* (*cumbu*), *ragi* and other cereals, tapioca, sago, potato, sugars and honey.

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Food Sources of Proteins

Beans, soyabean, field beans, Bengalgram (*chana*), blackgram (*urad*), greengram (*moong*), lentil (*masur*), peas, redgram (*arhar*), pulses, groundnut, cashew-nuts, almonds, gingelly seeds, oilcakes, eggs, milk, curds, cheese, liver, mutton, fish and poultry.

Food Sources of Fats

Butter, cream, animal fat, ghee, fatty meat and fatty fish, gingelly oil, coconut oil, groundnut oil, mustard oil, linseed oil and hydrogenated fats.

Food Sources of Cellulose (Roughage)

Fruits such as the grape, guava, jack fruit, berries, cherry, lime, mango, pear, orange, *mosambi*, pineapple, pomegranate, tomato, wood-apple and tamarind, vegetables such as the amaranth, bitter gourd, broad beans, celery stalks, cluster beans, double beans, drumstick, tender jack, lady's finger, *aonla* and *parwar*, bran and whole cereals.

Food Sources of Calcium

Green leafy vegetables such as the *agathi*, amaranth, cabbage, carrot leaves, coriander leaves (*hara dhania*), curry leaves, mint, neem and spinach, water cress, milk, curds, cheese, eggs, *ragi*, drumstick and cluster beans.

Food Sources of Iron

Green leafy vegetables such as the *agathi*, amaranth, cabbage, carrot leaves, coriander leaves (*hara dhania*), curry leaves, mint, neem and spinach, water cress, egg yolk and ragi.

Food Sources of Phosphorus

Wheat, rice, ragi, meat, milk, curds, cheese, eggs and vegetables.

Food Sources of Vitamin A

Green leafy vegetables such as the *agathi*, amaranth, cabbage, carrot leaves, coriander leaves (*hara dhania*) and curry leaves, butter, cream, egg-yolk, milk, cod-liver oil, red palm oil, shark-liver oil, liver, carrot, pumpkin, papaya, palmyra fruit, mango, peach and other yellow vegetables and fruits.

Food Sources of Thiamine

Bran and whole cereals such as wheat, ragi, *jowar* or *bajra*, par-boiled rice, unmilled rice, legumes such as dry beans or field beans, whole grams such as Bengalgram, greengram and blackgram and leg umes, liver, meat, egg-yolk and yeast.

Food Sources of Vitamin C

Citrus fruits such as lime, lemon, orange, grape fruit, *mosambi* or *aonla*, raw fresh vegetables such as green peas, bitter gourd, cauliflower, cluster beans, drumstick, knol-khol, ridge gourd, turnip and tomato, other fresh fruits, sprouted gram, green leafy vegetables such as *agathi*, drumstick leaves, amaranth, cabbage, carrot leaves, coriander leaves (*hara dhania*) and curry leaves.

Food Sources of Riboflavin

Green leafy vegetables such as the *agathi*, amaranth, cabbage, carrot leaves, coriander leaves (*hara dhania*), curry leaves, drumstick leaves, *manathakkali* leaves, milk, eggs, liver, meat, fish, poultry and yeast.

To know which foods from the above list are to be included for an adequate diet, certain 'food groups' have been developed, in which foods of similar nutritive values are classified together. Adequate diets can be developed by taking sufficient quantities of foods from these different groups which are known as the 'Basic Seven,' the 'Basic Six,' the 'Basic Five' and the 'Basic Four.' These food groups are flexible and allow for a wide choice of foods.

'The Basic Four' food groups include :

(*i*) Milk and milk products group.
(Children three to four cups daily; abolescents four or more cups; adults two or more cups; pregnant women four or more cups; and nursing mothers six or more cups)

(*ii*) Meat group which includes meat, poultry, fish and eggs. (Two or more servings)

(*iii*) Vegetable—fruit group.
(Four or more servings of vegetables, including a dark green or deep yellow vegetable, a citrus fruit or tomato; and other vegetables and fruits)

(*iv*) The cereals group. (Four or more servings)

The following suggestions can serve as a guide for fulfilling the nutritional requirements in terms of the amounts of foods to be used daily for an individual. In the ranges of foods indicated, the higher amounts are specially important for vegetarians.

Milk

For a growing child: two to four cups.

For an expectant and nursing mother: four cups.

For others : one or two cups.

Since the economic conditions of most people do not permit consumption of milk, substitutes like skimmed milk, groundnut milk or *ragi* malt may be used. It should be seen that children and pregnant or nursing mothers get as much milk as possible.

Leafy Green or Yellow Vegetables

Children : Two ounces
Adults : Four ounces

Tomatoes or Citrus Fruits or Sprouted Grams

Children : One ounce
Adults : Two ounces

Other Vegetables (Green and non-leafy)

Children : Two ounces
Adults : Three ounces

Roots and Tubers

Children : Two ounces
Adults : Three ounces

Fruits

Children : Two ounces
Adults : Three ounces

Eggs

For non-vegetarians : one
(For vegetarians : one or two ounces of groundnut, other nuts, pulses or dals in place of the egg)

Meat and Fish

For non-vegetarians : Three ounces
(For vegetarians : Three ounces of additional dal in place of meat and fish)

Cereals

Children : Eight to ten ounces
Adults : Fourteen ounces

Pulses

Children : Two ounces
Adults : Three ounces

Fats

Children : One ounce
Adults : Two ounces
(including half an ounce of butter and ghee)

Sugar and Gur

Children : One and a half ounces
Adults : Two ounces

Water

Six or more glasses.

ASSESSING THE ADEQUACY OF DIETS

How are we to know that the diet planned is adequate nutritionally ? Among the many procedures available for assessing the nutritive value of diets, the simplest one is the 'score card' method. Using the dietary allowances and pattern suggested above, a score card can be developed for determining how well the diet meets requirements. Table 33 gives one such score card. It will help individuals in checking up whether or not they are getting an adequate diet and will encourage them in the selection of all the essentials of an adequate and varied diet.

Another method of determining the nutrient content of diets is through the use of 'food composition tables.' Appendix III gives the nutritive value of some commonly used Indian food-stuffs compiled from Health Bulletin No. 23.

However, calculations based on the figures given in the food composition tables do not give any idea about the variation in the composition of the same food due to the stage of maturity, the type or variety, the fertilizers applied, the care taken in handling, etc., particularly in the case of fruits and vegetables. Nor do the calculations allow for the losses in the preparation of food.

TABLE 33
A SCORE CARD FOR ASSESSING THE ADEQUACY OF DIETS

Foods	*Minimum amount per day*	*Score*	*Your score*
Milk, milk products or groundnut milk	Adults : 2 cups Adolescents: 3 cups Children : 4 cups	20	
Tomatoes or citrus fruits or sprouted gram ..	2 ounces	10	
Leafy green or yellow vegetables	4 ounces	15	
Other vegetables	4 ounces	5	
Fruits	2 ounces	5	
Eggs or nuts	1 egg or 1 ounce	10	
Meat, poultry, fish; or dal or groundnut or curds	2 ounces	15	
Cereals	12 ounces	10	
Fat	1 ounce	5	
Water	6 or more glasses	5	
		100	

For every shortage or wrong habit, the following deductions in the score should be made :

Tea or coffee for children	10
Soda or other soft drinks	10
Eating meals at irregular times	10
Eating snacks in-between meals	10
Eating too fast	5
Omitting a meal	10

Table 34 gives the ingredients of a balanced diet for an adult.

TABLE 34
A BALANCED DIET FOR AN ADULT

Food-stuff	*Vegetarian (per day in ounces)*	*Non-vegetarian (per day in ounces)*
Cereals	14	14
Pulses	3	3
Green leafy vegetables	4	4
Roots and tubers	3	3
Green non-leafy vegetables	3	3
Fruits	3	3
Sugar and jaggery	2	2
Oils and fats*	2	2
Milk**	10	10
Meat and fish	—	3
Egg	—	1
Groundnut	1	—

NOTE : *Includes 0·5 oz. of butter and ghee.
**This is only the minimum daily intake recommended.

CHAPTER 20

PLANNING A MEAL

How much an individual benefits by eating depends not only upon the amount he eats but also on the combination, preparation and serving of foods in an attractive and enjoyable form. Planning the daily allowances of foods in terms of meals and distributing the different foods among the meals taken during the day are very important in the formulation of balanced diets.

The points to be considered while planning meals are the size of the family, age of the members, their activities, their food preferences, the availability of foods, the family income, the cost of food, customs, season, locality and the need for preparing special diets for abnormal conditions.

Appetite, taste, growth needs, amount of exercise and food tolerance differ with age. A child under three years and a grandmother over eighty years may have to partake of the same meal in the family. To cut down labour and expenditure, meals should be so planned that the same menu satisfies the nutritional needs of all the members. Only when an individual requires a special diet should different menus be resorted to.

The occupation of the members of the family and their leisure time activities should also be taken into account while planning meals. Men engaged in hard physical labour involving active muscular work, such as farming and other agricultural operations, need more energy than those who sit at an office desk. Women working on farms and those who do heavy work in the house also need extra energy. Working women have the additional problem of planning meals which can be prepared in a short time.

The amount of money available for food is another important consideration. For many families, the expenditure on food is the largest single item on the expense list. It should be first decided how much of the monthly income is to be allotted for expenditure on food. As much as 70 to 80 per cent of the income has to be spent on food in certain cases. The lower the income, the more carefully do the meals have to be planned to stretch the money spent on food. Low incomes should not prevent the serving of appetizing and nourishing foods. Adequate diets can be provided at different cost-levels if a little care and economy are practised in the purchase of foods. Many highly nutritive foods are available at relatively low costs. Foods which are in season or are produced locally, being more plentiful, are less expensive. This is particularly true of such seasonal fruits and vegetables as guavas, mangoes, litchis, oranges, bananas, peas, beans, carrots, cauliflowers, green leafy vegetables, etc. These foods should be used frequently in the menu in many different ways when they are in season.

The time of the year, the geographic location of the place, and the season directly influence the appetite for certain foods. Planning of hot foods in cold weather and cold foods in hot weather is a necessity.

The food patterns and quantities vary according to the status of health and stage of life. During infancy, illness, pregnancy and lactation, special diets have to be planned based on the nutritional needs for those periods.

WHAT IS A GOOD MENU ?

In a good menu, the foods should be properly combined, attractive, and pleasing in colour, form, texture and flavour; and they should give the maximum satisfaction and nutritive value for the money spent.

Variety, as they say, is the spice of life. Variety, whether in combining foods or in preparing and serving them, increases appetite and palatability. Monotony in diet, or serving of the same food in the same way time after time, leads to a dislike for the food. Combining different flavours, colours, textures and forms of food, and adding pickles, relishes and garnishes stimulate a greater intake of food.

Long established food customs have determined such food patterns as rice and *sambar; chapati*, curry and dal; *puris* and potatoes, etc. Substituting a new combination occasionally adds variety to the diet. Vegetables may be served raw and fruits may be baked. New ways of preparing foods should be devised for using new, unfamiliar and left-over foods.

Variety can also be secured by combining contrasting flavours, such as serving bland foods with strong flavoured ones, *e.g.*, rice with hot curry. Two strong flavoured vegetables, such as onions and cauliflowers, or two gas-forming vegetables such as turnips and cabbages, or two vegetables of the same family such as potatoes and yams in the same meal are undesirable. The same food repeated in the same meal does not show good planning.

Natural colours in foods particularly in fruits and vegetables are so abundant that there is no need for serving a colourless meal. A pleasing combination of colours is essential. A plate of *chapatis*, with raw tomatoes, salad, brown curry, boiled green peas and boiled potatoes, or glazed carrots is more interesting in colour than a plate of *chapatis* with brown curry, fried lady's fingers, browned potatoes and *bhujias*.

The texture or consistency of foods is important for the palatability of foods. Soft foods should be combined with crisp foods, such as rice and potato chips or *papads*.

The form in which the food appears is important. The shape of the *chapatis*, *pakoras*, *vadais* or *koftas*, the size of the vegetable pieces or tomato slices, the moulds for jelly, etc., should be pleasing.

The following points may be used for checking desirable nutritional and aesthetic features in a menu:

Nutritional Requirements

Energy (adequate ?)	15
Protein (suitable in kind and amount ?)	10

Minerals (calcium, phosphate and iron represented ?)	10
Vitamins (vitamins A, B complex and C present ?)	10
Protective foods (well represented ?)	10
Is the choice good for bulk ?	10
Is the choice good for digestion ?	10
	75
Aesthetic Requirements	
Is there variety in food and preparation ?	5
Is there a pleasing contrast in flavour ?	5
Is there a pleasing contrast in colour ?	5
Is there a contrast in consistency ?	5
Is there a contrast in form ?	5
	25
Total points	75+25=100

THE MEALS OF THE DAY

Generally, there are three main meals in a day—the morning meal (breakfast), the midday meal (lunch), and the evening or night meal (dinner). Some families include 'tea,' 'tiffin' or 'snacks' early in the morning or in the evening. The type of meals to be served—whether light, medium or heavy—depends upon the food needs, work, activities and income of the family. For children, the heaviest meal should be served at noon. One third of the day's requirements should be supplied in the morning at breakfast. Since more than twelve hours elapse between the meal taken during the previous night and the breakfast taken in the morning, it is important to replenish the body fully in the morning in order to avoid fatigue and lack of mental alertness. One-third of the day's nutritional needs should be provided through the lunch and the rest through the dinner. All the three meals should be planned together as one unit so that the total food needs are distributed evenly. Each of the three main meals should furnish approximately one-third of the daily food requirements through well-selected foods.

Breakfast

A good and substantial breakfast in the morning is essential for starting the day with energy and vigour. Hard working manual labourers can do more work; and children, mothers and office workers will show greater efficiency in their work if they are fed well in the morning.

Breakfast can include a seasonal fruit like guava, papaya, mango or orange; some cereal preparation, such as *chapati*, *dalia*, or *dosai*, and an egg or half a cup of cooked dal. Children must have at least half a cup of milk or a milk product or some substitute for milk like groundnut milk.

Lunch and Dinner

Lunch should also provide one-third of the day's nutritional needs. For most people, lunch is usually a lighter meal than dinner. It may consist of dal or meat,

TABLE 35

A SAMPLE MENU FOR A WEEK

	SUNDAY	*MONDAY*	*TUESDAY*	*WEDNESDAY*	*THURSDAY*	*FRIDAY*	*SATURDAY*
Breakfast	Banana Wheat *dalia* Dal* or egg Milk or ground-nut milk*	Guava Pounded rice (*pavva*) Seasoned dal chutney or egg Milk or ground-nut milk.	Papaya *Sooji* seasoned (*Uppuma*) Dal curry or egg Milk or ground-nut milk	Mango *Kitcheri* with rice Dal or egg Milk or ground-nut milk	Litchis *Puri* Dal-potato curry Milk or ground-nut milk	Guava Rice and *Dalia* Dal or egg Milk or ground-nut Milk	Papaya *Sooji* preparation Dal or egg Milk or ground-nut milk
Lunch	Dal or meat *Cholai* (amaranth) Raw tomato Rice or *chapati* *Papad*	Dal or fish *Methi* Sprouted gram Rice or *chapati* *Papad*	Dal or meat Mustard greens *Aonla* or cucumber Rice or *chapati* Fried potatoes	Dal or fish Spinach Raw carrot Rice or *chapati* *Papad*	Dal or meat *Cholai* Sprouted gram or tomato Rice or *chapati* *Papad*	Dal or fish Radish leaves Raw mango (in season) Rice or *chapati* Fried yam	Dal or meat Drumstick leaves Raw radish or carrot Rice or *chapati* *Papad*
Dinner	Dal Brinjal Rice or *chapati* Pickles Curds	Dal Gourd Rice or *chapati* Pickles Milk	Dal Cauliflower Rice or *chapati* Pickles Curds	Dal Beans Rice or *chapati* Pickles Custard pudding or *khir*	Dal Green Peas or gram Rice or *chapati* Pickles Milk *halwa*	Dal Cabbage Rice or *chapati* Pickles Curds	Dal Gourd or pumpkin Rice or *chapati* Pickles *Sooji* sweet with milk
Snacks	Peanuts	Roasted *chana*	Banana	Roasted sweet potato	Boiled and seasoned *chana*	Puffed rice	Banana

**Moong, arhar, chana, masur* and *urad* can be used in rotation in all the places where dal appears.

***Adults can have coffee or tea. Where milk cannot be bought by the family, groundnut milk can be used.

one cooked leafy or other vegetable and a raw vegetable, sprouted gram or fruit. The same pattern may be followed for dinner also. Usually, at dinner-time, all the members of the family return from work and school; and it is the only time for a leisurely family meal.

On special occasions, sweets may be added to lunch or dinner.

Growing children, active adolescents and adults engaged in very heavy work require food between meals. This may be a glass of buttermilk, a handful of roasted groundnuts, roasted or boiled *chana*, a fruit or a slice of bread.

The meals must be planned in terms of a week, thus providing for variety. Such planning also ensures economy. Table 35 gives a week's menu for an average middle class family. The items should be checked with the basic four groups and any necessary alteration made, taking care to substitute other foods from the same group. For example, if tomato is not available, lime, sprouted gram or *amla* can be used in its place. Those who can afford to spend liberal sums of money on food, can add more items such as milk, fruits, vegetables and sweets. Menus must be flexible enough to use left-overs easily, and also to take advantage of seasonal foods.

Mealtime provides one of the highlights of a happy family life. The mother spends all her time, energy and resources to cook the best possible meal for her family. She has the responsibility of careful planning, wise marketing and skilful cooking. Nothing gives her greater pleasure or a greater feeling of reward than the happiness reflected on the faces of the members of her family when she sees them enjoying a hearty meal. Her satisfaction will be even greater when she knows that the meals she provides are well-balanced and supply all the nutritional needs of her family.

CHAPTER 21

BUYING FOOD FOR MEALS

Planning meals in advance will help in buying more for the same money. Both time and money are saved by purchasing raw food for several meals at one time. Such planning also helps in checking whether the family's nutritional needs are being met.

After menus are planned, the items to be purchased in the market should be listed. Shopping will be efficient when the foods are grouped according to their availability in the different bazaars such as fruits, vegetables, cereals, meat, etc. The quantities of each of the items to be purchased should be estimated after checking the stores on hand.

ECONOMICAL BUYING

The following suggestions will help in economical buying :

(1) Buy in person whenever possible.
(2) Compare prices and qualities in different shops.
(3) Buy those foods which are in season or which are locally produced.
(4) Buy in weekly fairs and markets. Do not go during rush hours.
(5) Buy in large quantities. Preserve the seasonal foods for out-of-season use.
(6) Select fresh vegetables, fruits, eggs and meat.
(7) Buy from cooperative markets, dairy farms and agricultural farms.
(8) Never buy on credit since it is more economical to pay cash than to purchase on credit.
(9) Buy foods by weight rather than by bulk. Measure or count whenever possible. Check the weighing scales of venders.
(10) Buy staple cereals, potatoes, onions, pumpkins, dals, grains, etc., in as large quantities as possible and store them carefully.
(11) When a particular food such as egg is expensive, buy a cheaper substitute like dry beans, instead of eggs.
(12) Before buying packaged foods, read labels carefully.

CHAPTER 22

STORING FOOD TO SAVE

Storing food is just as important as buying food. If foods are not properly cared for, the money saved by careful buying may be lost. Moist foods should be kept moist. Dried foods should be kept dry. All perishable foods must be kept in the coolest part of the house or in underground pits, dug and constructed for the purpose. Meat should not be kept for more than a few hours unless in a refrigerator. Bread or *chapati* should be kept in a box with a few small holes at the bottom or sides for circulation of air. Left-over bread can be used as crumbs, fillings or stuffings, or combined with vegetables to absorb fluids, as for example in greens.

Milk must be boiled, cooled, covered and kept in a cool place. Eggs must be kept in covered containers, and should never be washed except just before use. While buying fruits in bulk to last for some time, do not buy all fully ripened ones. Buy some half-ripened ones and store them unwashed in a cool room. Keep potatoes, cabbages and onions in a cool, dark and well-ventilated place. Fats and oils must be kept covered in cool places.

'Janata refrigerators' have recently been devised by the Khadi and Cottage Industries Commission and the Sarvodaya Ashram at Shahpur in Saurashtra. Made of mud and costing Rs. 3·75 each, they reduce temperature up to 30° F, which is very helpful in keeping vegetables and fruits fresh in summer.

Proper storage of vegetables and fruits lowers food costs and improves the diet. Farmers and home gardeners who grow their own fruits and vegetables can profit most from home storage. Home-makers who buy from the local markets will gain by buying foods wholesale and storing them.

GENERAL POINTS ON STORAGE

Successful storage of vegetables is not difficult, if a few general points are kept in mind. They are :

1. Different vegetables and fruits require different storage conditions.
2. All products that show signs of decay or mechanical injury should be discarded.
3. Most vegetables and fruits dry out and wilt or wither rather quickly unless the atmosphere in the storage place is damp and unless the temperature is maintained as low as possible.
4. Ventilation is needed in the storage space not merely to change the air to carry off odours, but also to maintain the desirable temperature and humidity.
5. The ceiling and the walls should be insulated to prevent moisture from condensing and dropping on the stored products. Free water causes decay.

FACILITIES FOR STORAGE

A cool, well-ventilated room on the ground floor or an underground room (cellar) offers good conditions for the storage of vegetables and fruits. At least one window is necessary in the room for cooling and ventilating, while two or more are desirable. The windows should be darkened to protect the produce from the effects of exposure to light. They should also be boxed or shaded in such a way as to prevent the entrance of light when they are open. The size of the storage room is determined by the space available and the amount of material to be stored.

Natural earth makes a more suitable floor than concrete or brick, as a certain amount of moisture in the air is desirable and earth floors will insure this if kept damp by occasional sprinklings of water.

The door for the storage room should be located at the most convenient point. The ceiling of the storage room should be insulated from heat by spreading bamboo mats, hay or wooden planks.

It is advisable to construct shelves on the walls of the storage room to keep the containers off the ground. Placing the containers on shelves facilitates free circulation of air and ensures protection against rodents.

OUTDOOR STORAGE

Outdoor storage rooms are excellent for the storage of many vegetables and some fruits. They can be maintained at a uniform temperature over a long period; and it is possible to keep the room cool and to reduce the temperature of the stored produce to the desired point for safe storage. Reduction in temperature is obtained by opening the door during the night.

The storage room should be near the kitchen.

STORAGE IN PITS

Cone-shaped outdoor pits are often used for keeping vegetables such as potatoes, carrots, beets, turnips, cabbages, beans and peas. The pit is constructed in the following way :

A layer of straw, leaves, or other similar material is spread on the floor of the pit and the produce is stacked on the litter in a conical pile. More litter is used to cover the produce, and the entire pile is covered with two or three inches of soil which is made firm with the back of a shovel to make it water-proof. More soil mey be needed as the rainy season approaches. A shallow drainage ditch should be dug around the pit to carry away water.

The amount of ventilation required will depend on the size of the pit. Small pits containing only a few baskets of vegetables will receive sufficient ventilation if the straw between the vegetables and soil is allowed to extend along the walls of the pit and project above the pit. Another type of pit-storage consists simply of an open barrel covered with successive layers of straw and earth, the whole barrel being placed in the pit.

KEEPING THE STORAGE SPACE CLEAN

The storage space should be kept clean. Decaying material should be removed immediately on discovery. At least once a year, all movable containers should be removed from the storage room for cleaning. Scraping and scrubbing, followed by white-washing, is also necessary once a year. Permanent bins are more difficult to clean than movable containers and are therefore less desirable.

HANDLING THE PRODUCE

Produce intended for storage should be handled carefully at all times to avoid bruises, injuries and cracks. All mashed, cut or decaying specimens should be removed. If spoilt or broken produce is placed in storage, serious losses from decay are likely to result, specially if the temperature in the storage space cannot be kept below 50° F.

It is desirable to have separate compartments for fruits and vegetables. If pits are used for storage, fruits and vegetables should be stored in separate pits.

STORAGE OF VEGETABLES

Since most families use more vegetables than fruits, the storage areas designed for vegetables are larger. Different vegetables require different storage conditions. The secret of keeping the quality of the produce high and the storage costs low is to provide the right set of conditions needed for each variety of the vegetables stored.

Beans and Peas

All kinds of dry beans may be kept for use in winter by picking the pods as soon as they are mature and spreading them in a warm and dry place until they are thoroughly dry. The beans are then shelled, stored in bags and hung in a cool, dry and well-ventilated place until needed. Underground rooms are likely to be too damp for storing beans.

A few drops of carbon bisulphide in each container will control weevils.

Dry peas may be treated like dry beans and stored in the same manner.

Cabbage

Heads of cabbage may be stored in conical pits, long pits or in ventilated containers in outdoor storage rooms. When the cabbage is stored in conical pits, it is pulled out by the roots and the entire plant is placed head down and covered with soil. The advantage of long pits over conical pits is that only a few heads may be removed without disturbing the rest.

Cauliflower and Broccoli

Cauliflower and broccoli cannot be preserved under ordinary home storage conditions. However, they can be held satisfactorily at 32° F for two to three weeks.

Onions

To keep well, onions must be mature and thoroughly dry. Injured onions or onions with thick necks will not keep and should be used immediately. Sound onions should be stored in baskets, crates or loosely woven bags. Good ventilation is essential. A dry, well-ventilated and cool place furnishes good storage space for

onions; underground rooms are not suitable. It is better to place onions with their necks down in a single layer on wire netting which is suspended in an airy shed.

Potatoes

Potatoes which are to be stored for only a month or six weeks before being used may be stored under conditions different from those which are necessary for potatoes that are to be stored for a season. Storage for a short period may be at a temperature between 50° and 60° F. Potatoes held within these temperatures cook better and do not acquire the undesirable sweetness of potatoes held in long storage at temperatures below 40° F. However, at the higher range they will sprout sooner than at 40° F.

For longer periods, potatoes may be stored underground or in outdoor rooms, *i.e.*, in places where the temperature remains at about 40° F. They may also be stored in conical pits. Barrels, boxes or baskets may be used for holding the potatoes These must be protected from light.

If the potatoes become undesirably sweet because of a low storage temperature, they can usually be de-sugared by being kept at ordinary room temperature for a week or two.

Pumpkins

Well-matured pumpkins may be kept in dry, well-ventilated rooms. Pumpkins keep best when placed in rows on shelves. Late-maturing varieties of these vegetables will keep well if the temperature is maintained at 50° to 60° F. A preliminary curing at 80° to 85° F for about two weeks helps to ripen immature specimens and to heal mechanical injuries produced during harvesting.

Sweet Potatoes

Sweet potatoes should be mature when dug. Since they are easily bruised, they should be handled carefully at all times. A warm and moderately dry place is preferable for storing them. This crop may be kept in pits, but a relatively heavy loss from decay may be expected. When sweet potatoes are stored in pits, they are to be handled in much the same way as other root crops.

Tomatoes

Fresh tomatoes can be made available even after four to six weeks of the closing of the season by properly storing the fruits. One method of storing consists simply of pulling out the vine with the tomatoes attached and hanging the entire plant in a place where the temperature will not get below 50° to 55° F.

A better way of storing tomatoes is to store sound, well-matured (but not ripe) fruits in shallow trays in a moderately dry and well-ventilated room or outbuilding where the temperature will be maintained close to 55° F. Ripening will proceed slowly at temperatures between 55° and 60° F and the ripened fruits will remain sound up to six weeks if kept within this temperature range. A moderate amount of light gives a better ripening colour but otherwise it is immaterial whether the storage place is dark or otherwise. If the tomatoes are separated into different stages of maturity, the ripened fruits can be removed as needed.

Tomatoes taken from nearly spent vines are normally poor in quality. They also decay more quickly than fruits from vines in the prime of production. Therefore, if it is desired to extend the season as much as possible with good quality fruits, a late planted crop should be grown for this purpose.

CHAPTER 23

PREPARATION OF FOOD

COOKING OF MEALS

Before the body can use it, food must undergo some physical and chemical changes through such processes as cooking, digestion, absorption and metabolism. Cooking is the first step in making food available to the body.

Cooking is the preparation of food by the application of heat. The history of cooking food dates back to the discovery of fire. We are told that primitive people placed their food between stones made hot by the sun. Thus, the first method of cooking seems to have been baking. Boiling must have developed next. It is said that water held in animal hides was heated by dropping hot stones into it. This was soon followed by the origin and development of pottery, leading to the evolution of cooking methods.

Purposes of Cooking

The cooking of food is necessary :

(1) To increase the wholesomeness of food by destroying harmful bacteria and parasites.

(2) To improve the taste and flavour of food.

(3) To increase the digestibility of food by breaking down cellulose, softening the walls of the starch grains and making foods more tender.

Effects of Cooking

Heat affects food in many ways. Protein gets coagulated, hardened, toughened and difficult to digest according to the degree of heat applied. Cooking increases the digestibility and flavour of starch which when dry is insoluble in water and difficult to digest. Starch becomes more digestible when dry heat is applied as, for example, while toasting bread or roasting rice and groundnut. When cooked with moist heat, cereals absorb water, swell and become soft. Sugar is converted into a combination of glucose and fructose. When subjected to dry heat, it becomes a syrup and finally turns brown, giving a caramel flavour. When heated to a very high temperature, fats decompose, change flavour and impair the health of the digestive tract. Cellulose gets softened.

Some foods lose their nutritive value through cooking. The loss depends upon the solubility of the particular food in water. Exposure to air during cooking or the addition of baking soda destroys the vitamin content.

Therefore, some fruits and vegetables must be eaten raw if we are to get the vitamins and minerals in them. Tomato, radish, lettuce, cauliflower, cucumber, mango, green chillies, coriander leaves, mint and onion stalks can be eaten raw.

Accepted Methods of Cooking

In general, cooking procedures which help in the retention of colour, aroma, flavour, form and texture of foods also help in retaining their nutritive values. As

the vitamin C content is most easily destroyed in cooking, if that can be retained, most of the other values and desirable qualities can also be preserved. The following suggestions may be of help in ensuring the retention of the maximum nutritive value during cooking:

(1) Foods must be prepared carefully prior to cooking, i.e., during soaking, cutting, salting, etc. Since most of the parts rich in vitamins and minerals lie just beneath the skin of fruits and vegetables, it is desirable to cook them in their skins or to peel them only lightly.

(2) Vegetables should be cut just before cooking or serving and they must be cut into as big pieces as possible to minimize the surface exposed to air and boiling water.

(3) Accurate measurements and standardized recipes help in getting good results and avoiding waste.

(4) Refined foods, such as *maida*, white sugar or sooji, have lost many nutrients in the process of refinement and for this reason should be used in moderate quantities.

(5) Fresh vegetables should be used in preference to wilted or stale ones because the vitamin C content decreases upon storage.

(6) Minerals, vitamins and colours are lost when foods are soaked in water for a long time. Very little water should be used for soaking; and the soaking time should be reduced as much as possible. When dry foods such as dal or dry beans are soaked in water before cooking, the same water should be used for cooking. For the same reason, cooking in too much of water or for too long should be avoided as these lead to loss of nutrients. Water in which vegetables are boiled is usually thrown away. Since it contains valuable minerals, it should be used in cooking items like dal, soup, etc.

(7) Vegetables look better, taste better and have more food values, if they are added to boiling water and cooked for the shortest possible time—10 to 20 minutes. While cooking meals, vegetables should be cooked last.

(8) Using soda in cooking vegetables leads to the destruction of vitamin B and vitamin C.

(9) Cook meat, eggs and other protein foods at a low temperature, since protein gets hardened at high temperatures. Toughening of proteins may be produced by over-cooking.

(10) Serve foods as soon as they are cooked.

(11) Canned (tinned) and packaged foods should only be opened just before use, and the remnants kept in tightly closed bottles or jars. Keep jams and pickles in a cool place, and use them up as quickly as possible.

(12) Care should be taken to avoid too much stirring, sieving or straining of foods while they are hot, as this will incorporate air in them : air destroys vitamin C.

(13) If properly stored, vegetables cooked once need not be reheated. Therefore, left-over vegetables must be served in forms which need no reheating.

(14) All utensils used in the preparation of food should be kept thoroughly clean.

METHODS OF COOKING PREVALENT IN DIFFERENT PARTS OF INDIA

Methods Using Water as a Medium of Cooking

Boiling

Boiling is cooking in a liquid, mostly water, in which bubbles rise continuously and burst over the entire surface. Usually such green leafy vegetables as cabbage, amaranth or *methi* are cooked with little or no water. The water content of these vegetables is itself adequate for the cooking. Such vegetables as green peas, green beans or *lauki* (bottle gourd) are cooked with small quantities of water. Dried cereals, such as rice, dals, legumes, grams and tubers like potatoes may require larger amounts of water. Rice requires about twice as much water as its original volume if it is to be cooked by the absorption method in which the cooking water is not drained. Dals may require double that quantity.

Stewing

Stewing is cooking in a small quantity of liquid. The liquid or water covers the materials to be cooked, and the cooking utensil is covered with a lid. Meats and fruits are usually stewed with condiments, there being little or no additional water.

Simmering

Simmering is cooking food just below the boiling point at 82° to 99° C, or 180° to 210° F. It is easy to recognize this temperature by the presence of bubbles which appear slowly and break before they reach the surface. Soups and milk are usually simmered.

Steaming

Steaming is cooking food in steam with or without pressure. The steam may be applied directly to the food. Vegetables, fruits, fish, *dokala* (a Gujarati preparation) stringhopper and rice preparations like *idli* are cooked by steam. Several types of steam cookers are now available in the market.

Double-boiling

Double-boiling is cooking in a container over hot or boiling water. This process is used for such preparations as sauces, vegetables for infants and scalding of milk when temperatures below boiling are desirable. The food is placed in a utensil which is kept in another utensil containing water. When the water is heated or boiled, the food gets cooked.

Pressure Cooking

In pressure cooking, the steam generated during cooking is retained under carefully controlled pressure. This produces a higher temperature than boiling, shortens the duration of cooking, and helps to conserve nutritive values, colour,

flavour and palatability. The use of pressure cookers is gradually becoming popular in India.

Braising

Braising is cooking foods, particularly flesh foods, slowly in a covered utensil in steam or in a small amount of liquid with fire above and below. Meat may or may not be browned in a small amount of fat before braising.

In all these methods, care should be taken that strongly flavoured vegetables like cabbages, cauliflowers, onions and radishes are not over-cooked, since over-cooking leads to the development of unpleasant odours. Vegetables should be cooked covered, if possible, with the minimum amount of water, for the minimum amount of time so that the maximum amount of vitamins can be preserved. Green vegetables may be cooked uncovered for the first part of the cooking period, to allow volatile acids to escape. This may help in preserving the green colour.

Methods Using Fat as the Medium

Deep-fat Frying

Pakoras, *puris*, *bondas*, fish and mutton chops, meat balls, *pappads*, potato chips, *bajjies*, doughnuts and similar preparations are fried in deep fat. Deep-fat frying involves cooking foods in a considerable quantity of fat after heating it to a very high temperature. Therefore, the nutritive values of fried foods in terms of certain dietary essentials is reduced. At any rate, too much fried food in the diet is not desirable.

Shallow-fat Frying

In shallow-fat frying, less fat is used than in deep-fat frying. Mutton chops, omelettes, eggs, *paneer* (cheese), vegetables and French toast may be prepared by this method.

Pan Frying

When a minute quantity of fat is smeared on the frying pan or skillet, and the food spread on it and cooked, the method is called panning. *Parathas*, *dosais* and pan-cakes are examples of panned preparations.

Methods Using Air as the Medium

Baking

By baking is meant cooking in an oven or an oven-type appliance, using hot air as the medium. Dry *chapati*, bread, biscuits and pastries are cooked through baking.

Roasting

Roasting is cooking uncovered food with dry heat. Groundnuts, cashewnuts, *chana* dal, toast, meat and *pappads* are usually roasted.

The points to be remembered while choosing the method of cooking are :

Vitamin C is easily destroyed by heat and air. Vitamin A is destroyed by intense heat and exposure to air. The water soluble vitamin B_1 is not stable to heat. Riboflavin is not stable to light. Therefore, only mild heating can be applied while cooking foods which are rich in these vitamins.

CHANGES THAT OCCUR WHILE COOKING FOODS

Milk

When milk is heated, changes occur in its odour and flavour because of the loss of dissolved gases, oxygen and carbon dioxide. Physical changes including the formation of a film (calcium caseinate) at the surface, precipitation of coagulated albumin on the sides of the pan, and deposition of some calcium salts at the bottom occur. Continued heating coagulates the casein further, and finally a discolouration of milk sugar (lactose) causing browning (caramelization) results.

Vegetables

Vegetable low in starch lend themselves to being served raw. For the majority of vegetables, however, cooking is necessary to make them more palatable and digestible by softening the fibre and cooking the starch. The colour, texture, flavour, nutritive value and digestibility of vegetables are affected during cooking.

Vegetables normally contain volatile acids which are liberated during cooking. If they are not allowed to escape, they will come into contact with the vegetables and destroy the green colour, intensify the red and darken the white. They have no effect upon the yellow. The medium in which a vegetable is cooked may be kept alkaline by cooking uncovered for a few minutes and thus allowing the volatile acids to escape. Maximum colour in green vegetables and a desirable flavour in the strong flavoured vegetables will be assured if the cooking utensil is left uncovered during boiling. Other vegetables may be boiled in covered vessels. Covering reduces the time of cooking.

During cooking, cellulose is softened and made soluble; its cells are separated and made more digestible. Rapid boiling causes vegetables to break up, and cotinued boiling causes them to get mushy, spoiling their palatability and nutritive value.

Hard water prevents dry beans and pulses from becoming tender; this can be counteracted by adding baking soda. But the addition of soda may lead to the loss of vitamins. Addition of baking soda for retaining the green colour in vegetables is highly undesirable since it destroys vitamins, particularly vitamin B_1.

Addition of salt at the beginning or half way through the cooking of vegetables is said to produce a better texture and intensify flavour.

The flavour of vegetables is modified by cooking. Their nutritive value is also affected. Minerals, water soluble vitamins and sugars get dissolved in the cooking water and unless that water is used, food values are lost. The loss of vitamin C is less in an acid medium. High temperatures, such as those reached during frying, destroy vitamins. Long, slow cooking methods like stewing, simmering and baking cause a greater loss of vitamins than cooking methods which take a short time. Short-time boiling helps preserve more of the vitamin contents. Quick cooking aids in the conservation of vitamin C and in improving the texture and flavour. While steaming, vegetables are cooked in their own juice; steaming therefore results in a greater retention of nutrients. But from the standpoint of colour in the green vegetables or flavour in the strong flavoured vegetables, steaming is not the best method. Greater retention of food values will result if the cooking water is utilized for consumption

and if vegetables are (1) boiled with their skins and cooked whole whenever possible; (2) cut along the grain rather than across the grain; (3) cooked in the smallest amount of boiling watet; and (4) cooked until just tender.

Fruits

Fruits must be washed thoroughly if they are to be consumed raw. Due to the action of natural ferments in them, some fruits get discoloured when cut and exposed to the air. To prevent this, light coloured fruits, such as apples, peaches, bananas and pears should, when cut, be covered with the juice of a citrus fruit like lime or dipped into a solution of salt.

The flavours and pleasant odours of fruits are due to the presence of some highly volatile substances which escape in the steam during cooking. Therefore, there is a big difference in the flavour of raw and cooked fruits. Sometimes, fruits are cooked for adding variety to the diet. Sometimes, unripe fruits may have to be cooked to make them more digestible. The cooking qualities of fruits vary according to the amounts and nature of the sugars, cellulose and pectin present in them. Cooking in covered utensils in a sugar solution or syrup helps fruits in remaining whole. Sugar holds the shape and, therefore, fruits cooked in sugar syrup retain their shapes. Dry fruits must first be soaked for a short time in warm water and then simmered and not boiled to avoid loss of shape. Sugar may be added, if needed.

Cereals

Cereals are cooked to improve their appearance, palatability and digestibility. Pre-treatments, such as crushing, grinding, roasting and parching, facilitate cooking. The cooking of cereals is fundamentally the same as the cooking of starch. In addition to the softening of starch, the cellulose is also made tender.

Pulses

The principles applicable to the cooking of cereals apply also to the cooking of pulses. However, pulses should be cooked for a longer time. Whole gram can be cooked in a shorter time if it has been soaked for four to five hours prior to cooking. Certain food-stuffs like legumes improve in their protein value as a result of heat processing, either through the inactivation of the trypsin inhibitors or through an increase in the availability of certain amino acids found in them, particularly the amino acids containing sulphur. Proteins in some other foods are adversely affected by cooking, for some of the amino acids in them get altered or destroyed.

Meat and Poultry

Muscle proteins get coagulated when heated; they get toughened at high temperatures. The reasons for cooking meat are to destroy organisms, to improve its appearance, flavour and palatability, and to soften and loosen the fibres so that it becomes tender and easy to digest. Tender meats are usually cooked by dry heat methods, such as pan boiling or roasting. Less tender meats are cooked by using moist heat, as in stewing, braising and simmering.

The shrinkage of meat during roasting has been found to be less in larger pieces than in smaller cuts. The shrinkage is also less when meat is roasted at the lower temperatures in uncovered pans. Less tender cuts of meat may be improved by

cooking with some food containing an acid, such as tomatoes and curds, or by pounding, grinding or scoring with a knife. Addition of flour also softens them. Long, slow cooking at a temperature below boiling in a covered utensil is recommended for the less tender cuts.

Fish

The object in cooking fish is to improve its flavour, coagulate its proteins and retain its shape. Because of the small amount of connective tissue which disintegrates easily, retention of shape in fish cookery may be a problem. The methods applicable to very tender meats should be used in cooking fish. Fish may be fried, baked, steamed or buttered and broiled.

Eggs

Eggs are valuable not only for their nutritive value or for the flavour and colour they impart to foods in which they are mixed, but because they bind the ingredients together. The egg is used as a thickening agent in custards, sauces, fillings and dressings; as a leavening agent in cakes and omelettes; as a binding and cutting substance in pastries and cutlets; as a clarifying agent in soups and coffee; and as an emulsifier in mayonnaise dressings.

The white portion of the egg is in the form of a solution of albumin and water. The protein of the egg yolk is dispersed around the fat globules as an emulsion. Both the white and the yolk are coagulated by mild heat. Therefore, if you want them to be tender, eggs and egg dishes must be cooked slowly at low temperatures. High temperatures, or over-cooking even at low temperatures, produce tough and dry products. Over-cooking of a recipe consisting of eggs added to liquids may curdle the mixture and cause the liquid part to ooze out. Eggs cooked in the shell or at a high temperature for a long time may develop a green film on the surface of the yolk. This film is composed of iron from the yolk and sulphur from the white.

'Poaching' is one of the methods of cooking eggs. In this, the contents of the egg are dropped into boiling water and the heat reduced. Adding salt, vinegar or lemon juice to the boiling water or swirling the water vigorously with a spoon before dropping the egg results in a better shape of the poached egg.

While eggs are being fried, the fat must be hot but not smoking, and once the eggs have been dropped into it, the heat should be reduced.

For scrambling eggs, they must be cooked on a low heat or in double broilers. The same principles should be followed for omelettes and baked eggs.

When using eggs as a thickening to hold liquids, a definite proportion of the eggs to the liquid is necessary for optimum results. The greater the proportion of eggs, the thicker the finished product will be.

If a mixture of eggs and a liquid is cooked without stirring, as in baked custards, it sets as one piece. If stirred, a viscous fluid is formed as in soft custards. At high temperatures, the mixture shrinks, becoming watery and 'weepy.'

When using eggs in a starch mixture, as in puddings and fillings, it is necessary to cook the starch mixture before adding eggs.

When eggs are beaten, they foam with bubbles surrounded by coagulated protein. This is due to the low surface tension of the egg white and the stability of its surface films. Since fat decreases the foaming quality of egg white, even a very small amount of fat (on the egg-beater or vessel) will interfere with the quality of the foam. Addition of a little sugar and acid will increase the volume and stability of the foam. These should be added at the foaming stage or before the white is completely beaten.

Egg yolk is more suitable than the whole egg or the white of the egg for forming emulsions.

Fats

The chief uses of fats in cooking are to give richness and flavour to the product and to act as a frying medium and as a shortening. Solid fats like butter, ghee and hydrogenated oils are usually used for making pastry. Oils make tender crusts. When heated to a very high temperature, fats decompose, producing unpleasant colours and becoming harmful to the mucous linings of the digestive system. Such fats also become rancid easily.

Sugar

In addition to its sweetening power, sugar is an important preservative; and is used in many sweets, jellies and preserves.

SERVING MEALS

Proper serving of meals is as important as preparing them properly. A particular food might have been cooked by the best cooking methods with the intention of conserving its nutritive value, palatability, attractiveness, flavour and taste; but all these values might be lost if it is not properly served.

Everything that comes into contact with food must be perfectly clean.

The place where food is served must be made attractive and comfortable. Only then, will it win immediate and enthusiastic acceptance. This need not mean extra expenditure, because cleanliness and beauty can be obtained inexpensively with a little imagination and effort. Using glamour touches, such as cutting out beautiful shapes of vegetables or combining colours artistically, will certainly make even the most ordinary and inexpensive dish beautiful.

A spotless kitchen with a smokeless fire place, colourful pottery, flowers, greens and *rangoli* patterns will go a long way towards making the meals inviting and appealing.

Variety in shapes and textures as well as in kinds of food is important.

Maintenance of food at a suitable temperature is essential if the flavour and taste are to be properly appreciated.

As explained earlier, the secretion of digestive juices depends on the pleasantness of the environment in which food is served. The atmosphere of the dining place while serving food must be cordial. When meals are served in peaceful surroundings and eaten amidst enjoyable conversation, with no hurry or strain, appetite is stimulated, and digestion and metabolism are greatly facilitated.

CHAPTER 24

NUTRITION IN SPECIAL CONDITIONS

NUTRITION IN PREGNANCY

The influence of nutrition on human beings begins even prior to conception and is also felt during the gestation period. Therefore, during pregnancy, the mother has to feed herself and the growing foetus in her womb properly. In addition to meeting the needs of the fast developing foetus, the pregnant woman has to prepare for the requirements of lactation. The expectant mother's nutritional needs are almost twice her normal requirements.

The diet followed during pregnancy influences the physical condition of the infant at birth and the health of the mother. A good diet helps the mother in having a safe labour and delivery. A properly nourished mother is safer from the toxaemias of pregnancy, or other complications during pregnancy. She will recover strength more quickly after the baby is born, produce good quality milk for it, and have better prospects of nursing the infant. Her baby is less likely to be born prematurely and more likely to survive and be healthy. Thus, the food habits of the pregnant woman and her food intake throughout the prenatal period play a significant role in the health of both the mother and the child.

The first nine weeks of pregnancy (first trimester) are of particular importance, for it is during this period that the foetal organs are formed. Poor nutrition at this period may result in the malformation of the infant. During the first trimester, the mother often suffers from nausea or 'morning sickness.' She may even lose some weight during this period. Foods which are easily digested and small meals will help her in overcoming the nausea. Thiamine and other members of the B Complex group of vitamins also prevent vomitting.

The diet of the expectant mother must be planned carefully for the entire period of pregnancy. If she does not take the necessary nutrients, Nature will then, in order to protect the foetus, draws on the reserves of the mother, leaving her in a state of under-nutrition.

Calories

Unless a woman is underweight, her daily quota of Calories should not be greatly increased during the first six months of pregnancy. The Calories must be increased only gradually; this should be done by including more protective foods such as milk, fruits and vegetables.

The energy requirement is not greatly affected by the growth and development of the foetus. For a woman who initially has the ideal weight, there should be a gradual gain of 20 to 22 pounds during the entire period of pregnancy, leading to an increase of 20 per cent in energy requirement. However, an overweight person should limit her Calorie intake. The greatest development and gain in the weight

of the foetus takes place during the last three months of pregnancy (last trimester). About two-thirds of the total foetal gain takes place during this period. Consequently, the demands for building materials for the formation of new tissues are increased markedly. During this period, the mother also experiences growth of certain tissues—the mammary glands, the uterus and certain other glands and tissues throughout the body. Metabolism also increases, resulting in the need to raise the quantities of carbohydrates and fat foods in the maternal diet without replacing foods rich in proteins, vitamins and minerals. The weight gained during this period should be carefully checked.

Protein Requirements

The amount of protein needed during pregnancy is large because the body of the mother has to meet the higher needs of enlarging its own tissues, keeping itself in repair, and allowing the foetus to grow. Protein deficiency is very common during pregnancy. This leads to deficiencies of other nutrients as well, since foods rich in proteins also contain important vitamins and minerals. The protein consumption should therefore be increased during pregnancy by fifty per cent through the consumption of milk or milk products, eggs, meat, fish or poultry. People who cannot afford these can obtain nutrients through less expensive foods like groundnuts, pulses, peas, beans and wheat.

Calcium, Phosphorus and Iron

Calcium and phosphorus are needed in increasing quantities for the formation of the bones of the foetus and the enlargement of maternal tissues. The baby contains, at birth, approximately 22 grams of calcium most of which is deposited in the last foetal month. The rate of accumulation of calcium in the foetus is 50 milligrams per day by the third month, 120 milligrams per day by the seventh, and 450 milligrams per day by the last month of pregnancy. The consumption of calcium and phosphorus should be increased by fifty per cent in pregnancy.

Iron is also important as the foetus has to store iron for use in early infancy since mother's milk does not contain sufficient iron. Additional iron can be supplied hrough increased intake of green leafy vegetables. This will prevent hypochronic anaemia which is common in pregnancy.

Vitamins

The need for vitamins become considerably greater during pregnancy. Foods rich in the vitamins A and D should be taken regularly to supply the extra need for them. Cod-liver oil is a good source of these. These are particularly important in those parts of the country where osteomalacia occurs in women during reproduction.

The B complex vitamins can be obtained through the use of whole grain cereals, yeast and pulses. Generous amounts of tomatoes, limes, *aonlas*, green leafy vegetables and other fruits rich in vitamin C must be taken raw every day. Fruits, vegetables and whole grain cereals help to relieve constipation which is a common ailment in many pregnant women. Mineral oil should not be taken for the purpose, since it interferes with the absorption of the fat soluble vitamins A and D.

Foods Recommended in the Daily Diet

The daily dietary allowances for the expectant mother is given below :

TABLE 36

DIET FOR THE EXPECTANT MOTHER*

Food-stuffs	*Vegetarian* (*per day in ounces*)	*Non-vegetarian*
Cereals	12·0	12·0
Pulses	3·0	3·0
Green leafy vegetables	3·0	3·0
Roots and tubers	2·0	2·0
Other vegetables (green non-leafy)	3·0	3·0
Fruits	3·0	3·0
Sugar and *gur*	1·5	1·5
Oils and fats**	1·5	1·5
Milk	16·0	12·0
Meat and fish***	—	3·0
Eggs****	—	1·0

Note : ***Includes half an ounce of butter and ghee.*
****Four times a week.*
*****Three times of week.*

Proper diet during pregnancy cannot make up entirely for long standing dietary deficiencies which might have existed before pregnancy. Therefore, the habit of eating a variety of foods needed by the body is an important preparation for motherhood. It is necessary that girls understand this well. Having some knowledge of nutrition and developing the habit of eating well-balanced meals give them a great advantage in later life.

NUTRITION IN LACTATION

During lactation, the nursing mother requires a larger amount of Calories, proteins and other nutrients than she did in pregnancy owing to the need for production of milk for the infant. The nutrition of the infant is dependent on the quantity of milk secreted by the mother. Among the various factors which tend to influence the mother's production capacity of milk are the demand for milk by the infant, adequate diet and emotional factors. Deficiencies in the food intake lead to a diminution in the quantity of milk secreted.

It is estimated that on an average 850 cc. of milk are produced daily by a lactating mother. Therefore, her daily diet should include adequate quantities of foods which would meet the nutritional demands for secreting this amount of milk.

Calories

It is estimated that a lactating mother needs 1,000 Calories more than her normal requirements. This amounts to about 120 Calories

*'Road to Good Nutrition' by M. V. Radhakishnna Rao, Haffkine Institute, Bombay.

for each 100 cc. of milk secreted. Insufficient Calories in the diet will lead to less secretion of milk. Overfeeding, however, will not stimulate additional production of milk.

The increase in the need for calcium, vitamin C, protein, riboflavin and vitamin A is also much greater during lactation than during pregnancy. Therefore, the foods which are added to supply the additional Calories, must also generously provide those nutrients. Milk, citrus fruits, eggs, fish, pulses, sprouted gram, green leafy vegetables and fruits are good supplementary foods.

Protein

The daily allowance of protein should be increased by at least 20 grams over that required during pregnancy. Inadequate protein in the diet will also cause a deterioration in the quantity of milk secreted.

Caicium and Phosphorus

Two grams of calcium daily and a corresponding increase in the amount of phosphorus are recommended. In general, when calcium and protein are adequate in the diet, phosphorus will also be adequate.

Vitamins

The recommended allowances of vitamins for lactating mothers are :

Vitamin A—3000 International Units per day (an increase of 60 per cent over the normal requirements)

Thiamine—1 ·7 milligrams

Riboflavin—2 ·5 milligrams

Ascorbic acid (Vitamin C)—150 milligrams.

Table 37 gives the diet for a nursing mother.

TABLE 37

DIET FOR THE NURSING MOTHER

Food-stuffs	*Vegetarian* (*per day in ounces*)	*Non-vegetarian*
Cereals	11 ·0	11 ·0
Pulses	3 ·0	2 ·0
Green leafy vegetables	3 ·0	3 ·0
Roots and tubers	2 ·0	2 ·0
Green non-leafy vegetables	3 ·0	3 ·0
Fruits	3 ·0	3 ·0
Sugar and jaggery	1 ·5	1 ·5
Oils and fats*	1 ·5	1 ·5
Milk	32 ·0	24 ·0
Meat and fish **	—	3 ·0
Eggs***	—	1

Note: **Includes half an ounce of butter and ghee.*

***Four times a week.*

****Three times a week.*

NUTRITION IN CHILDHOOD

The requisites of good nutrition are the same at all periods of life, but the quantities of nutrients required vary with the different stages. They are greatest durng growth.

An adult's food should supply him with energy and heat, maintain his body processes and repair his wornout tissues. But a child's food must do all this and in addition constantly supply materials for building new tissues as he grows taller and gains weight year by year. The kind of health and happiness he enjoys, the kind, amount and cleanliness of food, the manner of feeding, the quietness and peacefulness of the surroundings, adequacy of rest and sleep, the cleanliness of the drinking water, protection from disease and the availability of fresh air, sunshine, play and exercise, are all important in deciding how well developed the child will be.

Feeding in the First Year

The child develops rapidly during the first few years of life. The first year is the period of highest growth and at no other time of life is food so important as in the first year. The weight of the infant at birth is six to seven pounds. It is doubled by the end of the fifth month, trebled by the end of the first year and quadrupled by the end of the second year. In height, the infant grows about ten inches taller by the end of two years. At the end of twelve months, the infant may have six teeth; at the end of eighteen months, twelve teeth; and at the end of two years, sixteen teeth. Because of this rapid growth, the nutritional requirements are high per unit of body weight. Never again after birth is growth so rapid. It is, therefore, essential that the infant should receive adequate food during this period.

Breast Feeding Vs, Artificial Feeding

Mother's milk is the best food for the baby during the first few months of its life. It is adapted in every way to the infant's needs. It contains proteins of an excellent quality for growth and furnishes all the essential amino acids. The other advantages of breast feeding are :

(*i*) It is free from bacterial contamination.
(*ii*) It requires no elaborate preparation.
(*iii*) It improves the parent-child relationship.
(*iv*) It is less likely to give rise to infant eczema or other allergic manifestations common in artificial feeding.
(*v*) It prevents or decreases the severity of many gastro-intestinal disturbances, specially in environments where sanitation and health measures are not adequate.

During the first six months, the baby needs about $2\frac{1}{3}$ ounces of milk per pound of body weight every day. During the remainder of the nursing period, it needs two ounces of milk per pound of body weight every day.

Because of growth and metabolic changes, the needs of infants for Calories, proteins, vitamins, minerals and water are great. The baby needs one gram of protein and 50 Calories per pound of body weight; this is double the corresponding

requirements of adults. Water requirement per unit of body weight is almost three times that of adults. Many times, infants cry not because of hunger but because they are thirsty.

When babies cannot be breast-fed, artificial feeding has to be devised. Usually, a formula of cow's milk which has been properly modified and prepared after calculating the baby's needs and the amount of milk and sugar that should be mixed with water proves satisfactory.

The number of feedings varies with infants, but on an average five feedings a day are given. The amount at each feeding is one to two ounces more than the age of the baby in months. About $1\frac{1}{2}$ ounces of milk per pound of the body weight of the baby per day will supply sufficient protein, calcium and phosphorus. This amount of milk, when subtracted from the amount of milk mixture, gives the amount of water to be added to the milk. One-tenth of an ounce of sugar per pound of the body weight should be added to the formula. The mixture should then be boiled, and given to the baby in a clean sterilized bottle. The feeding bottle, its cap and nipple must be boiled before use. The required amount of milk must be directly poured into the clean bottle and covered with the nipple and cap. Before being used again, the bottle should be placed in a utensil filled up to four inches with water, covered and boiled for thirty minutes, cooled and given to the baby.

Supplements to Milk

Neither the human milk nor the cow's milk is completly adequate in all the nutrients needed for the rapidly growing infant. It is, therefore, necessary to add other feeds during the first year. Some solid foods may be given by the time the baby is five to six months old. The additions may be fresh fruit juices for supplying the vitamin C; cod-liver oil for the vitamins A and D; strained cereals or mashed potatoes for Calories; soft cooked egg yolk for iron and the vitamins A and D; rusks, crusts and crisp cereal preparations for the satisfaction of chewing; cooked, strained and unseasoned vegetables and cooked, strained fruits for minerals, vitamins and laxative value. Butter supplies energy and the vitamins A and D.

Extreme care in the handling of foods should be exercised to avoid food-borne infections which are common in infancy.

The section on child development deals in detail with the ways in which supplementary foods should be introduced to infants.

The early feeding experiences of the infant have a significant effect on his emotional development. During the first months of his life, he learns to trust or distrust the people who care for him. When his hunger is satisfied, he has a feeling of trust in the person who feeds him. Being hungry is one of his first frustrations, while being fed is one of his first satisfactions.

A well-nourished child is healthy, chubby and bright. His body receives all the food materials essential for growth and activities. He is alert and happy. His digestion and elimination are regular. His teeth are well-formed and his gums are firm and pink. He develops strong muscles. All these are reflected in his posture. Good feeding prevents ailments due to malnutrition and undernutrition.

Feeding the Pre-school Age Child

Between two and six years of age, i.e., the pre-school period, growth proceeds at a slower rate than during the first year and the baby enters 'childhood' leaving behind babyhood. It is at this time that lifetime food habits are formed, and it is important to see that children learn to like the foods which they require for good nutrition.

The foods that the baby has become accustomed to during the first year, should be continued during the second year and the following pre-school years, but in greater amounts and varieties to meet his increased needs. The energy needs are provided by larger amounts of cereals, potatoes and other starchy foods. The needs for proteins, minerals and vitamins are to be met by larger quantities of fruits, vegetables, dals, milk, eggs, meat and fish. The pre-school child should have plenty of water to drink. Fish-liver oils should be continued.

Children at the pre-school stage differ from others in their food tastes, as they do in everything else. Their eating habits vary from day to day and from meal to meal. The kind or amount of food that they demand is unpredictable. Such fancies are a of part developing childhood.

The way food feels and tastes for them leads to future food likes and dislikes. For most children, warm foods are more acceptable than either hot or cold ones. Cereals and vegetables are eaten more readily if they are of semi-fluid consistency. Mild flavoured foods are preferred to strong flavoured or highly spiced foods. Crisp and tender vegetables, such as carrot and cucumber, are well-liked.

A colourful food plate makes the meal more appealing to children. Single foods and easily identified foods are more popular with them than mixtures. Such preferences must be recognized and eating made easy and joyful. Comfortable sitting arrangements, dishes which do not tip over easily and vessels small enough for the child to handle add to the pleasures of eating. It was found in some nursery schools that allowing some choice of food in the menu helped children increase their food intakes and reduced food problems.

Regularity of meals should be established and eating in-between meals discouraged. The reason why the child refuses to eat some foods should be studied and the situation handled carefully so that the child does not come to form a permanent dislike for any principal item of food. Reluctance to eat new foods, a craving for certain foods, poor appetite and dodging at meals require patient treatment. Refusal to eat is often used as a weapon by the child. Parents' concern makes that weapon powerful.

The atmosphere during mealtime should be pleasant. Good eating habits are formed if the parents expect the child to eat, recognize that the child himself has something to contribute to his nutrition, and appreciate his food preferences. The child should be allowed to feed himself as soon as he shows readiness to try it. He will of course spill and scatter food in the beginning, but he should be encouraged to keep on trying. Foods must be prepared for them in forms which make eating

easier. Vegetables should be cut into small pieces. Raw vegetables and fruits should be cut in sizes that can be picked up in their hands. Even when the child can feed himself quite well most of the time, he will occasionally need his parents' help specially when he is tired or upset.

The nutritional requirements of children are given in Table 26. Accordingly, the diet for a pre-school child may consist of :

Cereals	4	ounces	
Dal (pulses)	1	„	
Green leafy vegetables	2	„	
Roots and tubers	2	„	
Other vegetables	2	„	
Fruits	2	„	
Sugar and *gur*	1·5	„	
Oils and fats (preferably butter and ghee)	0·5	„	
Milk and curds	20	„	If vegetarians, and 16 ounces if non-vegetarians
Meat and fish	1	„	for non-vegetarians
Egg	1	„	for non-vegetarians

There are numerous ways of planning attractive and simple meals using the above allowances. A suitable menu for a day is given below :

Breakfast

Banana or guava
Sooji porridge with milk (cooked *sooji* ½ cup and milk ½ cup)
Chapati or *dosai* (two small ones with butter)
Milk (½ cup)

Lunch

One egg or mashed dal (½ cup)
Boiled vegetable with butter
Green leafy vegetable
Chapati (4) or rice (1 cup)
Curds (½ cup)
Sweet (milk sweet, steamed pudding, jelly or steamed rice preparations)

Tea

Biscuits and milk (½ cup)

Dinner

Mashed potato
Raw vegetable
Chapati or rice
Fruits
Milk (½ cup)

A number of menus for children are suggested in the section on Child Development.

During early childhood, children like foods prepared in simple ways—boiled, mashed, baked or steamed. It is undesirable to give them fried foods, or too mchh condimented or sweetened foods. Fat and sugar tend to satisfy their appetite before they have eaten enough food.

Feeding the Middle-school Age Child

Between the ages of seven and ten (the primary and middle school age), growth continues at a steady pace and is accelerated at the pre-adolescent period.

The nutritional requirements of the school-age child are not very different from the pre-school age child. But the fact that the child goes to school and mixes with other children of the same age brings some problems. During the school days, meals and other activities have to be planned in relation to the time-table at school. The mid-day meal programmes started in several States of India for school-going children are a welcome step towards increasing national health and education.

The quantity of foods should be increased during this period to take care of the demands of greater growth. School children digest almost everything in the family diet. It is desirable to continue to serve them simple, palatable, attractive and balanced diets. Table 38 gives the diet of a school age child.

TABLE 38
DIET FOR THE SCHOOL AGE CHILD

Food-stuff	*Vegetarian* (*per day in ounces*)	*Non-vegetarian*
Cereals	8	8
Pulses	2	2
Green leafy vegetables	2	2
Roots and tubers	1·5	1·5
Green non-leafy vegetables	1·5	1·5
Fruits	1·5	1·5
Sugar and jaggery	1·5	1·5
Oils and fats*	1·0	1·0
Milk	16	12
Meat and fish**	—	2·0
Egg	—	1
Groundnut	0·5	—

**Includes half an ounce of butter and ghee*
***Three times a week*

Feeding the Adolescent

While feeding the adolescent, one must bear in mind the rapid rate of growth and intense activity as well as the great variability among individuals characteristic of this stage. Physical, mental and emotional changes in adolescents take place at different ages at different rates in different individuals. Spurts in growth take place in children whose health has been safeguarded and who have had sufficient food. The growth spurt in boys begins around 13 to 15 years and in girls around 10 to 12 years. Both boys and girls continue to grow rapidly for four to five years during the adolescent period. Then the rate of growth slows down.

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Because of the extremely rapid growth, the adolescent boy or girl needs more sleep than the younger school-going child. If enough sleep is not available, many boys and girls may feel sleepy and tired in the class and are unable to concentrate on their lessons.

An adolescent boy or girl may be so active and grow so fast that he or she may actually need more food than the father or mother. Usually, boys and girls of this age are always hungry. However, they assert their independence and may even reject some foods in favour of others, if it seems to be more in keeping with adults.

The chief dietary problem in adolescence is to ensure that the foods eaten meet the increased energy requirements and that they do not lack any of the essential nutrients. It is important that foods are offered in pleasing forms, conducive to cheerful eating. In addition to the protective foods such as milk, eggs, vegetables, fruits, meat, etc., energy-giving foods should also be taken in liberal amounts. Such foods include butter, ghee, bread, starchy tubers, cheese, groundnut, cashewnut, peas, beans and sweets. Besides the three regular meals a day, additional food in the form of snacks may be needed during the adolescent period. Table 39 gives the diet for an adolescent.

TABLE 39
DIET FOR THE ADOLESCENT

Food-stuff	*Vegetarian* (*per day in ounces*)	*Non-vegetarian* (*per day in ounces*)
Cereals	12	12
Pulses	3	3
Green leafy vegetables	4	4
Roots and tubers	3	3
Green non-leafy vegetable	3	3
Fruits	1·5	1·5
Sugar and jaggery	1·5	1·5
Oils and fats†	1·5	1·5
Milk	16	12
Meat and Fish‡	—	2
Eggs	—	1
Groundnut	0·5	—

† *Includes 3/4 ounce of butter and ghee*
‡ *Four times a week*

The Child with Special Food Needs

Sometimes, we may have to feed a child who, because of some special physical conditions, is malnourished and has to receive special attention if he is to be brought back to normal health. Sick children with acute or chronic illness and children suffering from physical handicaps also need special care. Diet plays an important part in the control of diseases and in the rate of recovery.

The Sick Child

The diet of a sick child needs careful supervision. Foods advised by the doctor should be offered in forms which will be eaten and enjoyed. Very sick children have little appetite; they may have difficulty in eating and might frequently refuse to eat. Regular food intake is important for recovery. Much skill and patience should be exercised in getting the necessary nourishment into the child without upsetting his digestion or peace of mind. Foods which make a many-sided contribution to the diet such as milk products, eggs, fruits, leafy vegetables, whole grains and unmilled rice should be prepared in attractive ways.

If solid foods are disliked or not accepted, fluids and juices can be reinforced with milk, malt powder, egg powder or other nutritive foods and served pleasantly flavoured to provide proteins, minerals and vitamins. Sick children should never be urged to take more than what their appetite demands. Forcing them to eat is harmful.

The Malnourished Child

In a malnourished child, we must first find out whether there is any chronic disease or physical difficulty interfering with his nutrition. Then, with the help of his parents, a careful study of his dietary habits should be made to discover the cause of his malnutrition. A doctor's help will be necessary for improving his health. A badly selected diet might have developed in the child certain food prejudices, to remove which time and tact will be required. The health of the child who has been malnourished in the past can be brought up to a high standard if good diets and good health habits are continued for a sufficiently long period of time.

The Psychology of Feeding Children

Children acquire food habits very early and these habits are persistent. Their attitude towards food is of the utmost importance for avoiding future conflicts over food. It is important that they eat the foods required for growth; but it is even more important that they learn to like them, prefer them, and continue to eat them even when they grow up and choose their own foods. Young children show strong feelings of frustration or satisfaction about food. Such feelings may affect the way in which children meet other situations in life. Emotional satisfaction during eating help in the building of mental health.[1]

For pleasant meal-times, a child needs :

(1) Play, rest, sleep and cleanliness.
(2) Attractive food.
(3) Small servings.
(4) Some freedom to choose his own food.
(5) Some freedom to eat in his own way.
(6) Relaxed parents.

Play, Rest, Sleep and Cleanliness

While eating is fun for a hungry child, an exhausted or excited child cannot enjoy his food.

The child's need for sleep is as important as his need for food. Sleep and rest are required by the body to use food for building up bones and muscles. The benefits of a good diet may be offset by inadequate sleep and rest. Each child will develop his own regular pattern of sleep. Adults must help him satisfy this need fully by making him comfortable at sleeping time.

If the child has played just before mealtime, he must be given the chance to quiet down, before he sits down to eat. He should be encouraged to wash himself. This will make him feel clean and fresh.

Attractive Food

The attraction of food lies in how it looks, tastes and feels. Bright colours such as yellow carrots, green peas, oranges, white eggs and red beetroots make food appealing. Colourful mats, tables, plates and other utensils, and a gay eating place make mealtimes happy.

Milk and delicate flavours are preferred by children. Moisture and smooth consistency in food preparations and crispness in raw fruits and vegetables are the textures liked most by children.

Small Servings

A heaped-up plate is discouraging to a young child. Foods are attractive to him if each dish stays separately. Serve him with only small helpings of each food at first, and let him ask for another serving if he so desires.

Some Freedom to Choose His Own Foods

Even infants show definite food preferences. Babies brighten up at the appearance of one vegetable, frown at another and close their mouths tightly against a third one. Their appetite varies from one meal to another and from one day to another.

The child's needs, rate of growth, activities, feelings and moods determine the amount he eats during a particular meal. Travelling, visitors, the weather, teething, illness, unusual excitement or any emotional upset will affect his appetite. Before coaxing the child to eat, the basic cause for his refusal to eat must be traced and removed.

When new foods are served, the old favourite foods must be served along with them. If the child is not willing to give the new food a trial, he should not be nagged or bothered about it. The food should be served to him on another day in a different form. New foods should be given when the child is hungry and in a good mood.

Sweets must be given as part of a meal and not in between meals or as bribes.

Children who are given foods they like and the freedom to decide for themselves how much to eat enjoy eating. They should thus be encouraged to make their own selections and to serve themselves. This naturally makes them interested in a variety of foods.

Some Freedom to Eat in His Own Way

Children like to feed themselves with their fingers. Small pieces of vegetables, fruits and bread are intended to be eaten that way. If children plunge their fingers in a bowl of rice, soup or curry, they should not be scolded. Manners cannot be expected until children have learnt to eat a variety of foods and have grown up enough

to be able to handle foods and utensils skilfully and feel part of the group.

Relaxed Parents

The easy way is the best way to feed young children. The key to peaceful eating is to serve suitable foods in friendly surroundings, without expressing worry about what, how much or how the child eats. Parents must stop worrying if they want their child to eat better. They must instead fix their attention on making mealtimes enjoyable. If they are tired or nervous, the child quickly catches the same mood. The mealtime is a good time to chat with the child about his play, school and friends. Harmony in the home, regularity in meals, matter-of-factness about meals, cheerfulness at mealtimes and the setting of proper examples by adults promote desirable food habits in children.

Humiliating or frightening the child, telling him fantastic stories about food or bribing him into eating with false promises will establish bad food habits in him.

NUTRITION FOR LABOURERS AND HARD WORKING PERSONS

Working men and women, specially agriculturists and those engaged in hard industrial labour, need larger quantities of Calories to meet their energy requirements than sedentary workers. Industrial workers must be well-fed if they are to turn out the maximum work. To fulfil their higher requirements, their daily allowances of cereals, roots, tubers and dals should be increased. The diet for an industrial or agricultural worker is given in Table 40.

TABLE 40*

DIET FOR THE INDUSTRIAL OR AGRICULTURAL WORKER

Food-stuff	*Vegetarian* (*per day in ounces*)	*Non-vegetarian*
Cereals	16	16
Pulses	4	4
Green leafy vegetables	3	3
Roots and tubers	4	4
Green non-leafy vegetables	3	3
Sugar and *gur*	2	2
Oils and fats**	2	2
Milk***	10	10
Groundnut	1	—
Meat and fish	—	3
Egg	—	1

***Includes half an ounce of butter or ghee.*

****If the worker cannot afford fresh milk, 'toned' milk or reconstituted milk from skimmed milk powder may be used.*

*'Road to Good Nutrition', by Dr. M.V. Radhakrishna Rao, Haffkine Institute, Bombay.

NUTRITION FOR OLDER PEOPLE

The Importance of Avoiding overweight

In adolescence, the demands of rapid growth and strenuous physical activity increase the nutritional needs and appetite. With maturity, growth comes to a halt, and life is usually more sedentary. As we grow older, the activities of the body become less strenuous. Food is required in old age mainly for maintaining the body activities.

Therefore, the nutritional needs decrease in adulthood but the same thing does not happen to the appetite and food intake. If the energy intake is not cut down, the result will be accumulation of extra weight and, eventually, obesity in older people.

We must think of the adult's nutrition in terms of the past, present and the future. The present nutritional status of an adult has been conditioned by his previous history and the current food habits are a forecast of his nutritional status in the years to come. The nutrition problems of the older persons are often a result of life-long poor food habits, which cannot be easily changed.

OVERWEIGHT AND OBESITY

Overweight is a problem for adults. It is a common outcome of malnutrition. The reasons for overweight may be one or more of the following :

(*i*) Inactivity ;
(*ii*) A history of overweight from childhood ;
(*iii*) Poor food selection and ;
(*iv*) Excess food intake.

In some cases, overweight persons consume more Calories than their bodies can utilize. Because much of our social life is associated with food, the problem of dieting is more difficult for those who attend social functions. Very often the guests want to please the hostess because she will be offended if they do not consume her special, rich preparations.

An individual whose weight is 10 to 20 per cent above the ideal weight is considered overweight. Deviation of 20 per cent or more above the desirable weight may be pathologic and is called obesity.

The simple reason for overweight is that people eat too much. Why are people impelled to eat more than is necessary? The reasons are :

(*i*) Disturbed appetite control ;
(*ii*) Psychosomatic influences ;
(*iii*) Lowered energy needs with age ;
(*iv*) Insufficient physical exercise ;
(*v*) The role of food in our social life; and
(*vi*) The habit of eating more food than is needed.

Disturbed Appetite Control

Appetite means 'desire for food.' Physiologists tell us that there are many centres in the brain which exercise a control over appetite and also that there are drugs

to curb appetite. Appetite is a function of the mind and sometimes influences us to eat when we have no need for food. The kinds of foods which we desire to eat are those which we had previously liked and enjoyed. For instance, we may say after a heavy meal that 'we are full' and yet find it possible to eat a sweet dish that is offered to if it is one we like.

Psychosomatic Influences

Some persons eat excessively to compensate for their emotional disappointments, idleness or boredom. They just nibble to while away the time and to break the monotony of life.

Lowered Energy Needs with Age

Persons who have passed middle age tend to gain weight. This is because the energy needs diminish with advancing age. Their Basic Metabolic Rate is lower and the tendency to take exercise is less than it was in their younger days. Consequently, they begin to accumulate fat. Inactivity and insufficient exercise lead to overweight. Many of the modern labour saving devices in the home have taken us away from the bending, stretching, walking and climbing which were involved in housekeeping and which kept our muscles active.

Food and Friendship

Serving food is a mark of friendship. Eating together and giving gifts of food are integral parts of our social life, and symbols of our hospitality and traditions. Food habits die hard. They are formed from early childhood and can be conquered only with difficulty. Therefore, if a habit of consuming extra Calories has been developed, it will lead to overweight.

Obesity predisposes the body to many disturbances and diseases, such as diabetics, high blood pressure, and cardiac or kidney troubles. Therefore, the diet of older people should be low in Calories and high in protective foods. The most effective type of diet for reducing is one which is sound nutritionally and which will bring about a gradual but permanent loss in weight. It should be a diet which the person will enjoy and which will help in the formation of better food habits. One of the most satisfying types of diet is one which has high protein and moderate fat contents. Such a diet will give a feeling of satisfaction and eliminate the craving for eating in-between meals.

The meals should be varied and interesting, and should include milk, fruits, vegetables, dal and whole grain cereals.

CHAPTER 25

DIETS DURING ILLNESS

Diet has been called the corner-stone of preventive medicine, the handmaiden of curative medicine and the responsibility of every doctor. Nutrition is a part and parcel of all therapy.

The fundamental objective of feeding the patients is the maintenance and re-establishment of nutritional status. The normal diet is the basis for the planning of diets in disease. The basic principles used in planning normal diets are applied to therapeutic diets also, although disease may affect the individual's nutritional requirements. In some pathological conditions, the normal diet will have to be modified with respect to the quantity of one or more nutrients. In some other situations, such qualitative changes as changes in consistency, flavour and digestibility of foods, etc., will be necessary. All such alterations can easily be done, if they are related to the normal diet.

Psychologically, there is an advantage in relating all diets to the normal pattern. Most people, however sick they may be, look forward to the return to normal. Even for those patients who have to be on modified diets for the rest of their lives, emphasis on the similarities to the normal diet rather than the differences promote acceptance of the special food and speedy recovery.

In a normal diet, the basic meal patterns are planned in terms of food groups, rather than specific foods, giving full scope to the individual for his preferences as to the kind of vegetable, fruit, meat or bread he likes to eat.

The ingredients, formulation and preparation of the normal diet have already been discussed. The food allowances for a balanced daily diet for an adult are given in Table 26.

There are numerous ways in which the food allowances mentioned in that Table can be formulated into attractive and inexpensive meal patterns. One is given below :

Breakfast

Fruit or fruit juice.
Cereal preparation such as porridge, *idli*, *dosai*, *puri*, *chapati*, *uppuma* or *khichadi*.
Soft cooked egg or roasted or boiled groundnut.
Butter or ghee.
Milk or coffee with milk and sugar.

Lunch

Rice or *chapati*.
Dal or meat or fish.
Mixed vegetable salad (raw vegetables).

Boiled vegetables.
Fruit.
Milk or *dahi* (curds).

Tea

Biscuits or roasted gram and tea.

Dinner

Rice or *chapati.*
Butter or ghee.
Boiled vegetables.
Meat or dal preparation.
Potatoes.
Milk or *dahi.*
Sweets.

While planning diets for the sick, the foundation diet outlined above can easily be modified. Let us suppose a low Calorie diet is desired. A nutritionally adequate diet can then be prepared by using one or more of the following simple adaptations of the normal diet:

(1) Using skimmed milk instead of whole milk
(2) Decreasing fats and oils
(3) Reducing the amount of cereals and potatoes; and
(4) Increasing the vegetables and fruits, to provide bulk, acceptability, and vitamins and minerals which are decreased by cutting down other foods

Again, for a diet in which milk is to be omitted entirely, the nutrients contributed by milk should be furnished through other foods. Milk supplies protein, calcium, thiamine and riboflavin to the normal diet. Meat and egg may replace the protein and thiamine, but calcium and riboflavin supplements will be necessary.

If raw fruits and vegetables are to be deleted from the diet, the vitamin C supplied by them must be compensated by increasing the amount of citrus fruit juices.

Thus, a variety of dietary modifications based on the normal diet are possible to formulate therapeutic diets. A few such special diets are discussed in this section.

BLAND DIETS

A bland diet is one in which the choice is restricted to smooth and soothing foods to prevent irritations of any kind—mechanical, chemical or thermal—to the mucous membranes of the digestive tract. The bland diet is prescribed in disturbances of the gastro-intestinal tract, such as peptic and duodenal ulcers, ulcerative colitis, dysentery or diarrhoea.

Bland diets are planned to establish and maintain nutritional balance, prevent mechanical irritation of the gastro-intestinal tract, and to reduce gastric acidity either by inhibiting secretion of the gastric juices or by neutralizing or diluting the gastric contents. Bland diets are consequently restricted in fibre content since coarse fibres irritate the sensitive mucous membranes.

The skin, seeds and cellular portions of foods are the chief source of fibre. The amount of fibre present in foods depends not only upon the kind of plant, but also upon the degree of maturity. For example, potatoes and carrots with their skins removed have very little fibre, while lady's finger is fibrous; young green beans contain only a small amount of soft fibre, whereas mature green peas are tough and have a considerable portion of rough fibre.

The fibre content of normal diets can be reduced by using foods low in fibre. This can be done by eating tender vegetables, avoiding overripe vegetables, removing the skins and seeds of vegetables and fruits, eating only cooked vegetables and fruits (since cooking softens fibre), straining cooked vegetables and fruits, and using only refined cereals foods. Meat has fibre in the form of indigestible connective tissues. The amount of connective tissues present depends upon the age of the animal, the part of the body from which the muscle has been cut and the method of cooking employed.

Strongly flavoured or 'gas forming' vegetables such as onions, cabbages or turnips are also avoided in bland diets. Over-cooking such vegetables releases sulphur-rich compounds which induce gas forming tendencies. If the vegetables are cooked quickly, such decomposition can be kept to the minimum. Condiments, relishes and highly seasoned foods should be omitted in bland diets, since they stimulate gastric secretions. In place of them, salt, nutmeg and cinnamon may be used for flavouring.

In peptic ulcers, the proper choice of food as well as the avoidance of anxiety or frustration result in a diminished flow of gastric juice and its neutralization which are essential for giving relief to the patient. Since fats inhibit the flow of gastric juices, emulsified fats such as those in whole milk, cream, butter and egg yolk should be used. As protein foods are effective in neutralizing acid in the stomach, milk is particularly valuable as a buffer. Bland diets must be planned with milk as the main item of food. Such diets can be served in three meals a day, but frequent feedings can dilute the stomach contents better and will result in a greater intake of nutrients and more satisfaction.

During prolonged dependence upon milk and milk products as in the case of some acute ulcer conditions, deficiencies of essential nutrients such as proteins, iron, vitamin C and thiamine are likely to occur. Moreover, alkali therapy interferes also with the absorption of iron. Therefore, protein, iron and vitamin C must be given as supplements to such bland diets.

The belief that citrus juices may irritate mucous membranes is widely held, but discomfort can be avoided if the juices are taken at the end of a meal. They should be included regularly in the diet to supply the much needed vitamin C.

LIQUID DIETS

Liquid diets are given in post-operative cases, fever conditions and whenever the patient is not able to take solid foods. They are usually used for short periods. The various types of liquid diets are :

(i) Clear Liquid Diets

Clear liquid diets supply fluid in the form of fat-free soups, ginger ale, and tea or coffee with sugar but without milk or cream. Occasionally small amounts of strained fruit juices, egg white and gelatin are also included.

(ii) Full liquid Diets

Full liquid diets include all foods liquid at room and body temperatures. They provide nutritional requirements in a form which requires the minimum activity for digestion and absorption. Full liquid diets include :

> Milk, eggs, strained cooked rice or *canjee*, thin porridge, cooked and strained vegetables, citrus fruit juices, tomato juice, cocoa, sugar, butter, gelatin, custard and ice cream.

Dry yeast can be included to supply iron and niacin. The Calorie level of full liquid diets can be increased by adding cream to milk, butter to soup and glucose to fruit juices.

HIGH PROTEIN DIETS

In severe under-nutrition following surgery or injury, in diseases of the liver or kidney, in infections, and in gastro-intestinal disturbances, high protein intakes are very essential. The maintenance and restoration of body proteins are influenced by such interrelated factors as the dietary amount of protein and its nutritional efficiency, Calorie adequacy, acceptability of the diet in terms of palatability, food practices, amount of food, tolerance of foods and ability to chew and swallow, etc. Economic factors such as the cost and availability of foods or their keeping qualities also influence the practicability of high protein diets.

The proteins of egg yolk, milk products other than butter and fleshy foods supply sufficient amino acids for tissue repair and growth. Unfortunately, because of too much emphasis on animal proteins, the valuable contributions of plant foods are sometimes overlooked. Most of the cereal foods, nuts and legumes contain varying amounts of essential amino acids. If a small quantity of animal food rich in the limiting amino acids is used as a supplement to plant foods, the mixture will be satisfactory for the construction of tissues.

Under normal conditions, a diet deriving as little as 10 per cent of its protein from milk and the remaining 90 per cent from cereal foods can provide a mixture of amino acids excellent for maintenance and growth. Cereals and milk, bread and cheese, rice and *dahi*, meat and wheat, dal and *dahi*, and *soojee* and milk are some satisfactory combinations. Thus, animal foods which are costly and available in a limited quantity can be put to the most effective use when combined with the much less expensive plant foods. The supplementary relationships of the proteins in plant and animal foods are useful only when the foods are fed simultaneously. However, in disease conditions, it is desirable to have half to two-thirds of the total protein intake from animal foods.

The amount of protein required in many pathological conditions may be two, three or even four times the normal requirement. Diets providing 150 to 300 grams of

protein per day are recommended in such conditions as burns or injuries where wound healing should be promoted, diseases of the liver or severe under-nutrition. Diets with 110 to 125 grams of protein per day have proved to be of immense value in many instances of under-nutrition, diseases of the kidney and such disturbance of the gastro-intestinal tract as peptic ulcer or colitis.

The success of these diets depends upon the day-to-day ingestion of specified quantities of high quality protein foods at the Calorie levels most favourable to the efficient use of the amino acids. In times of stress, the Calorie requirements of the body take precedence over other demands. At such times, carbohydrates, fats and proteins are all oxidized to provide the needed energy. Therefore, giving a high level of good protein will be wasted unless correspondingly high amounts of carbohydrates and fats are also provided simultaneously. Depending upon the restlessness of the patient, the rise in his body temperature and the energy required for the process of tissue repair, the Calorie requirement may go up to 4,500. Liberal intakes, of carbohydrates and fats, with due attention to taste, will help towards the maximum utilization of the high protein foods.

High protein diets should be based on normal diets, emphasizing the patient's total nutritional needs rather than the amount of protein as such. If possible, 80 per cent of the increased protein should be obtained from animal sources. It is also important to keep in mind the patient's likes, dislikes, tolerance for foods and eating habits; strange or unpalatable foods which may lead to lifelong hatred of essential foods should not be imposed on him.

An addition of two cups of milk, two eggs or two ounces of groundnut and four ounces of meat or pulses to the normal diet will increase the protein content from 70 to 125 grams daily. The use of concentrated foods of a high protein content such as skimmed milk powder, cheese, thick dal, dal sweets, groundnut butter, *sandesh*, *gulab jamun* and *rasgulla* will make the meals attractive and palatable.

Recovery to normal health will be facilitated when such diets are prepared with regard to their appearance, taste and appeal, and when the meals are served to the patient in a cordial atmosphere.

FAT RESTRICTED DIETS

The fat content of a normal diet may have to be reduced for curing obesity and in the dietary treatment of diseases of the liver and the gall bladder. Fats are the most concentrated source of Calories and supply twice as many Calories as the proteins or carbohydrates in the diet. A reduction in fat will necessarily involve an increase in bulk. People who are ill may find it difficult to consume the additional amounts of food required to maintain their Calorie balance. Using such sugars as glucose and lactose in fruit juices or sweet preparations help in reducing the bulk. Fats contribute to flavour, palatability, staying power and a sense of well-being. Therefore, they are not easily replaceable by other constituents. Fats are the sources of essential fatty acids and are carriers of the fat soluble vitamins

A and D. A severe restriction of fats will therefore reduce the fatty acids and the vitamins A and D in diets. These nutrients should be given as supplement.

In fat restricted diets, there should be enough of the other nutrients to maintain normal nutrition. The fats included should be those which are highly emulsified and readily digestible as in cream, egg yolk, curds, etc., and the foods should be bland in flavour.

An example of a fat restricted diet is given below:—

Milk	2 cups
Egg	1
or defatted oilcake	1 ounce
Lean meat	5 ounces
Cereals	½ cup
Bread	3 slices
Potato	4 ounces
Green or yellow vegetables	4 ounces
Other vegetables	4 ounces
Citrus fruits	2 ounces
Other fruits	8 ounces
Butter	1 ounce
Total fat content	60 grams
Calories	1,500
Proteins	75 grams

In cases where severe fat restriction is needed, egg and butter may be omitted and skimmed milk may be given instead of whole milk. Such a diet needs strong supplementation with vitamin A and other nutrients. Additional proteins can be given through non-fat milk solids and egg white. Meal planning should take into consideration the individual requirements as usual.

DIABETIC DIETS

In a diabetic diet, the total Calorie requirement is the first consideration. It is based on the patient's weight and activity. A moderately active normal adult needs 20 Calories per pound of the 'ideal' body weight. The Calorie allowance of a moderately active diabetic patient is usually kept at 15 Calories per pound of the 'ideal' body weight. Thus, a diabetic patient whose 'ideal' weight is 120 pounds would require 1,800 Calories per day.

The protein requirements of the diabetic person is the same as that of the normal individual, that is 0·5 to 0·7 grams per pound of the 'ideal' body weight per day. The diabetic patient whose ideal weight is 120 pounds will need 60 to 80 grams of protein daily. The carbohydrate allowance is determined on the basis of furnishing 50 per cent of the non-protein Calories as carbohydrates. In the above example, the patient is receiving 1,800 calories, to which 80 grams of protein contribute 320 (80×4) Calories. Therefore, out of the 1,480 (1,800-320) non-protein Calories, fifty per cent, *i.e.*, 740 Calories are to be supplied by 185 (740/4) grams of carbohydrates.

The fat allowance is calculated from the remaining non-protein Calories, that is 82 (740/9) grams. The final diet prescription for the patient is carbohydrate : protein : fat (C : P : F) : : 185: 80: 80 or 2 : 1 : 1. These amounts should be distributed among the three meals, and as many in-between feedings in the day, as advised by the doctor. As usual, the regional and religious customs which influence acceptance of certain foods, the food habits, the hours of work, the economic status and other similar factors should be considered in planning the diet.

LOW CHOLESTEROL—LOW FAT DIETS

Cholesterol is a substance present in the animal tissues, occurring in great concentration in action tissues and body fats. Liver, brains, heart, kidney, egg yolk, fish, milk, butter, cream, cheese and meats are abundant sources of cholesterol. Vegetable fats do not contain cholesterol, although they may serve as the precursors for the synthesis of cholesterol in the body.

A low cholesterol and low fat diet is indicated in diseases of the vascular system, such as arteriosclerosis and high blood pressure. Modifications of the normal diet to provide low cholesterol diets include the omission or restriction of the foods mentioned above. One of the chief obstacles to the use of this diet is its reduced palatability. The delicate flavours due to the fats are absent and the patient's choice of food is limited. Skimmed milk may be used successfully in the preparation of many items; and cooked vegetables may be seasoned with salt, pepper and a variety of other spices.

LOW PURINE DIETS

A low purine diet is used for the treatment of gout. Since compounds containing nitrogen and carbon produce purines in the body, nucleo-proteins and fats are to be restricted. All animal foods, germs of seeds, meat extracts, poultry, fish, whole-grain cereals, dried beans, peas, spinach, cauliflower, etc., contain nucleo-proteins. Since a high fat diet may interfere with the excretion of nitrogen, the fat level is also restricted. Carbohydrates are used in abundance to fulfil the Calorie requirements.

HIGH CALORIE DIETS

Diets high in Calories are given in febrile (feverish) conditions. Fevers are due to disturbances in the normal balance between heat production and heat loss. For every increase of one degree in the body temperature, the Basal Metabolic Rate is increased by 13 per cent. When there is toxic destruction of body tissues as in infections, another 10 per cent increase in energy requirement is indicated. If the patient is restless, an increase of 10 to 30 per cent in Calorie requirements may result. In infections, protein metabolism is also increased due to protein destruction. High Calorie diets should fulfil the increased needs for proteins, vitamins and minerals.

DIETS DURING ILLNESS

In typhoid fever, 4,000 to 6,000 Calories per day are prescribed. Typhoid patients usually suffer from lack of appetite and cannot eat large amounts of food. Therefore, the Calories are given through sugars and fats in the diet. Since the intestinal membranes are inflamed and since haemorrhage may occur, the nature of the diet should be bland.

Tuberculosis is a debilitating fever in which emaciation is a salient feature. The diet for the tuberculosis patient should help in improving his nutritional status, resisting the infection and gaining weight. To a patient suffering from this disease, high Calorie diets should be given through protective foods, with an abundance of vitamins and minerals. Menus should be planned with simple, easily digestible and well-prepared foods.

SODIUM RESTRICTED DIETS

Restriction of sodium is needed in cardiac disturbances such as congestive heart-failure, in coronary and hyper-tensive heart diseases, and in essential hyper-tension.

In sodium restricted diets, the normal daily intake of 3·6 grams of sodium is reduced to 1 to 1·5 grams. Table salt is the principal source of dietary sodium. Baking powder and cooking soda also contribute significant amounts of sodium. Animal foods furnish more sodium than most vegetables, fruits and cereals.

In low sodium diets, the flat taste makes acceptability of food difficult. Attempts should therefore be made to make diets attractive and palatable in ways other than adding sodium.

CHAPTER 26

DEFICIENCY DISEASES

The deficiency diseases or stages are pathological or sub-normal conditions for which some specific food deficiency is wholly or partially responsible. A deficiency disease may involve a secondary infection or metabolic disturbance, in which case, it is difficult to distinguish the type of disease. A deficiency state may lower resistance to infection; and certain infections may bring about deficiency states by interfering with normal absorption and utilization of nutrients. This is called 'conditioned malnutrition.' Many diseases which are not deficiency diseases may be aggravated or even initiated by malnutrition.

Incidences of mild and chronic deficiencies are more common than those of acute and single deficiencies. Deficiency diseases are frequently the result of multiple deficiencies which are complex and difficult to diagnose.

PROTEIN DEFICIENCIES

(Hypoproteinemia and Nutritional Oedema)

The following are the causes of protein deficiency :

(*i*) Deficient intake of protein as related to quantity and quality, *i.e.*, of essential amino acids.

(*ii*) Failure in absorption or utilization of the proteins consumed.

(*iii*) Abnormal distribution or loss of proteins from the body as in nephrosis and in severe burns.

One of the most widespread nutritional disorders in tropical and subtropical areas is a condition called Kwashiorkar, which is considered to be a poly-deficiency disease. Kwashiorkar was first noticed in Africa. The word 'kwashiorkar' means 'red boy,' thus indicating the loss of pigmentation in the dark skinned people. Similar symptoms are noticed in other parts of the world also.

Kwashiorkar is characterized by five essential features : retarded growth in the late breast-feeding, weaning and post weaning ages; alteration in the skin and hair pigmentation; oedema; fat infiltration; cellular necrosis of liver; and heavy mortality when not treated.

In the treatment of Kwashiorkar, adequate supplies of animal proteins are essential. However, wherever such additions are not possible, improvement in the quality of vegetable proteins, such as groundnuts, legumes and dals, should be effected. More suitable supplementary foods for weaning infants, such as skimmed milk powder, fortified groundnut milk and *ragi* malt, should be provided.

Deficiency conditions due to the shortage of vitamins have been discussed under the various vitamins.

CHAPTER 27

HEALTH ASPECTS RELATED TO NUTRITION

To enjoy and assimilate food, one has to be sufficiently healthy. Many aspects of health are related to food and nutrition. Health is promoted by the quantity and the quality of the food consumed, the appetite, proper teeth, recreation, the mental attitude such as cheerfulness, sense of humour, etc., cleanliness, suitable clothing, exercise and rest. Disorders of digestion, food allergies, food poisoning, and excessive use of stimulants or alcohol affect the utilization of food.

The signs of good health are: an erect and easy posture; a smooth and clear skin; the correct weight to height and age; good appetite; freedom from fatigue, worry or pain; and enjoyment of work and recreation.

APPETITE, HUNGER AND NUTRITION

Hunger is a physiological expression indicating the need for food. It is caused by the emptiness of the stomach and evidenced by a feeling of weakness, restlessness and actual pangs and movements in the stomach. Appetite, on the other hand, is a psychological desire for food. Hunger can be described as a craving for food of any kind; appetite is a sensation associated with the enjoyment of selected foods which are found tasty and pleasant. Usually, in a normal and healthy individual, both hunger and appetite occur together. Hunger sharpens the appetite, makes one look forward to taking food and assists in digestion.

Appetite is influenced by habit and may be present even when hunger is completely absent. For example, even when a person is not hungry, he wants his food regularly at mealtimes. On the other hand, a person may be very hungry, but if he is given an alien food, as when meat dishes are offered to vegetarians, he may not have any appetite at all. Rest, play and exercise enhance appetite, while sweets and eating in-between meals depress it. Thiamine is a promotor of appetite. The colour, flavour, taste, texture, form, shape and aroma of foods appeal to the appetite.

SOUND TEETH AND NUTRITION

The formation of teeth in the jaws, the eruption of teeth, and their condition in later life are dependent on the nutrients that are supplied to them.

The first set of 20 teeth, called the temporary or deciduous teeth, are formed before birth in the jaw. The nutrition of the mother during pregnancy is, therefore, very important. The first of the twenty comes out when the baby is about six to seven months of age; three more come out by the end of the first year; the next twelve or fourteen during the second year; and the remainder by the end of two years. All the first twenty teeth fall by the age of twelve years. Simultaneously, the second set of 32 permanent teeth, which are also in the jaws before birth, are calcified and erupted.

Structure of a Tooth

What appears to be a completely solid tooth is made up of many parts. The central portion is composed of soft pulpy cells, supplied with nerves and blood vessels. It is surrounded by a layer of cells which form the hard dentine. During growth, a space of soft material lies between the pulp and the hard dentine. The main portion of the teeth, dentine, is made of calcium phosphate. Enamel covers the dentine over the part of the teeth exposed above the gum. Enamel is the hardest substance in the human body. It is smooth and brittle. Blood vessels from the pulp bring nourishment to the teeth.

Poorly developed teeth become soft and result in decay, receding gums or dental *caries*. In some of the Western countries, as much as ninety per cent of the population is affected by dental *caries*. Dental defects are on the increase in India also.

A diet which is adequate in all the essential nutrients will promote the formation of good teeth. The nutrients which are of special significance in this connection are calcium, phosphorus and the vitamins A, C and D. Excessive consumption of sugar and sweets has an adverse effect on teeth, because by supplying Calories, it reduces the intake of protective foods and nutrients. Sugar encourages the growth of some harmful bacteria in the mouth. The prevention and control of tooth decay can be achieved through a proper diet, oral hygiene and periodical medical check-up.

Keeping the teeth clean through regular rubbing and brushing is important in mouth hygiene. Dental decay is caused by acids formed by microorganisms in the mouth. These thrive most on the layers of food sticking to the teeth. Starches and sugars readily yield acids by bacterial action. Acidity in the mouth can be prevented by washing the teeth immediately after each meal and before going to bed, after which sweets or other foods should not be eaten. Brushing the teeth with neem sticks or banyan roots is effective because of the presence of chlorophyll in them. Using a mixture of charcoal powder, salt and cooking soda is helpful because of its absorbtive, disinfective and deodorizing effects. Eating raw vegetables or fruits at the end of the meal also promotes oral hygiene.

EFFECTS OF MENTAL ATTITUDES ON DIGESTION AND NUTRITION

Stomach upsets, stomach-aches, gas formation, heartburn, loss of appetite, nausea, diarrhoea and constipation are the symptoms of disturbances in the digestive system. These manifestations are the healthy body's natural way of expressing its rebellion against careless eating or drinking. They may also be caused by a diseased digestive system or due to disorders in some other system.

A person's mental state at mealtimes affects his digestion. Strong emotions such as anger, fear, worry or excitement of any kind inhibit appetite and result in digestive disturbances. Nervous indigestion occurs in people who work under tension. Therefore, children should not be forced to eat soon after vigorous play but called in gently from the playground, made to rest, and then fed. One should not go to a

meal unless relaxed and ready to enjoy food. Nor should one eat too much when tired or angry. Hurrying at mealtime is dangerous. Cheerfulness and happiness speed up digestive processes.

Constipation

Constipation is one of the common troubles of modern civilization. Some people often resort to the use of laxatives; but, in the long run, this is likely to become a habit and endanger their health.

The inclusion of foods which have bulk and roughage in the diet, regular exercise, intake of plenty of water and regularity in defecation help in the prevention of constipation.

Food Allergies

Allergy is a term which describes sensitiveness to substances which are harmless to most persons. Substances which cause allergies are called allergens. They are of three types—foods, inhalants and contact substances. The most common symptoms of allergy are eczema, headaches, indigestion, nausea, vomitting, diarrhoea, asthma, congestion of the nose, and migratory swellings of the face, hands and feet.

Among the food allergens, wheat, milk, eggs, cabbages, tomatoes, oranges and chocolate are said to be the greatest offenders. Just what causes a person to become sensitive to these foods is still not known. Heredity seems to be an important factor. It is very difficult to discover specifically which particular food causes allergy. Studies have to be made on the effects of special diets, leaving out one item of food at a time, until the offending food is located.

Apart from foods, hair, feathers, pollen grains, vapours, smoke and dust also cause allergy.

EFFECTS OF THE STIMULANTS FOUND IN COMMON BEVERAGES

Coffee, tea and cocoa are the commonly used beverages. When taken in moderate amounts, they have no serious effects on the health of adults. Coffee and tea contain the stimulants caffeine and theine respectively. They raise blood pressure and increase the activities of the kidneys, intestines, heart and nerves. They generally help adults to do more and better work with less fatigue. However, too much of caffeine may affect sleep and the strength of muscles, and lead to the trembling of hands, headache, irregularities in heartbeat and heartburn. Through psychological studies, it has been shown that the stimulating effect of coffee may last up to three hours. Therefore, if coffee is taken around bedtime, some people experience disturbed sleep. Coffee taken with milk and sugar or with meals is not as harmful as black coffee taken on an empty stomach in-between meals. It is not advised for children.

BACTERIA AND FOODS

Food Poisoning

Bacteria live everywhere. We carry them all the time. The number of micro-organisms on any one person may exceed the number of people on the earth. Just like

human beings, bacteria take food, grow, multiply and give off waste products. Under favourable conditions, a single bacterium can produce 281 trillion other bacteria in 24 hours. Fortunately, a great many of them die off, and many others are harmless.

Some bacteria and micro-organisms spread disease through foods. Food-borne diseases are of two types : (1) bacterial infection where the germs multiply in the body, and (2) actual poisoning by toxins produced by some bacteria. For details, refer to the section of Health. A few food-borne diseases and their mode of entering the human body are :

Disease	*Route*
Food infections	Foods contaminated by unwashed hands, sores, boils, rats, flies or spoiled foods
Botulism	Improperly prepared, canned or packaged foods
Trichinosis	Insufficiently cooked pork
Amoebic dysentery	Water or food contaminated by unwashed hands or flies
Bacillary dysentery	Water, dishes or utensils contaminated by a carrier; food or water contaminated through unwashed hands or flies
Diphtheria	Utensils contaminated by a carrier; also by his sneezing, coughing or spitting
Septic sore throat and scarlet fever	Contaminated raw milk
Typhoid fever	Water, milk and foods contaminated by a carrier; unwashed hands or flies

Most harmful micro-organisms grow best at body temperature. High temperatures and direct sunlight usually kill them. Freezing does not hurt them but prevents them from multiplying. Micro-organisms breed best in dark and moist places. Therefore, kitchens and food centres should be kept clean and dry. Sanitary arrangements and ventilation for entrance of sunlight into the kitchen should be adequate.

Persons handling food or working in the kitchen can transfer disease-causing bacteria through their infected hands and fingers. Foods are also contaminated by persons who, without actually touching them, transmit organisms through droplets from nose and throat while sneezing or coughing.

Food infections are rarely caused by eating food that has been poisoned, but rather by eating food that has been infected.

Protection against food-borne diseases can be ensured through, among other things, careful handling of food, boiling or pasteurizing of milk, and hygienic serving of food. Some general suggestions for the control of bacteria are given below :

(1) Kill bacteria by high temperatures.
(2) Store perishable foods in a cool place or refrigerator.
(3) Avoid food standing in the open.

(4) Always cover food, when it is not in use.
(5) Boil all canned vegetables and meats for 20 minutes before tasting.
(6) Never use any mouldy food, food which comes from a bulging can or food which has a bad smell. Do not even taste it. When in doubt, throw it out.
(7) Wash carefully fresh fruits and vegetables which are to be eaten raw, since chemicals such as DDT or arsenic might have been used to kill insect or plant parasites, and since night soil may be adhering to them.
(8) Wash hands thoroughly before touching food or anything that comes in contact with food.
(9) Protect food and utensils from contamination carried by flies, insects, ants or clothing.
(10) Take regular inoculations against food-borne diseases.
(11) Have all those who handle food examined and protected against food-borne diseases.
(12) Use boiled and cooled water for drinking.

CHAPTER 28

FOOD CONSERVATION

As food production increases, the responsibility of individuals and families for utilizing the available food resources to the best advantage becomes greater.

Kitchen gardens contribute significantly to the family's food needs. Vegetables and fruits raised in home gardens supplement what the family can ordinarily buy or procure in the locality. The increased consumption of vegetables and fruits from kitchen gardens improves the nutritional status and health of families. The satisfaction and recreation derived from gardening are additional values.

Nutrients are also conserved by careful food preparation. By employing suitable cooking methods, the maximum amount of nutrients can be retained in food. Food waste caused by unplanned buying, improper storage, the inability to use left-overs, unpalatable cooking of food, over-generous servings of food, and the failure to utilize all portions of the food is very great in our country. From farm to kitchen, there is a continuous waste of food. Since every ounce of food is precious, this waste should be of concern to all of us.

HOW TO AVOID WASTAGE OF FOODS

(1) While Buying Foods

(*a*) Decide how much to buy keeping in mind the stock on hand and the cost.
(*b*) Use the left-overs to the best advantage in other meals.
(*c*) Do not touch fruits and vegetables unnecessarily since they may get injured.

(2) While Preparing Food

(*a*) Do not peel thin skinned vegetables and potatoes so as to retain vitamins and minerals.
(*b*) Use sprouted gram as often as possible.
(*c*) Save the top leaves of such vegetables as radish, beetroot and carrot; and use them in place of green leafy vegetables.
(*d*) Use the outside leaves of cabbages since they are richer in vitamins than the inner ones.
(*e*) Use left-over buttermilk or curds in making chutneys, *raitas*, *kadhi* and *dosais*.
(*f*) Use bran from wheat flour.
(*g*) Do not soak cut vegetables in water.
(*h*) Use tamarind in cooking for conserving nutritive value.

(3) While Eating Food

(*a*) Do not eat more than is necessary.
(*b*) Do not take foods which you are not likely to eat.
(*c*) Take small servings first and have a second helping, if needed
(*d*) Eat all the food placed before you.

(4) While storing Food

(*a*) Store the dry cereals and pulses in tightly covered utensils, tins or jars to avoid losses due to moisture.

(*b*) Keep vegetables and fruits in the coolest part of the house.

(*c*) Unless there is a refrigerator, do not buy perishable foods for storage.

(*d*) Milk should be boiled and cooled. It should then be kept away from foods like onion that have an odour.

(*e*) Avoid polishing of rice.

(*f*) Keep cooking oils and fats in tightly covered jars in a cool and dark place. Always strain the cooking medium before using it again.

CHAPTER 29

FOOD PRESERVATION

Various methods for preserving foods, based on techniques which eliminate moisture and other factors causing food spoilage, have been devised and practised in Indian homes from ancient times. However, these are mainly confined to the preparation of pickles, chutneys, *morabbas*, *pappads*, dried fish, dried meat, and dehydrated vegetables and fruits. The average housewife has yet to learn the numerous other methods available for food preservation.

CLASSIFICATION OF FOODS

For purposes of food preservation, foods are classified as perishable, semi-perishable and non-perishable. The perishable foods are juicy fruits and vegetables like tomatoes, mangoes, papayas, peaches, plums, cucumbers, snake gourds, bottle gourds, etc. These food-stuffs have a high moisture content and are highly susceptible to spoilage. The semi-perishable foods have a smaller moisture content. Beetroots, carrots, peas, beans, clusterbeans, pumpkins and apples fall under this group. The non-perishable foods have a very low moisture content. They are the mature food-grains like the cereals, pulses and nuts, and are not easily susceptible to spoilage by micro-organisms and enzymes.

CAUSES OF FOOD SPOILAGE

Food spoilage is caused by factors present both in the foods and in the environment. The action of enzymes in plant and animal foods tends to change their composition. While some degree of enzyme action is desirable as in the case of the ripening of fruits and the fermentation of foods, continued action of enzymes renders food inedible. The environmental factors include : (1) living organisms, (2) temperature conditions, (3) moisture conditions, (4) light, and (5) air (oxygen).

Among the living organisms responsible for food spoilage are bacteria, yeasts, insects and rodents. The moulds are in the form of threads developed on perishable foods. They are easily visible to the eye. The spoilage caused by them is only on the surface. Yeasts are tiny organisms which are not visible to the naked eye but which can be seen through the microscope. They multiply very fast. Yeasts cause fermentation by acting on certain components of the perishables. During yeast fermentation, the sugars present in the particular food are broken up to form alcohol and carbon dioxide. Most of the fruits and vegetables contain sugars. The carbon dioxide produced in yeast fermentation produces some reaction in the containers. In corked bottles, the corks are thrown away or the bottles break; in tin containers, the cans swell and bulge.

In bacterial spoilage, carbon dioxide is evolved, and the swelling of cans takes place. A sour taste, off-flavour and turbidity also develop in the spoilt food. Further, certain toxins are produced particularly in canned vegetables. Therefore, canned vegetables should always be boiled before use.

All these micro-organisms need optimum moisture and temperature ranges for the multiplication of cells. The optimum temperature for moulds is 40° to 45°F for yeasts 40° to 45° F and for bacteria up to 110°F. All these micro-organisms are sensitive to heat. Therefore, an effective method of killing them is heat sterilizing. Temperature conditions can damage foods either directly by changing their physical state, as in the melting of fats, or indirectly by accelerating the activity of enzymes and bacteria, as in the spoilage of fruits and meat. Moisture conditions cause spoilage of such foods as fruits and meat. They cause food spoilage either by adding to or reducing the original water content. The loss of crispness in biscuits and fried foods, the drying and wilting of vegetables, the staleness of bread and the hardening of sweets are all due to changes in moisture content. Light accelerates rancidity in fats and loss of riboflavin and vitamin C in foods. Oxygen increases the rate of development of rancidity with its associated unpleasant flavours and harmful chemical changes.

Enzymes are catalysts present in fruits and vegetables. They cause food spoilage due to chemical reaction. Because of such reaction, the apple becomes brown soon after it is cut, while tomato sauce develops a black scum. Enzymes are sensitive to heat and are easily destroyed by heat. Therefore, enzyme activity can be prevented by heating foods to temperatures which inactivate the enzymes. It can also be prevented by cooling (as in freezing and refrigeration), by elemination of air, by protection from light and by the addition of anti-oxidants.

Micro-organisms which cause spoilage may be killed by heat or by such other means as exposure to the ultra-violet rays. For lasting effectiveness, sterilization must be accompanied by the prevention of new contamination through hermetically sealed containers.

The damage caused by insects and rodents to food can be reduced by the use of insecticides and rodenticides. Spoilage caused by temperature can be prevented by controlling storage temperature. Food spoilage by moisture can be reduced by minimizing the humidity of the storage place or by dehydration.

Deterioration by light can be prevented by storage in dark places, opaque packages and light-proof rooms. Oxygen can be removed from foods by heating and sealing.

DIFFERENT METHODS OF FOOD PRESERVATION

The methods of food preservation can be divided into two groups : (*i*) temporary preservation in which micro-organisms are suppressed; and (*ii*) permanent preservation in which micro-organisms and enzymes are completely destroyed. Cold storage, freezing and addition of chemical preservatives like sugar, salt, spices or vinegar are the methods of temporary preservation. Using high

temperatures either alone or in combination with acids and salts is a permanent method.

The different methods of food preservation are :

(1) Dehydration
(2) Use of chemicals
(3) Use of those types of micro-organisms which inhibit spoilage
(4) Canning
(5) Freezing

Whatever method is used, cleanliness and general sanitary conditions are important. Every effort should be made to avoid contamination of the food by soiled hands and work surfaces, dust laden air or dirty utensils.

Dehydration

Drying is the oldest method of preserving foods for future use. Drying removes water from food. And most organisms are unable to grow without water.

Our ancestors dried fruits, vegetables, meat and fish by spreading them out in the sun or in dry, warm places. They used salt, turmeric (*haldi*) and other condiments to facilitate preservation and improve taste and appearance. In many farm houses, open spaces and lofts full of dry foods can be seen. Drying can be applied to raw, half-boiled or fully boiled foods. It causes considerable changes in flavour and food values.

Preservation by Addition of Chemicals

The use of chemicals for food preservation has declined with the development of canning and refrigeration. Salting is still practised for preserving meat, fish, vegetables and for making pickles. Several anti-oxidants are available for preserving fats. With the exception of salt, sugar, nitrates, vinegar, citrus fruit acids, alcohol and wood smoke, other substances should not be used for this purpose, because of their harmful cumulative effects.

Use of those Types of Micro-organisms which Inhibit Spoilage

A most convenient type of preservation by means of micro-organisms is the fermentation of sugars by lactic acid bacteria. These bacteria are widely distributed in nature for they are present in milk, fruits and vegetables. Another type of fermentation in fruit juices is caused by yeast, as in vinegar or alcohol. Curds, ripened cheese and fermented pickles from such vegetables as beetroots, turnips, beans, green tomatoes, onions, cauliflowers, green chillies, green peas or garlic are examples of foods preserved through fermentation by micro-organisms.

Canning

In canning, foods are heated to kill spoilage micro-organisms and to inactivate enzymes. The foods are then sealed immediately in air-tight containers to prevent subsequent contamination. It is a suitable method for preserving all foods which are acceptable in a moist form.

Freezing

Freezing has become one of the most popular methods of preserving food in the West. Foods preserved in this manner very closely resemble fresh foods in appearance, taste and food value.

Details of the different methods of preserving food are given in the series of pamphlets published by the Central Food Technological Research Institute, Mysore, entitled 'The Brochure on Home-scale Food Preparations series,' a portion of which has been included in the appendix.

CHAPTER 30

NUTRITION AND HOME SCIENCE EXTENSION

To conduct effective education programmes on nutrition, Extension workers should first study the food situation in the villages where they work.

SURVEYING DIETARY HABITS

A survey of the dietary habits of people and their food intakes should be made to obtain information on the following points :

Food Sources and Types in the Villages

What are the foods grown in the village ? (cereals, vegetables, fruits, pulses, milk, eggs, meats, etc.)
What are the foods sold in the local market?
What are the foods produced in the village and taken away for marketing purposes ?
What is the number of people who grow their own food in the village ?
What is the amount of money spent on buying food in the homes ?
What is the number of cows, goats and buffaloes which provide milk for the village; and what are the amounts available ?
How much milk is produced, consumed and sold by the villagers ?
How much butter and ghee is produced and consumed in the village ?
In what way is the buttermilk used ?
What is the position of egg production in the village ?
Is honey produced in the village ?
Do the villagers use fish ?
What are the sources of fish ?
Do they grow pulses, oilseeds or groundnuts ?

Uses of Food

What is the staple cereal of the village ?
In what form is it used ?
How is the cereal cooked ?
How are the dals and pulses cooked ?
How much oil is used in cooking ?
How are the vegetables cooked ?
How are the fruits used ?
What beverages do the villagers drink ?
Which and in what quantities are the condiments used ?

Food Storage

How are the different foods like cereals, pulses, vegetables, fruits, etc., stored ?

Food Preservation

What are the foods preserved during each season in the village ?

What are the methods used for food preservation ?

Food Intakes

How many meals are taken per day ?

What are the hours for the meals ?

How much of each of the different kinds of food is consumed daily ?

Miscellaneous

Do they cook all the foods themselves ?

Do they buy prepared foods from the bazaar ? If so, of what type ?

How often do the villagers fast ?

What are the special dishes prepared for the different religious festivals ?

How are the villagers inclined towards vegetarian and non-vegetarian foods ?

What are the common food-borne diseases occurring in the village and how often do they occur?

What are the special diets they give to children while weaning them ?

What are the diets given to pregnant and lactating mothers ?

What are the special diets for sick people ?

What foods are given to the older people ?

What are the common food beliefs, fads and fallacies ?

Based upon the information gathered from the above survey, the Extension worker can plan a meaningful nutrition programme.

In the choice of one's food, economic conditions impose certain limitations. Therefore, the Extension worker must, keeping in mind the purchasing power of the people, calculate how far the science of nutrition can be of help in improving their health, efficiency and welfare.

HOW TO IMPROVE NUTRITIONAL HABITS

Improvement in family nutrition can be brought about through (1) better food production, better utilization of food, and better distribution of the money already being spent on food, giving priority to protective foods, and (2) allotting a higher proportion of the total income for expenditure on food, specially in the lower income groups which constitute the large mass of people in our country. If we examine the family budgets of the lower income groups in our country, it will be seen that such items of expenditure as tea, clothing, ornaments, ceremonies, the cinema and other amusements run into a disproportionately high amount. While the items mentioned above cannot wholly be avoided, people must be taught that higher expenditure on food gets them a better return in the long run in terms of health and efficiency in work. This in turn helps in increasing their earning capacity. Malnutrition, on the other hand, will only result in suffering and unnecessary expenditure.

Proper nutrition depends upon numerous factors such as the knowledge of adequate diets, the cost, variety and availability of foods in the locality, and the choice, preparation and use of food. The amount of money spent on food is influenced by

traditions, habits, tastes, attitudes and values. Two families with the same income may spend widely different amounts on food, because one family may attach a greater importance to clothing or family ceremonies, while the other may restrict those expenses to spend more on food. Even when the same amount of money is being spent, one family may include such essential items as milk, while the other may not choose so wisely. Therefore, in nutrition education, individual approach is important. The Extension worker has to help both those who are interested in improving their diets by selecting better foods and those who have little or no knowledge of nutrition. Both have to be convinced of the importance of nutrition in leading a happy life.

Mothers and wives are always eager to do their best for the well-being of their families. If information is given to them in ways they can understand and follow, it will yield fruitful results. It has been proved that women in villages are receptive to changes, provided these changes are not beyond their means, and do not call for a complete change in established habits. Balanced meals can be provided in a variety of ways. Instead of changing to completely new foods, the existing patterns should be studied and modified to include new combinations. Suggestions for improving food habits should be made in terms of individual and family tastes, attitudes, customs, practices and the religious beliefs prevailing among the people.

AN ECONOMIC AND EDUCATIONAL PROCESS

Nutritional improvement is both an economic and an educational process. Introducing courses on food and nutrition in schools and colleges, and spreading that knowledge should be part of the National Extension Service Programmes. It will help in eradicating the effects of wrong traditions, superstitions and fallacies in food habits. Many superstitions exist about combinations and preparations of food. For example, it is believed that curds (*dahi*) aggravates cold; that lime juice should be avoided in cold weather; and that dal should be eliminated from the diet of a lactating woman. Such beliefs should be studied scientifically and the dangers of malnutrition arising out of these practices pointed out.

On the other hand, the good points in existing practices, such as taking groundnut and *gur* together or giving steamed foods to children being weaned, should be studied and promoted. Some of the fine traditional methods of food preservation ought to be investigated and brought to light.

The Extension worker should also promote the attempt to increase the production of such essential and protective foods, as green leafy vegetables, eggs and milk as part of home activities and agriculture.

For the success of Extension work, the Extension worker's mental approach as well as the building up of a proper relationship with the people among whom she works, are of basic importance. What really matters is not how much knowledge is conveyed but how it is conveyed. The relationship should be such as to inspire confidence and affection in the minds of the home-makers with whom the Extension worker lives and moves, so that they will come to her spontaneously for consultation

and guidance. This aspect of human relationship based on mutual respect is the essence of Extension work.

The improvement of the home depends upon several factors. One such factor is nutrition. It plays a significant role in securing better health for the family members. Every Extension worker should feel proud of the part she can play in meeting the great challenge of developing the community.

SECTION IV

HOUSING

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CHAPTER 31

FUNCTIONS OF A HOUSE

The home is a place where we seek refuge from the anxieties and worries of the outside world. It is a place where we enjoy family life through happy group living and where we do the things that help us in developing into mature and emotionally strong men and women. The house is the physical space which provides the atmosphere for the home. For comfortable living, the house should furnish adequate space for the daily physical needs as well as for the personal activities of the members of the family. Housing requirements change according to the size, composition and income of the family. An understanding of the part that the house plays in home life and in the changing patterns of family life will help us in analysing our housing needs and in making plans for their fulfilment.

Individual and family values play a major role in coverting a house into a home. Some of the universal values sought by all people are beauty, comfort, convenience, good location, health, privacy, safety and economy. All these values are interrelated and influence a family's choice of its house. The manner in which a family furnishes its house and carries on its activities indicates the values which it considers important. Furnishings make our houses livable and convenient for carrying on our many and varied activities.

The job of 'making a house a home' does not end with furnishing it. The house, along with its furnishings and equipment, should be properly cared for if it is to prove functional, useful and satisfying to the family. Sound practices of house-care help the members of the family in developing good habits of living and add to the material value of the house and its furnishings. A clean, attractive and comfortable house gives the inhabitants a feeling of pride in their home. A well-arranged and well-kept house gives the family moral, social and financial advantages that add to their security.

WHAT IS A GOOD HOME ?

'Home' has been described by Lita Bane as 'a place of abode of persons bound together by ties of affection; a place where the affection of parents for each other, for their children, and among all the members of the family is nurtured and enjoyed; where genuine personal hospitality is extended; where the immature are protected and guarded. A place where one may have rest, privacy, and a sense of security; where one may enjoy his individual kind of recreation and share it with others. A place where one may keep his treasures; where one may satisfy his individual tastes; where fundamental culture, consisting of customs, languages, courtesies and traditions is conserved and passed on to the young. A place where regard for others, loyalty, honesty and other worthy traits are cultivated and enjoyed. A haven, a sanctuary, and a source of inspiration.'

With these important functions to fulfil, we can easily see why it is said that the homes of a nation form its very foundation. It is important that the home-maker should strive to provide the best possible home for her family. Be it a bungalow, a cottage or a hut, the elements of a good home can be incorporated into every house. It is not the house but the spirit within it that builds strong men and women. The home contributes to the physical, mental and social well-being of the members of the family.

CHAPTER 32

SELECTING A HOUSE

When the amount that the family can afford to spend on housing has been decided, the next consideration is its location. As a basis for comparing various locations, the following factors should be studied in the light of the requirements of the family : the surroundings; the type of houses in the area; the neighbourhood; nearness to the place of work; nearness to schools, temple, bazaars, stables, dumps, railroads and village industries. The house should be located in a place which is free from noise, dust, smoke and heavy traffic. If possible, the location should give a sense of spaciousness and provide air, sunlight and a pleasant view.

WHAT KIND OF A HOUSE DOES THE FAMILY NEED?

The amount and kind of space needed for housing a particular family is affected by :

1. The family income
2. The size and the composition of the family
3. The living habits of the family
4. The activities carried on in the household
5. The space needed for furniture
6. The space needed for storing articles
7. Future housing needs.

The income, size and composition of the family influence the number of rooms needed. The number and sex of the children and the number of adults to be accommodated also have a bearing on the number of bedrooms, bath-rooms, latrines, etc., that will be required.

The amount of entertaining that the family does determines the size of the living-room, the dining-room and the kitchen. Similarly, the recreational activities and hobbies of the family affect the space requirements.

The furniture that a family has or plans to buy will affect the wall and floor space requirements. The position of the doors and windows affects the arrangement of the furniture in the rooms.

The family can determine its needs by making a list of the space it considers necessary for its activities its and for storage.

FACTORS WHICH AFFECT THE CHOICE OF A HOUSE

An important factor in the choice of a house is its attractiveness. The type and size of the house to be selected will also depend on the size of the family, its income and the ages of its members. A family with growing children needs a house with plenty of room to run about and play in. Space is always an important consideration. By space is meant space within the compound as well as within the house.

Yet another important factor is the convenience and livability of a house. Good location and the proper arrangement of the rooms in a house make it convenient and livable. Such a house makes house-work easy, with the minimum expenditure of time and energy.

Other features of a house that contribute to its convenience are adequate storage space, adequate ventilation and adequate lighting (both artificial and daylight). Convenient arrangement of the work-areas also increase the livability of a house.

Renting Your House

Many families prefer renting a house to owning one. The advantages are :

(i) It costs less to rent a house than to own one, particularly in terms of upkeep. The responsibilities of the family in respect of the house are less when it rents the house.

(ii) The money necessary for buying or building a home may not always be available.

(iii) When a family rents a house, the location can be changed when desired. For example, if the income of the family is suddenly reduced, they can move over to a less expensive house or when the income increases, the family can move over to a more expensive house.

However, renting has its disadvantages. Landlords, for instance, frequently fail to make the necessary repairs desired by the tenant. Rented houses are not always in the type of neighbourhood the family desires.

It may be difficult for a family to find a house that it can afford to rent, for housing is scarce in many parts of India. Even small alterations and modifications to suit one's convenience are not possible in a rented house.

Owning your House

Many families, on the other hand, prefer to own their own houses since it gives them a certain status and a feeling of pride and self-respect. The responsibilities of meeting the obligations of house ownership develop in them a keen judgement and skill in management. Owning a house gives a family security during periods of unemployment or old age.

Thus, the problem of deciding whether to own or rent a house should be solved by a family only after considering all the factors pointed above.

CHAPTER 34

KITCHEN ARRANGEMENT

The kitchen is said to be the 'nerve centre' of a home. In some countries, it is called the heart of the home. In India, the housewife spends about 70 per cent of her time in the kitchen. Therefore, the kitchen should be a pleasant and comfortable place.

There are two types of kitchens: (i) the squatting type where the *chulha* is built or kept on the floor; and (ii) the platform type, where the *chulha* is kept on a platform at waist-level and where the housewife works while standing. Most Indian women prefer the squatting type. Whatever may be the type of kitchen in use, it should be such that all the work is done with the fewest possible movements. It should be easy to clean and have good ventilation and drainage facilities. The floor must be firm, smooth and washable.

KITCHEN ACTIVITIES AND WORK CENTRES

The usual kitchen activities are cleaning and preparing food, cooking, serving and cleaning up. For convenience and efficiency, a kitchen may be arranged into four work-centres.

1. *Work-space*: The kitchen must have ample work-space. The *chulha* should be raised at least 18 inches above the floor level, so as to enable the housewife to sit comfortably on a stool or '*patta*' and work without back-ache.

   There should be some space on both sides of the washing place to keep soiled utensils on one side and washed ones on the other. Space is also needed near the washing place for washing and cleaning vegetables, grains, etc., and for using and keeping the grinding stone. There should be work-space near the *chulha* for cutting vegetables and for making preliminary preparations for cooking food.
2. *Washing place* : There should be a convenient washing place with a good supply of water near the work-space. Space should be provided near or under the washing place to keep the broom, the cleaning powder or ash, and the fibre or other cleansing material used while washing the utensils.
3. *Storage space* : There should be sufficient storage space in the kitchen for keeping provisions, vegetables, utensils and cooked food. Storage space can be provided in the meat safe, by fitting shelves below the work space in the platform type of a kitchen, or by constructing racks on the walls.
4. *Cooking space* : All cooking processes centre round the *chulha* and the utensils needed for cooking should be kept near the *chulha*. Knives and

spoons ought to be hung on a rack close by. Salt and other condiments should be placed in a *masala* box and kept near the *chulha* so that the housewife can reach and use them conveniently without wasting much time and energy.

The area near the *chulha* should have enough light. It should be kept clean and tidy. It is often seen that a house is good to look at, properly arranged and kept very nicely, but that its kitchen is full of smoke and has black walls. The rooms near such kitchens are also black with soot. Cooking in a smoky kitchen is harmful for the health and the eyes of the home-maker.

THE SMOKELESS CHULHA

Smokeless *chulhas* are becoming very popular in homes because they give freedom from smoke, soot, heat, waste, fire risks, etc. The smokeless *chulha* is simple, saves on fuel and labour, is adaptable, and improves the house. It solves a number of problems connected with health, housing and fuel economy.

The smokeless *chulha* can be made with earth and cowdung. It can have two or three holes for cooking according to the needs of the family. Two or three things can therefore be cooked at the same time on this *chulha* if necessary. Hot water is always available for making tea and coffee or for washing purposes.

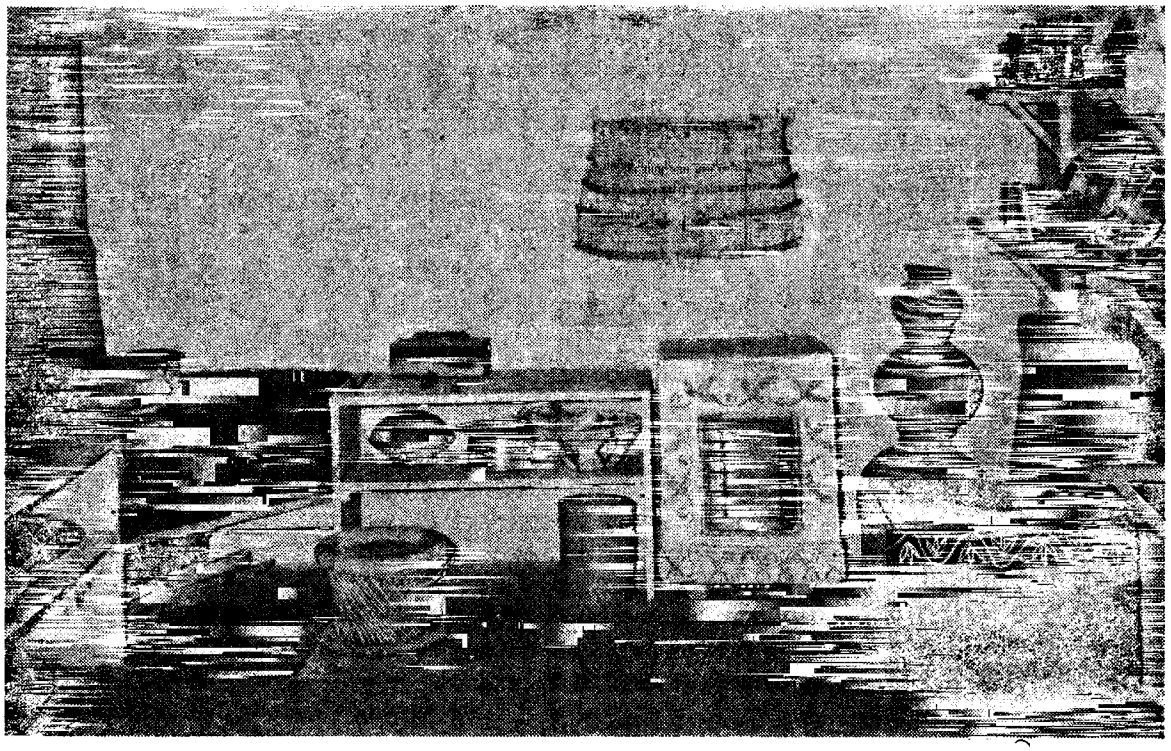
The chimney can be made with clay pipes joined together or with old tin pipes. The chimney can have a small hood to keep out the rain. While cooking, you should either keep pots on all the holes or cover the holes. Otherwise, there will be a back draught of smoke and the *chulha* will no longer be 'smokeless.'

Having a smokeless *chulha* and proper work-centres in the kitchen is not enough. The home-maker should spend some time in planning and organizing the different activities in the kitchen. The comparatively little time that is spent on planning saves many hours of unnecessary work and worry.

Preparing a meal for a farmer-husband, school-going children and working women at the same time can be a peaceful activity, if properly planned in advance. But it becomes confusing and hectic if done in a haphazard manner. By analysing every step in preparing a meal and carefully planning the whole operation, much time can be saved.

Time and energy in a kitchen can be saved in the following ways :

1. By separating utensils of daily use like tumblers, *thalis*, *katoris*, etc., from those used less frequently. The former should be kept in open shelves.
2. By feeding the family in the kitchen.
3. By rolling enormous *chapatis* on a big table or *patta* and then cutting out small ones instead of rolling each small *chapati* separately.
4. By using *thals* or trays for carrying and serving food or for clearing the table after eating.
5. By keeping baskets at the head or the foot of the stairs for collecting the articles to be taken up or down the staircase.



A WELL-ARRANGED KITCHEN

THE LOCATION OF THE KITCHEN IN THE HOUSE

Since more and more women are now doing their own housework, it is no longer convenient to have the kitchen at one end of the house. The housewife cannot hear the visitor's knock at the front door. If the kitchen has a smokeless *chulha*, it need not be very far from the front door. A kitchen that is clean, attractive and large should be so linked to the adjacent areas that it is in sight of the rest of the family. Should there be any accident in the kitchen, it would then be detected immediately by the others. Space can be provided in the kitchen for the children's play, for Father's reading and for Mother's sewing or writing. Such an arrangement would make the kitchen less of an isolated area or a place of drudgery.

CHAPTER 35

STORAGE AND SANITATION

Storage is the most important factor in the creation of an orderly and attractive home. 'A place for everything and everything in its place' could very well be the home-maker's motto. Storage, however, is also the most difficult of all house-keeping problems. Not only are even the most modern houses not built to provide adequate storage space, but almost all families, however meagre their income, seem to acquire too many things. By working together, the family will be able to devise better methods of home storage. This is an enterprise in which everyone must participate.

ADVANTAGES OF GOOD STORAGE

In the following pages, an attempt has been made to explain why proper storage is essential in a home.

Good Storage Increases Efficiency : To determine how much time is lost in searching for misplaced or lost articles, note down the time of beginning your task.

Here are some typical cases where lack of proper storage would hinder the implementation of your decisions :

(*a*) You have to finish a library book before its return date. But where is the book ? Where are your reading glasses ? Where is a comfortable chair with a good light ?

(*b*) You have to mend a torn sari. Where is the sari ? Where have you kept the matching thread, the needle or the scissors ?

(*c*) You have to write a letter to a long neglected friend. Where are the pen, the paper and the stamps ?

You will probably find, to your great astonishment, that you spend more than half the time in searching for materials and supplies. In a number of homes, many projects have to be abandoned completely because of the loss of necessary articles. The obvious solution is to allot a place for each thing and to request or even force yourself and others to keep it in the right place.

A convenient grouping of the supplies and materials needed for different jobs is another aspect of good storage. This is particularly important in food preparation. If there is a work-centre with everything kept within easy reach, household tasks would take less time and energy. Household organization often merely calls for planning and imagination for which no extra funds are needed.

For example, let us see what happens when a button is missing from a garment. The scissors are, as likely as not, in the dining-room, while the buttons are in a desk in the living-room, and the needle and thread are in the bedroom. In a well-ordered household, sewing supplies are kept together in a mending box or basket. This is an example of the way efficiency can be increased in a small way.

Good Storage Contributes to Well-ordered Living : During a search for lost articles, it will be instructive to check the pulse rate. The entire nervous system undergoes a change for the worse when it is found that something is missing. Note the sigh of relief and the lessening of tension when a lost article is found. There are times when the entire family has to join in a hectic search for some article needed at once.

Such frantic searches, charged with emotion and tension, cannot contribute to well-ordered and serene living. With proper storage facilities, family life can move on with less friction and strain. Time and energy can be released for other worthwhile activities. Confusion and clutter can be reduced or eliminated.

Good Storage Conserves Family Resources : The following situations are familiar enough to most of us:

A woollen garment is damaged beyond repair by moths.
Leather shoes are ruined by mildew.
Milk goes sour.
The family jewels are stolen.

The result may be trifling or disastrous, but there is no doubt that each could have been prevented by proper storage. The material and physical resources of the family are thus preserved and protected from insects, thieves and such destructive processes as mildew, rust and the like by proper storage. In addition, the general appearance of the home is improved.

Good Storage Contributes to Health and Safety : It sometimes happens that some member of the family falls over a toy and hurts himself and perhaps even breaks a leg. This is an example of preventable waste of time, funds and resources. More accidents occur in and around the home than in any other place. Cases of children swallowing poison and people getting wounded or killed by firearms or other instruments are further examples of tragedy that can be prevented if these items are stored out of reach.

ANALYSIS OF THE STORAGE NEEDS OF A FAMILY

The storage problems of a household are complex because of the bewildering variety of things required by modern living. Even the poorest family is not entirely without possessions. It is impossible to suggest any one solution which can answer the needs of all families. The following list is therefore only suggestive in scope, for the different parts of a house can be made to serve varying purposes depending upon the space available and the needs of the family.

Part of House	**Storage Needed for**
Living-room	Books, magazines, current newspapers, musical instruments Objects of art, bric-a-brac Things needed for correspondence, etc. Things for recreation and hobby collection; card tables and cards, chess sets, etc. Children's toys

Dining-room	Dishes (Chinaware and glassware)
	Locked storage for valuable silver
	Table linen

If there is no dining-room, these storage requirements are added to the living-room. Conversely, many of the storage items, such as the recreation and hobby supplies listed for the living-room, may be shifted to the dining-room.

Bedroom	Personal clothing
	Clothes that hang, such as coats
	Clothes that fold, such as shirts
	Personal toilet articles
	Other personal effects
	Accessories and keepsakes
	Shoes
	Bedding and household linen
	Sewing and mending equipment
Kitchen and Pantry	Staple food-stuffs
	Perishable food-stuffs
	Tinned food-stuffs
	Utensils
	Fuel
	Cleaning equipment and supplies
Bath-room	Medicines, first aid equipment
	Soiled clothes hamper
	Toilet and hygiene supplies
	Laundry equipment
Miscellaneous	Baby carriage
	Bicycle
	Umbrellas and rainwear
	Sports equipment
	Tennis racquets, hockey sticks, guns, cameras, fishing tackle
	Boxes, baskets

Any family can add to this list of articles needing storage space. A solution of storage problems will require planning and imagination. It will also require an outlay of funds, large or small, according to the resources available.

STORAGE SPACE FOR FAMILIES WITH RENTED HOUSES

The problems of a family living in a rented house are somewhat more difficult to solve because of an understandable reluctance to make permanent installations. Here are a few suggestions for storage in such cases.

Under-bed Storage

There is a lot of unused space under a bedstead but a family must not push too many boxes and other containers under the bed. That will give mice and other vermin too many hiding places.

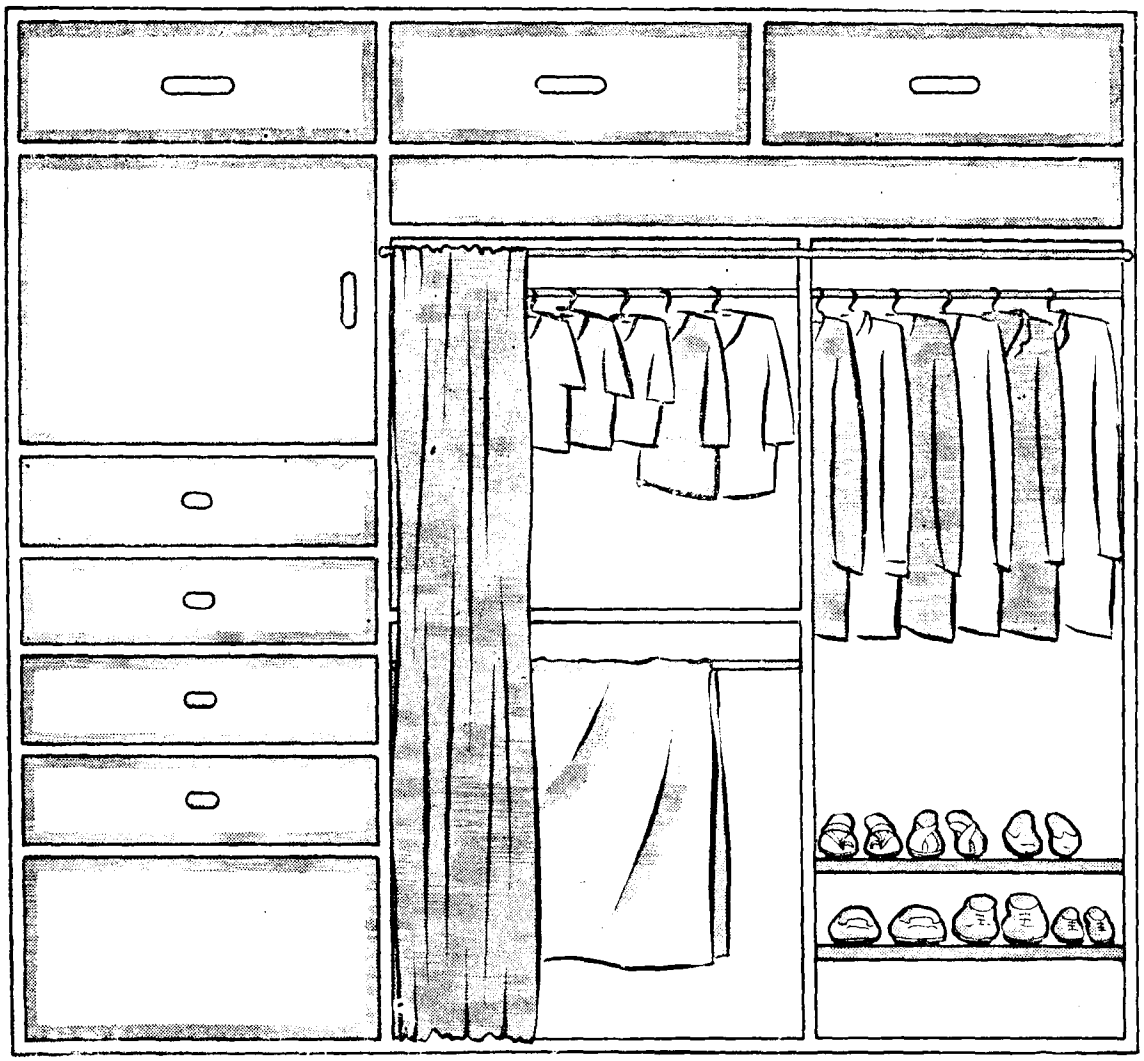


FIG. 12. A STORAGE WALL WITH SECTIONS THAT CAN BE TAKEN APART

One large flat box on wheels, which can be easily pulled out from or pushed in under the bed, makes a good storage space for bedding, out-of-season clothing and the less frequently used articles. Storage drawers can be built into the framework of the bed, but should not be too large.

Free Standing Storage Wall

A free standing storage wall, every inch of which is designed to do a specific job, can be planned according to the needs of the family. In the illustration (Fig. 12), the storage wall is planned in sections that can be easily taken apart when the family moves. The larger section is designed to hold saris, *cholis* and coats on hangers. Sliding doors are suggested, but the less expensive curtain will do. Shoes can be placed in the section nearest to the floor. The next unit consists of a cupboard space for bulky items with a series of drawers beneath for folded articles.

STORAGE SPACE FOR FAMILIES OWNING HOUSES

A family living in its own home can find countless ways of increasing storage space, specially with built-in cabinets and closets of every description. Built-in equipment is now a common decorative feature in many homes but it is not always designed to fit the storage needs.

In spite of some temporary inconvenience, a family building its own dwelling may like to live in it for a while before installing built-in furniture. A built-in piece placed in one location may, under the routine of daily living, be found more desirable in another spot. Only experience can finally determine what is most convenient.

There are many unrealized possibilities for storage under staircases, in the bathroom, under wash basins and in bare corners. A living-room storage wall, a series of cabinets, built-in cupboards to fit particular points, etc., will add not only to the storage space, but provide handsome pieces of furniture in themselves.

In this discussion, we have purposely not discussed, because of its infinite variety, that huge store of supplies and articles that the family members refuse to part with. But we firmly believe that no member of the family should ever be forced to part with treasured articles, not even for the sake of orderliness.

SANITATION

Sanitation refers to the control of those factors which affect health. Important among these are water, food, housing, disposal of body waste, and pests like flies, mosquitoes or rats.

DISPOSAL OF BODY WASTE

By body waste is meant the bowel motions and urine. The germs of cholera, typhoid, dysentery and similar diseases as well as hookworms and other intestinal worms continue to breed in the excreta that are deposited on the soil.

It is a general habit in small towns and rural areas to pass motions in the fields or on the roadside. This waste matter gets washed into wells, streams and tanks; and the soiled, germ-ridden water from them is used for drinking, cooking and bathing. To make the environment and water safe, body waste should be deposited in properly built and maintained latrines.

Types of Latrines

Where there are no proper latrines, one should dig a hole to deposit the motion and cover it up with mud. Many people do not use the latrines even when these are available because the latrines have not been properly built or kept clean and are therefore repulsive because of the odour and filth.

Water-seal latrines such as those provided in Extension Training Centres and Community Development Blocks are good. Water for flushing is necessary when this type of a latrine is used.

Bore-hole latrines are recommended where there is a scarcity of water. These latrines must be made and maintained properly; otherwise they give out offensive odours.

A latrine should be sufficiently near the house and at the same time at least 50 feet away from wells and other sources of water so that the sewage does not seep into the well.

DISPOSAL OF WASTE WATER

Small pools of water often collect around the bath-room, around the kitchen where vegetables, grains, utensils, etc. are cleaned, and in the streets. They become breeding places for flies and mosquitoes. Small worms can be observed wriggling in such puddles. They are the larvae of mosquitoes. Flies and mosquitoes are as dangerous to health as the deadly poison from a mad dog or a snake. Therefore, all waste water should be drained off into a soakage pit, depriving them of breeding places.

Flies thrive on filth, excreta, clearings from the throat or lungs, and other unclean material. They bring filth and germs into the house and cause dysentery, typhoid and other diseases.

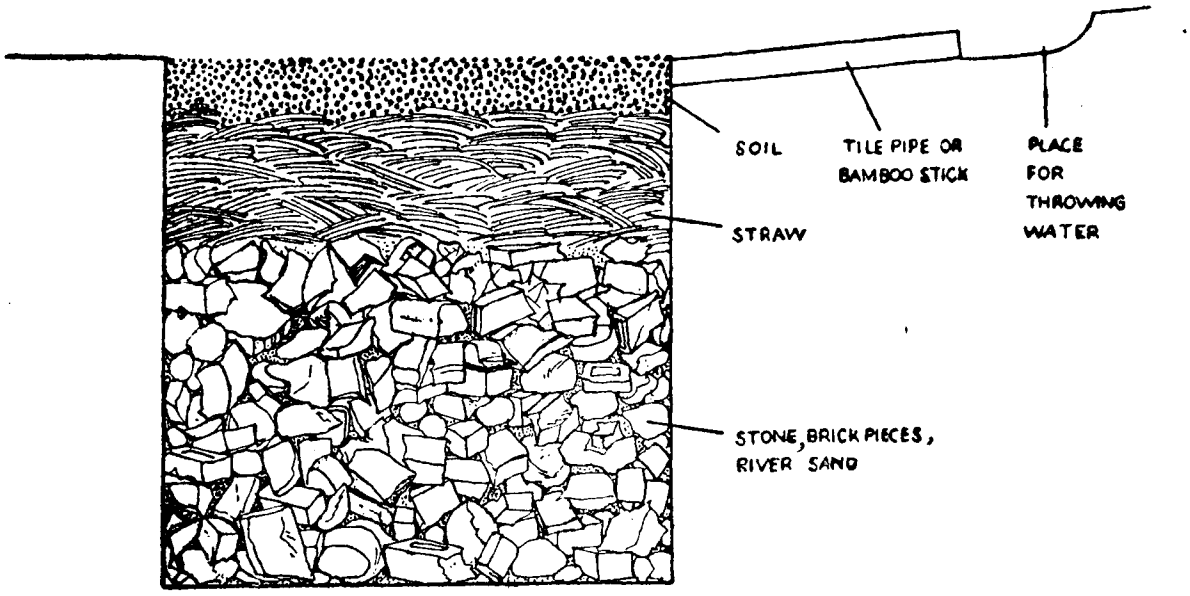


Fig. 13. THE SOAKAGE PIT

The Soakage Pit

The soakage pit is made in the following way :

1. Dig an eight feet wide, eight feet long and eight feet deep hole in the ground.
2. Fill the hole with stones, brick pieces, other loose material and some river sand.
3. Cover the top with straw and then with soil.
4. Dig a small trough from the place where the water is thrown out to the soakage pit.

5. Place a tile pipe or bamboo stick in the trough so that the water will run freely into the soakage pit.
6. Keep the trough clean and do not allow it to get filled up with filth.
7. Build a 'grease trap' to prevent the soakage pit from clogging up. Soapy and greasy water will not be absorbed by any soil.

DISPOSAL OF ANIMAL WASTE

Unfortunately, in our country, most of the animal waste (dung) is collected, dried and used for fuel. Animal waste is a very good plant food and by using it in that capacity we benefit more.

The Compost Pit

Many communities have compost pits where dung, leaves and trash are placed. These are then left to rot and turn into manure.

A compost pit is necessary for the following reasons: Warm, moist cow dung is highly favoured by flies for breeding. Therefore, it should not be left out in the open. The compost pit provides a place to put this animal dung as well as leaves and left-over food (except greasy food). It thus makes homes and villages cleaner and healthier places to live in. It also provides manure for the fields.

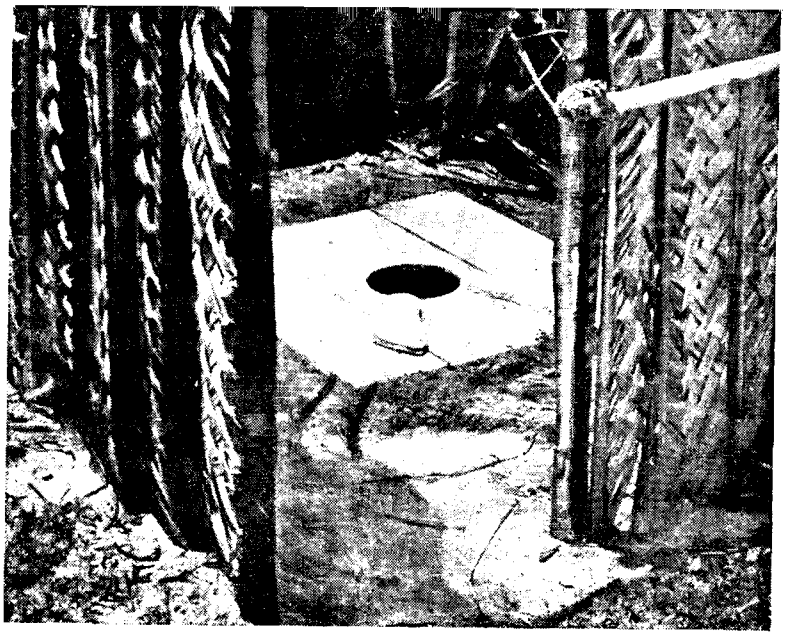
You can make a compost pit in the following way :

1. Dig a four feet deep, eight feet wide and eight feet long hole. The size depends on the amount of materials to be put into the pit and the space available.
2. Put dung, leaves and vegetable trash into the pit.
3. Cover the trash with a layer of earth each time you put in trash and pour some fresh water over it. It is necessary to cover the material with soil to keep flies and rats from breeding there. Water increases the decaying action in the material.
4. When the pit is fully covered, add more earth and leave the compost to rot. Use the contents as manure after a year.

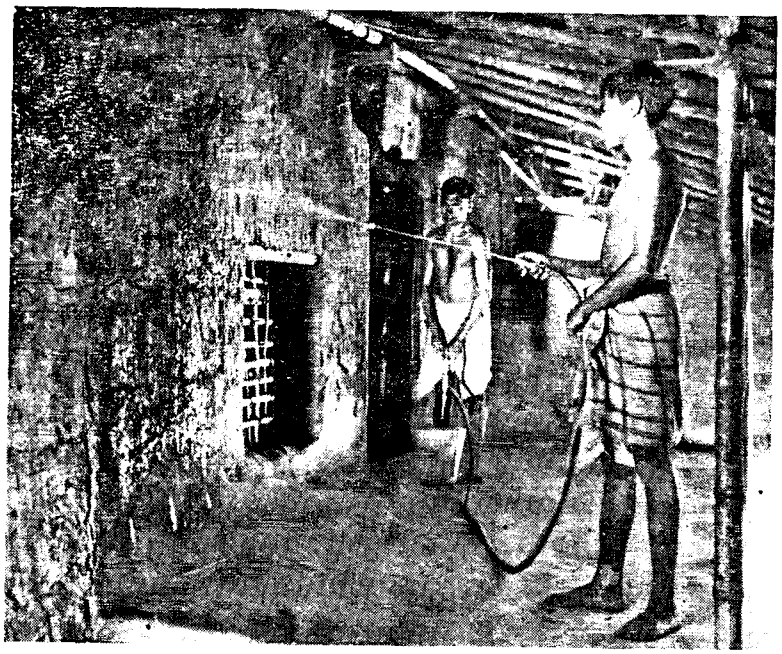
HOW TO GET MOSQUITO-FREE SURROUNDINGS

Mosquitoes are responsible for transmitting malaria and filaria from a sick person to a person susceptible to these diseases. Mosquitoes live and breed in stagnant water. Mosquitoes can be controlled in the following way :

1. D.D.T. or gammexane spray is used to destroy mosquitoes. It is absolutely necessary to use enough D.D.T. of the correct strength; otherwise mosquitoes develop an immunity to it.
2. Do not allow uncovered water jugs and pots to lie about in the house or village.
3. Cooperate with the local malaria and filaria control programme.
4. Use mosquito nets.



A. A Cheap Type of Latrine For Rural Areas



B. Spraying The House for Protection Against Diseases

C. Well-Covered Pots Keep off Rodents and Pests

ANTI-FLY MEASURES

The legs of flies are covered with small hair. Germs and filth cling to this hair when flies sit on filth. Flies carry and deposit these wherever they go. They spread such diseases as typhoid and dysentery. They can be seen in all places where food is stored or served.

The following simple measures will be found effective in controlling the fly menace :

1. Keep your food clean and covered.
2. Use the latrine properly and keep it clean.
3. If possible, cover the windows with fine wire netting and additional wire doors.
4. Cover all garbage pails.
5. Do not leave the floors moist.

By keeping the house clean, covering the garbage and removing the puddles around the house, you will have far less trouble from flies and mosquitoes.

CHAPTER 36

HOME LIGHTING

The sun is the earth's fundamental source of light. Normally, we depend this primary source during day-time. It is true that means must be devisupon exclude the sun's rays during the hottest part of the day in summer; but sued to is the home-maker's ally in her fight against damp, disease and household pestslight

The amount of light entering the home depends chiefly upon the r and location of doors and windows. A window area equal to one-fourth of th imber area is considered desirable. Windows provide ventilation, light and dece floor and thus satisfy three principal needs. ration

Sight is the only one of our senses dependent on an outside agency, li its functioning. Light, whether natural or artificial, must be adequate if ght, for is to be protected. One medical authority has estimated that 25 per centyesight energy is consumed in seeing with normal eyesight and proper illumination of our illumination will necessitate a still greater consumption of energy. Poor

HEALTH AND LIGHTING

(Illumination is defined as the amount of light falling on a surfac source of light.) This is what actually determines comfort in seeing. The sc from a intensity of light must be adapted to requirements. urce and

When there is an adequate source of light, one can work with ease. less tension. The heartbeat is closer to normal. There is less blinking or There is And the general sensitivity of the visual sense is greater. straining.

(Improper lighting puts a strain on the eyes and nerves.) If such conc prolonged, serious damage to eyesight and to health in general occurs. (Ne ions are ness, specially in children, may have been caused by keeping reading r-sig close to the eyes due to inadequate light.) (A small, concentrated source of material a very small reading lamp, produces sharp shadows and harsh effects; it light, like eye strain and, indirectly, mental and nervous strain.) hus causes

Acute eye discomfort is associated with an excessive feeling of fa ascribed to other causes but actually caused when the eyes strain hard to gue, often symptoms are aching, redness, burning and scratchiness of the eyes. e. Other need more light than young people, since the size of the pupil decreases ; old people tissues become less translucent with age. nd the eye

Eyes become defective through abuse. The pupils gradually dila requiring continuous or great visual effort. Eye strain resulting fro under work of the eye to adapt itself to unfavourable conditions may not alwa the attempt in eye trouble but in headache, nausea, indigestion, sleeplessness a reveal itself d irritability.

Among school children, lack of interest, failure to concentrate, sleepiness and apparent laziness may all be caused by eye strain.

The objective in home lighting is therefore to provide adequate light for all the tasks that have to be performed in the home.

Lighting is also a form of protection, for prowlers are wary of entering illuminated premises. Moreover, lighting is a form of home decoration and creates an atmosphere of cheer and relaxation for the family. On festive occasions like Divali or Republic Day, lighting is used to create gaiety and excitement or reverence and dignity.

The quantity of light within a room greatly depends upon the colours of the floor, the ceiling, the walls and the furnishings. Dark colours absorb light. Light colours reflect light. These qualities of absorption or reflection vary from colour to colour. Light colours are easier to live with as they give back the light in soft reflections. While choosing colours for a room, remember that : (i) floors reflect 10 to 20 per cent of the light; (ii) walls reflect 35 to 55 per cent of the light; and (iii) ceilings reflect 65 to 80 per cent of the light.

The fact that ceilings reflect the highest percentage of light makes it imperative that they be of a lighter colour than the side walls. Even if the entire room cannot be decorated, a new coat of paint or distemper on a dull, dark ceiling alone will give more light to the room.

The texture of the finish used also plays an important role in the distribution of light. A dull finish tends to spread or diffuse the light in all directions. A glossy finish tends to mirror and reflect bright spots, and thus produces glare.

The reflecting powers of typical paint, paper and wood finishes used in interiors are given in Table 40. It is seen, from this Table, that light coloured or white walls reflect the greatest percentage of light and are therefore more desirable for use in the home.

Glare is the transmission or reflection of light in such a way that the eye gets an unpleasant sensation. One writer has defined glare as 'light wrongly directed.' Direct glare comes from unshaded or insufficiently shaded lamps placed directly in the line of vision. Reflected glare results when a bright light falls on a polished or glossy surface and is reflected from that surface to the eye. The very shiny covers that books and magazines often possess cause reflected glare. Spotty light gives glare by contrast. This happens when table lamps or floor lamps are used in a room without switching on the general light overhead. The eye then gets fatigued in its constant effort to adjust itself to the circles of brightness and darkness that result. The bare unshaded light is a common sight in many homes. It is unattractive as well as harmful.

ILLUMINATION FACTORS

Even when there are enough windows in the right positions, other factors will affect the amount of light entering the room. Some of these are mentioned below :

Window Glass

The window panes may absorb or reflect as much as 35 per cent of the light. It has been found that the light coming into the room can be increased by as much as 7 per cent if frosted glass is used with the smooth side of the glass facing the outside. The thickness of the glass used does not seem to have any effect on the amount of light.

TABLE 41

REFLECTING POWERS OF VARIOUS TYPES OF FINISHES

Colour	*Percentage of light reflected*
PAPER OR PAINT FINISH	
White	85
Light shades	
Green	75
Gray	75
Yellow	75
Buff	70
Blue	55
Medium shades	
Yellow	65
Buff	63
Gray	55
Green	52
Blue	35
Dark shades	
Gray	30
Red	13
Brown	10
Blue	8
Green	7
WOOD FINISH	
Maple	42
Satin wood	34
English oak	17
Walnut	16
Mahogany	12

Between 15 and 20 per cent of the total light may be absorbed by the dirt on the panes. In smoky localities, as much as 50 per cent of the light may be lost because of dirty window panes. Surely this is a good reason to keep windows clean. Glass distributes and diffuses light, giving more illumination to the farther side of the room than would be possible if there were no glass.

Cleaning Windows

If windows are dusted along with the furniture every day, they will not require frequent washing. A very dirty and streaked window will require washing with soap

and water. Soap drops left to dry on the windows will streak the window panes and cannot be rubbed off easily. All traces of soap must therefore be removed with clear water immediately.

Clear water to which a few drops of ammonia have been added will ordinarily make the windows sparkle. A wad of newspaper may be used for making windows shine. A duster often leaves 'light' on the windows. Stubborn fly specks on a window disappear if rubbed with kerosene. Kerosene or turpentine will remove small and fresh drops of paint from the windows. A thick drop of paint which has been there for a long time can be removed with the help of a razor blade.

Do not 'cut the corner' while cleaning windows. By using a pointed stick wrapped with a cloth, you can reach even the extreme corners for thorough cleaning. A good window-cleaning solution can be made with 2 quarts of warm water and any one of the following : 2 tablespoons vinegar; 1 tablespoon kerosene; 2 tablespoons household ammonia; 1 tablespoon borax; or 1/2 a cup denatured alcohol.

Window Bars

Window bars which are commonly put in for protection materially check the entry of light into the room. The loss may be as high as 40 per cent. If this form of protective device is absolutely essential, care must be taken to provide efficient sources of artificial light. There are several types of protective devices, some in the form of grills and others in decorative scroll-like patterns of iron work that are more attractive than a series of iron bars.

Window frames are placed outside the window bars in some homes. In others, they open into the room with the bars being placed outside. The amount of light lost through the use of bars is probably the same in both cases. For purposes of home decoration and utility, however, it is better if the window frames are placed inside. They are more easily cleaned and can be curtained. The life of a curtain is bound to be shortened if it is fastened to a window opening outwards.

Window Draperies

Window draperies and curtains are an accepted part of home decoration and improvement. They too have a decided effect upon the amount of light received by a room.

Dark coloured and heavy draperies may cut off as much as 75 per cent of the light. They also tend to increase shadows and to produce a 'spotty' condition which may result in glare. If a thin material is used to cover the window panes, it will diffuse the light and soften shadows. The heavier draperies can then be hung well to the side of the window. They can be drawn to exclude light when necessary, but can easily be pushed back to permit more light. A curtain on the window panes will ensure privacy and, at the same time, admit light.

ARTIFICIAL LIGHTING

Down the ages, many different types of artificial lighting have been used. Fire, whether built inside or outside a dwelling place, seems to have provided the first artificial light. Later developments led to the creation of numerous types of lamps

(using edible or non-edible oils), candles, kerosene lamps and, finally, electric lights.

Villages in India still not reached by electricity generally use either oil lamps or kerosene lights. Even in towns where electricity is available, due to economic reasons, some families are not able to take advantage of electricity. They use kerosene lanterns. The different means of obtaining light in the home have been described in the following pages.

Oil Lamps

Oil lamps vary from the small mud plate to the elaborate brass lamp. Non-edible vegetable oils are generally used as fuel. Cotton waste or rags are rolled into a wick, the thickness of which depends upon the spouts of the lamp. The wick is dipped into oil which has been poured into the lamp's receptacle for being used as fuel. A small portion of its edge is projected at the mouth of the spout and lighted. The wick, when lighted, feeds steadily on the oil in the receptacle. It is obvious that the oil has to be replenished often. Brass oil lamps have become an indispensable item in worship, festivities and at ceremonies.

Candles

Candles give sufficient illumination for going about in the house, but are unsatisfactory for such detailed work as sewing or reading. They are very soft on the eye provided they are not used for tedious work.

Kerosene Lamps

Kerosene lamps can be of many sizes and materials. The light available from a kerosene lamp is reduced, when the wick is not kept well-trimmed, when the chimney is not cleaned, or when the level of the ground on which the lantern is kept is uneven.

Users of kerosene lamps must remember the following rules :

1. The base should never be filled more than two-thirds with kerosene.
2. The lamp should be cleaned daily. The wick should be moved up to the edge of the burner and the burnt-out portion is rubbed or cut off, after making sure that the wick is smooth and straight. The chimney or globe should be washed in warm soap and water, rinsed in warm water, dried, and polished with dry paper.
3. Kerosene must always be kept in a metal container and out of the reach of small children.
4. In homes where there are small children, lamps with metal bases should be preferred.
5. The flame should never be at the user's eye level.
6. Since kerosene is inflammable and since the lanterns produce a brighter light when left undisturbed, the lamp should not be moved from place to place.
7. The wick should be adjusted occasionally, care being taken not to turn the lighted wick down into the oil.
8. In case of an accident, water should never be thrown on a kerosene fire

because the kerosene will splash about and the fire will spread. Only sand should be used to smother the fire.

Petromax Lamps

Petromax lamps are more complicated than kerosene lanterns but are next to electric light in their advantages. They are very expensive; and their operation and proper maintenance require far more care than those of ordinary lanterns.

A petromax lamp has a broad metal base to serve as a reservoir for kerosene. An air pump is attached to the metal base, to pump in air which is necessary for combustion and for the transformation of the oil into gas. On the base is placed a small receptacle for methylated spirit which is used as a starter for burning. Also attached to the base is a tube which carries oil to the top portion, where it is changed into gas for lighting. On the top portion of the petromax is another metal structure, holding several tubes and parts which are involved in the change of oil into gas. It also keeps in position the mantle which takes the place of the wick. In kerosene lamps, the mantle is surrounded by a chimney which joins the top and bottom metal portions tightly.

To light a petromax lamp, pour methylated spirit into the small receptacle and light it. After a few moments, pump in air slowly until the mantle becomes illuminated without smoke. Pump more air into the lamp, and place the lamp in such a position that the whole room gets illumination. Petromax lamps can be highly dangerous if they are not handled carefully. Sometimes, due to over-pumping of air, they explode, causing serious damage to life and property.

Since the consumption of kerosene in a petromax lamp is considerably larger than that in the ordinary kerosene lantern, this method of lighting cannot be afforded by people in the low-income groups. It is also bad for the eye, for its light is very intense. Therefore, reading should be done at a place sufficiently away from the lamp. A lamp shade may be helpful in reducing the glare.

ELECTRIC LIGHTING

The provision of a reliable source of electric power at prices within the reach of the majority of the people will have a tremendous impact on home improvement. The chief contribution of electric power, besides its uses in industry, is the provision of home lighting. Probably no other convenience brought into the home exerts so great an influence on family life.

Electric lighting is at present largely confined to the urban home. At the end of the First Five Year Plan, about 95 per cent of the towns with populations above 20,000 had been electrified. The aim of the Second Plan was to provide electric supply for small towns which have populations between 5,000 and 20,000 and which are centres for the development of adjoining rural areas. This onward march of power will eventually reach villages on a large scale, bringing a safe, simple and convenient method of illuminating millions of homes. As electric power becomes more abundant, it usually becomes cheaper.

An ever-increasing amount of every-day work is now done with the aid of

electric light. At the same time, an even greater proportion of recreation and relaxation is being increasingly sought with the aid of electricity. This increase in activity has resulted in great demands on eyesight. It is, therefore, necessary to provide lighting conditions which will preserve eyesight. One authority has said : 'Mere lighting in the home is not enough. Comfortable seeing is what counts.'

Light Fittings

Fittings are needed to provide three general types of home lighting : for general illumination, for localized work and for decorative purposes. Light fittings are classified under the following general headings.

Direct Lighting

This is a common form of lighting, usually seen in the form of an open shade or globe suspended from the ceiling (Fig. 14a). The maximum quantity of light is obtained by a direct fitting as light is concentrated at the desired surface and the minimum amount is lost in transmission. A direct fitting, however, produces more glare, specially when the light is at eye level.

Light fittings in many houses consist of single drop cords suspended from the ceiling with an unshaded bulb at the end. This is unattractive as well as harmful. In a rented dwelling, the occupant will naturally not wish to spend much on electric fitting. However, some improvements can be made without incurring much cost. For example, a clear bulb should be replaced by a 'frosted' bulb that will diffuse the light and, to some degree, reduce the intensity.

Several types of shades designed for use with drop cord fittings are available in the local markets. A small investment in some type of shade will more than pay for itself in attractiveness and increased lighting efficiency.

Indirect Lighting

Here, the highest percentage of light is directed upward towards the ceiling for redirection downward (Fig. 14 b). The illumination provided by indirect lighting is spread over a larger area. It is an improvement over direct lighting, but should be

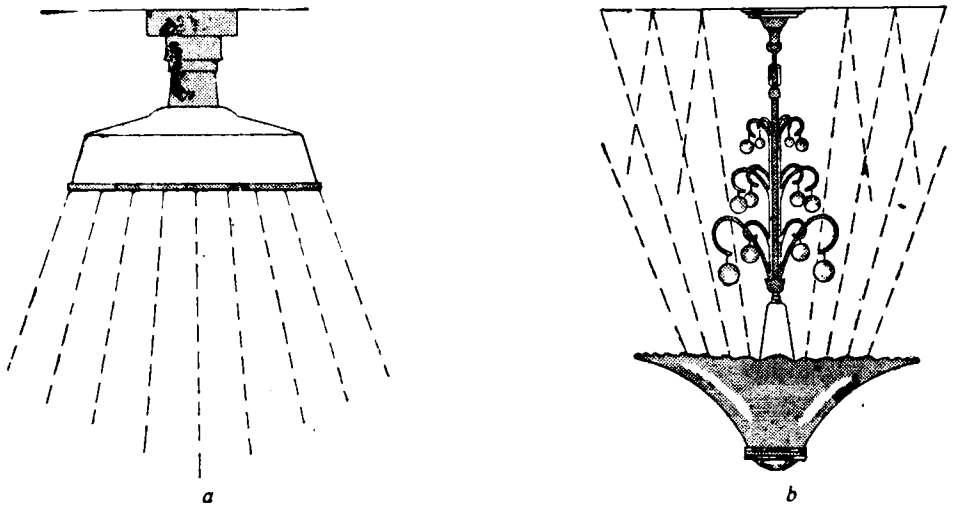


FIG. 14 LAMP SHADES FOR DIRECT AND INDIRECT ILLUMINATION
(*a*) FOR DIRECT ILLUMINATION (*b*) FOR INDIRECT ILLUMINATION

supplemented by other portable lamps or fittings in rooms where reading or other such work is done.

Semi-direct Lighting

Fittings that produce a somewhat greater percentage of light downward than upward but that are still mostly of the direct type come under this heading.

This type of fitting is popular for use in homes. As a fair percentage of lighti thrown to the ceiling, contrast is reduced, and shadows and glare diminished.

Diffused Lighting

Fittings of the type shown in Figure 15 produce an almost equal amount of light in all directions. These are used as ceiling lights for kitchens and bath-rooms.

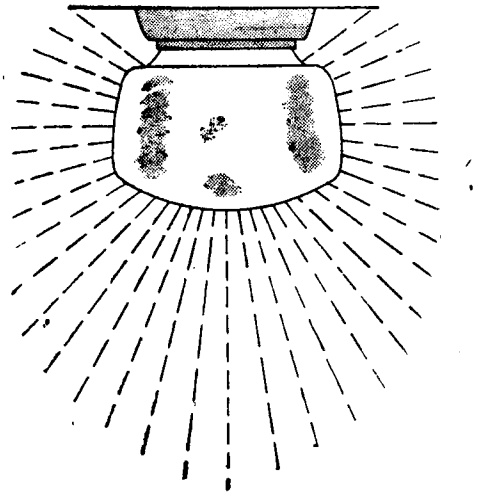


FIG. 15. LAMP SHADE FOR DIFFUSED LIGHT

Semi-indirect Lighting

In this arrangement, a greater percentage of light is directed upward than downward (Fig. 16). A good fitting of this type combines direct and indirect lighting.

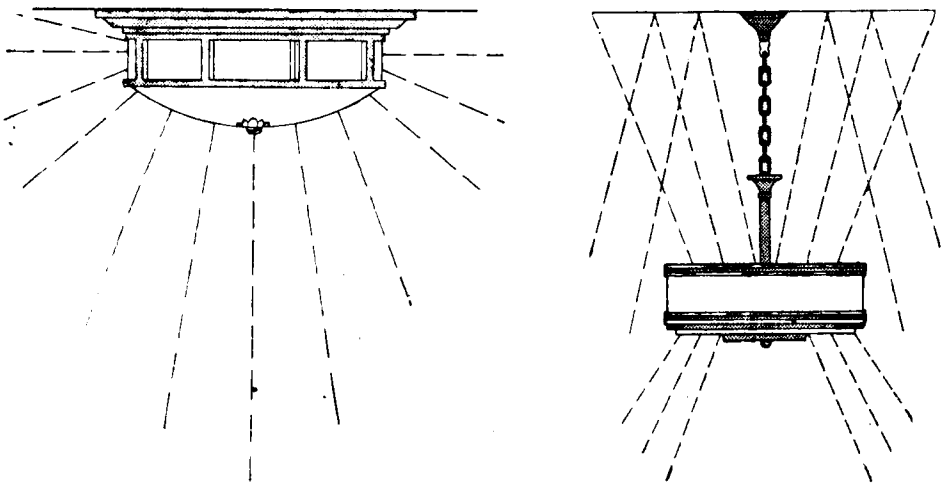


FIG 16. LAMP SHADES FOR SEMI-INDIRECT LIGHT

Light goes upward for general room distribution for reducing contrast and shadows. It also goes downward to illuminate the area where work is being done.

While planning the light fittings for the home, the following points should be borne in mind.

1. Rooms generally require more than one type of fitting. The semi-indirect type described above is used as the ceiling fitting for living-rooms, dining-rooms and bedrooms. Depending upon the requirements of the particular room, other portable lights are used to supplement these basic fittings.
2. Irrespective of the type of fitting used and its location, all lights should be shaded.
3. Rooms should be wired in such a way as to supply sufficient light. There should be no point along the floor line or in any unbroken wall space more than six feet away from an outlet.
4. Lighting should be interesting and pleasing, and should contribute to the attractiveness of the home.
5. Light should be distributed in such a way that there is enough of it everywhere to meet all requirements.

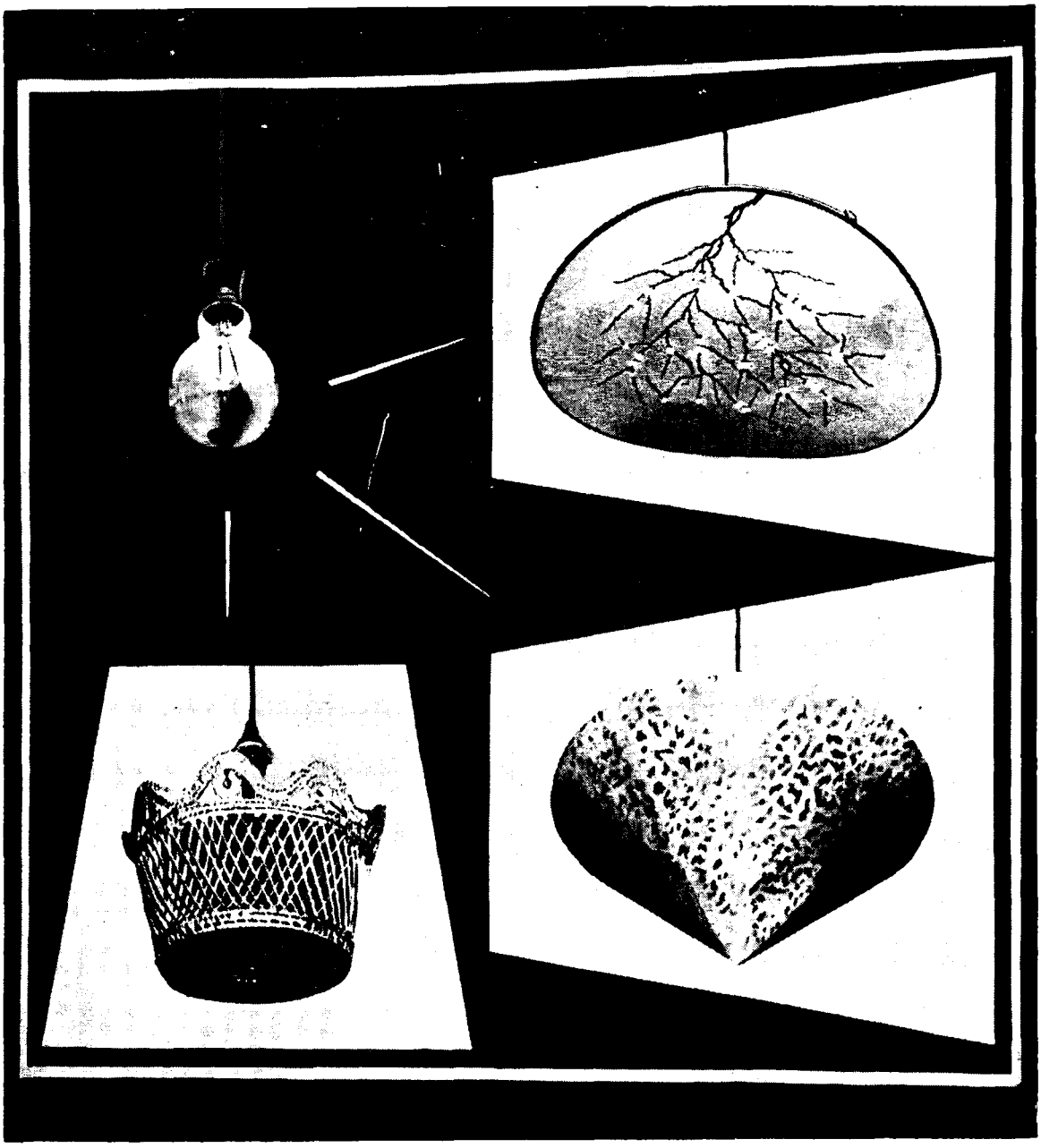
Lighting Equipment

Light bulbs and fixtures should be kept clean. The accumulated dust will absorb as much as 50 per cent of the available light. The accumulation of dust may be so gradual as to go unnoticed, but the amount of light obtained would be becoming progressively small. Wipe off bulbs with a damp cloth. Never immerse them in water. Remove all lamp shades and globes occasionally for a thorough dusting or washing.

Keep the ceiling and walls clean. One authority has estimated that the cleaning of bulbs and ceilings alone would increase light efficiency by 50 per cent.

Common Electric Terms

Fortunately, it is not necessary to be an engineer to enjoy the convenience and benefits of electricity in the home. However, the intelligent home-maker would like to understand a few basic facts so that she might use electricity more efficiently in her household. The following definitions will be helpful.



SOME SIMPLE AND ATTRACTIVE LAMP SHADES

Watt : It is a measurement of electric power. Lamp bulbs are rated in watts. The wattage to be used depends upon the amount of light needed. Generally, a ceiling fitting for over-all room lighting will require bulbs of 100 to 150 watts. A wall bracket fitting used for decoration may need a bulb of 15 watts or less.

Volt : To make electricity start flowing along a wire, some pressure is necessary. This pressure is measured by a unit known as 'volt.' When a lamp bulb is marked '220 V,' it means that 220 volts of electric pressure are needed to send enough current to produce light from that bulb.

Circuit : The path along which current flows from its source through some electrical device and back again to the source is called the circuit. When too many electrical devices are connected to a single circuit so that too much current flows through it, the wires get over-heated and a fire may be caused.

Fuse or Circuit Breaker : It is a safety device to protect the circuit by cutting off the current when the load becomes too heavy for safety. The cause of the overload may be too many appliances on one circuit or frayed appliance cords which touch and cause 'short circuits.'

Outlet : It is an opening in a wall, ceiling or floor connected to the circuit. Appliances may be connected or 'plugged' on to it.

Switch : This is a device for turning a circuit 'on' or 'off.'

Direct Current or D.C. : A continuous movement of electric current in one direction is called direct current.

Alternating Current or A.C. : This type of electricity changes or reverses its flow at definite intervals. Some appliances operate only on A.C. and will get damaged if attached to D.C. and *vice versa.* It is important that the home-maker knows which type of current serves her house. She can then buy only those appliances which will work on that type of current.

Replacing a Fuse : If the circuit has been over-loaded and the fuse has blown off, it is a simple job to replace the fuse, provided some fuse wire is kept in the home. It is done as follows :

1. Disconnect all lamp cords and appliances on the circuit where the fuse has blown off.
2. Shut off electricity at the main switch by moving the handle to the 'off' position.
3. Stand on a dry floor and make certain that your hands are dry.

4. With a torch, locate the blown fuse.
5. Unscrew the blown fuse, grasping it between the thumb and the forefinger.
6. Screw in a new fuse of the same size as the old one.
7. Restore electricity by moving the switch handle to the 'on' position.

CHAPTER 37

THE WELL-GROOMED HOUSE

A well-groomed house is basically clean. There are no tell-tale odours coming from the kitchen or bath-room. No cobwebs are seen clinging to the ceilings or light fittings. The corners and undersides of things will bear close inspection. Everything is in its place. Windows sparkle; brass gleams; and the furniture reflects the glow of polish. There is a kind of freshness that makes it a home of charm and gracious living. Such a dwelling looks as if it enjoys 'loving' care, as indeed it must if it is to have such an atmosphere.

CLEANING EQUIPMENT

There are tools for every trade and housekeeping is no exception. A basic list of the cleaning equipment is given below :

1. A good step ladder strong enough to take the weight of a person. Ceilings and such fixtures as fans or light fittings cannot be properly reached; and the step ladder is needed then.
2. A long handled brush capable of reaching the most far-away spot in the room.
3. Strong brushes or brooms for floors, carpets, mats and rugs.
4. Brushes for upholstered furniture.
5. Special brushes for cleaning the bath-room.
6. Dusters.
7. Mops for wet cleaning.
8. Flannel polishing clothes.
9. A scrubbing pail.
10. A carpet beater made of cane.

The housewife should also have the following materials to assist her in thoroughly cleaning her home.

1. Household ammonia.
2. Kerosene.
3. Strong and mild soaps.
4. Disinfectants.
5. Cleaning abrasives.
6. Metal and silver polishes.
7. Furniture waxes and polishes.
8. Floor waxes and polishes.

CLEANING ROUTINES

Logically, all cleaning should be done from the top to the bottom. Dirt dropping from above can be removed when the floor is swept at the end. One of the

reasons why cobwebs are often seen on light fittings and the ceilings of otherwise spotless homes is that they are forgotten until the end and then left untouched for fear of spoiling the work already done.

Daily Care : Dust furniture, floors, mirrors, windows and window-sills; empty and wash ash-trays; empty waste baskets; arrange magazines and papers; water house plants; arrange fresh flowers; adjust curtains; make beds; clean the main traffic areas on rugs; wash tile floors; clean all bath fittings.

Weekly Care : *Kitchen*—Clean shelves, stove, food safes and floors; polish utensils.

Bedrooms—Air mattresses, mats, pillows and beddings; change linen; clean out almirahs and cupboards.

Bath-room—Clean out medicine chest.

General—Brush down ceiling walls and light fittings; brush upholstered furniture, lamp shades, curtains and pictures; wash glass accessories; polish metal accessories; wipe light bulbs; polish mirrors; clean rugs; polish a few pieces of wooden furniture.

Monthly Care : Wash curtains and windows; wash walls of kitchen and bath-room if washable; wash glossy or glass parts of light fittings; polish any furniture missed in weekly cleanings; turn mattresses; dust bedsheets; make needed repairs.

Periodical Care : Wash or dry-clean slip covers, draperies and hangings; wash and wax furniture; reverse rugs after thorough cleaning; put away seasonal clothes; rearrange furniture if needed; do a thorough cleaning of every room.

Annual Care : Do some repairs or redecorating. Never let a house run down until it needs everything at once.

Unscheduled Jobs : Remove spots from upholstered furniture or rugs; remove rings or scratches from polished furniture; make small repairs such as repairing cane or bamboo furniture.

METAL ARTICLES

One rarely fails to notice if the brass, copper or silver articles in a room are tarnished or neglected. It is the housewife's job to see that all metal articles in her home are polished from time to time.

The following preliminary steps must be taken before beginning actual cleaning of metal articles :

1. Protect surroundings.

2. Remove grease and dirt.
3. Remove tarnish with suitable chemicals; rub well and polish.
4. Use the cloth most suitable for the metal to be cleaned.
5. All traces of cleaning material must be removed, if necessary by washing.

Brass Fittings

Brass fittings such as door-knobs, knockers, taps, etc., should be cleaned with a good metal polish. There are several to be found in the market today. Wipe the things with just a dash of vaseline or olive oil. The shine will last for quite a long time. If painted (after being cleaned well and polished) with a thin coat of one of the patent lacquers they will retain their brightness for months. Patent lacquers are easily obtainable in the market. A home-made substitute may be produced by dissolving one ounce of pure white shellac in a gill (·142058 decilitres) of methylated spirit. Ornamental copper is also cleaned in the same way as brass.

Brass Ornaments

Wash them thoroughly with hot soapy water; use a brush to penetrate the interstices and chased portions. The articles should be rinsed in clean water, carefully dried and rubbed with a clean cloth, and polished with a good metal polish. Other cleaning agents for brass are :

Tamarind Water : It is prepared by soaking tamarind in water and squeezing out the pips and fibres. Rub the brass with this water and then wash it with warm water. Finally, dry and polish it with a piece of soft cloth.

Lemon : Cut a lemon into two halves, dip it in salt and rub the brass articles thoroughly with it; then proceed as above.

Ashes : Prepare a paste with charcoal ash and water, and rub thoroughly on brass.

For bad stains, use vinegar and salt, and wash the articles with hot water. Then dry and polish it in the usual way.

Bronze Articles

Bronze is an alloy of copper, tin and zinc or lead. It is usually not polished. It may be washed in soapy water. After drying it, a little sweet (*til*) oil is applied to it and the job finished by polishing with a soft cloth.

Chromium Plate and Stainless Steel Articles

These materials are used commonly in the bath-room, pantry and kitchen. Generally they do not require any special cleaning. Washing with water will keep them bright and in good condition. To give an extra shine, some whiting can be used. A final rub with a soft duster will give them a high polish.

Aluminium Articles

Never use soda to clean an aluminium article. Wash it in hot water and soap, or rub it with wood ashes. Then wash and dry it. You can also polish it with whiting, wash it with hot water and then dry it.

Zinc and Lead Articles

Wash the article in a strong solution of soda and water. Polish it with a paste of some detergent and paraffin.

Table Silver

Wash it in hot soapy water immediately after use. Then rinse in hot water. Dry it at once and polish it with chamois leather before putting it away. Egg stains on silver can be removed with salt. Silverware should be cleaned regularly. The best cleaning agent for them is refined whiting made into a paste with water, dilute ammonia or methylated spirit. The paste is allowed to dry on the article and then removed. Today, several commercial silver cleaning preparations are found in the market.

Teapots

If stained inside with tannin, teapots can be easily cleaned by steeping them in strong soda water. This softens the deposit which can then be removed by rubbing.

CHINAWARE

General Method : Wash the article in a wooden or plastic bowl as there is less danger of their breaking in this way. If neither is available, then line a metal bowl with an old tea cloth or large duster. This prevents the china from chipping. For very delicate china, spread a cloth on the draining board too. Use hot soapy water or some detergent. For very greasy plates, soda or any one of the detergents sold in the market can be used, but these should not be used for gilded china. Wash the clean articles first, and change water often as only two articles should be washed at a time. Special attention is required for handles, spouts and grooved parts. Rinse the articles in a separate bath of hot water, drain and dry. If a plate rack is used, a better gloss is obtained by rinsing the article in cold rather than hot water. Burnt marks on cooking china can be removed with salt, any detergent, fine ash, etc., after steeping them in water for a considerable time.

GLASSWARE AND EARTHENWARE

General Method : For glassware, prepare the bowl and the draining board in the same manner as you would for china. Do not use very hot water; glass is a bad conductor of heat and unequal expansion will take place causing cracks. Sudden changes of temperature, such as those which occur when hot glass is put on a very cold surface, will crack glass articles; but if the glass is warmed slowly, hot water may be used.

Put milky articles in cold water before washing them to dissolve the protein which is set by hot water.

Wash one article at a time, using a soft brush for crevices. Rinse the article in water. A few drops of vinegar may be added to the water to produce a more brilliant polish. Dry and polish with a non-fluffy soft cloth.

Special dusters for drying glass are available. All glassware should be clear and brilliant, and free from finger marks.

Jugs, bottles, vases and decanters often become discoloured and may be cleaned as follows :

Used tea leaves when shaken well with water will remove stains. The deposits

on glass are generally from temporary hardness of water. These can be dissolved by using acids. Where the above method is unsuccessful, use a dessert spoonful of rough salt moistened with vinegar and shake well. Very often one of the detergents sold in the market will help to remove the stains. After removing stains, wash well and dry as usual.

Earthenware can be washed with warm soapy water or with a detergent.

HOME-MADE CLEANING AIDS

All types of polishes, waxes, creams and cleaning agents needed in the household can be obtained in the market. For the person who wishes to save money by making cleaning aids at home, here are some suggestions.

Furniture Polish

The following ingredients are needed for this : Two parts linseed oil; one part each of turpentine, vinegar and methylated spirit. Put the ingredients into a bottle. Keep the bottle well corked. Shake well before using.

Polishing of Furniture

The following suggestions come in useful while polishing furniture : Dust the article thoroughly. Rub lemon oil or furniture polish on it and let it stand for 15 minutes. Rub it with a clean duster until the polish is absorbed. With another clean duster, rub it to a high finish. Always rub each part of the article along the grain. Apply polish to the curved portions with a brush. Polish with a second brush. Finish with a piece of cloth.

If the article is too dirty, it should be cleaned before polishing. The following recipe may be used : Add three tablespoons of linseed oil and one tablespoon of turpentine to each quart of hot water. Cool the mixture before using. Apply it to one small section at a time. Dry thoroughly. Finish with a polish.

Removal of Spots, Stains and Scratches from Furniture

The following methods may be used to remove spots, stains and scratches from furniture.

Fresh Stains : Wipe the article promptly. Rub the portion at once with a piece of cloth dipped in oil or rub it with fingers, after having dipped them in oil.

Old Stains : Prepare a paste of lemon oil with powdered pumice or rotten stone. Dip a piece of soft cloth in the paste and rub it thoroughly on the stain. Wipe it with a piece of cloth which has been dipped in lemon oil. Then wipe it dry with another piece of cloth. Rub the portion with a flannel polishing cloth. If this does not remove the stain even after several trials, the stain has gone into the wood grain and complete refinishing is required.

Heat Marks : They are generally caused when hot dishes are kept on a wooden surface. If the marks are on a lacquer finish, rub the portion along the grain with a cloth which has been dipped in a paste of linseed oil and powdered pumice or rotten stone. Dry the portion with a soft cloth. If the marks are on a varnish or shellac finish, dip the cloth in essence of peppermint or the spirit of camphor. Finish with furniture polish.

White Water Marks : If these marks are on a waxed surface, remove the wax by applying a new coat of liquid wax which will dissolve the old wax and bring off the marks. Renew the surface with a fresh coat of wax.

On any other finish, rub the surface with a cloth dipped in a mixture of lemon oil and powdered pumice or rotten stone along the grain of wood. Or, if you prefer it, rub with a damp cloth dipped in the oil of peppermint. A few drops of ammonia on a damp cloth will serve the same purpose. Finally, use a piece of clean cloth to rub the surface dry, and then polish it.

Scratches : On a polished surface, rub polish into the scratch; this will darken the scratch. If the scratch is deep, apply a matching wood stain with a fine brush. Sometimes, painting it with iodine darkens the scratched spot. When that dries, apply white shellac with a fine brush until the crack is filled; allow each shellac application to dry before putting another on it. When completed, wax the spot.

On a waxed surface, try rubbing the scratch with wax or with a cut piece of walnut meat. If this does not succeed, apply turpentine with a fine brush.

Sagging Cane Seats

When a cane seat begins to sag, scrub first the top and then the bottom with hot soapy water. Dry i' in the open air. Try to keep as much water as possible away from the wooden frame while washing the cane. Wipe off the frame immediately with clean water to remove the soap and dry it. Then give a good waxing.

Carpet Cleaning

To safeguard the colour and weave of a good carpet, it should be kept clean and never allowed to accumulate dirt. For those who can afford it, a vacuum cleaner is a wise investment. The suction action of the vacuum cleaner draws the dirt and sand out of a carpet in a manner which no other method can ever accomplish.

If the dirt and sand are deeply embedded in a rug, it must be taken outside and cleaned with a hand beater designed for this purpose. This method tends to break the threads of a fine carpet and should only be used in extreme cases.

Those portions of the rug which take heavy traffic should be cleaned daily. The following precautionary treatment should be applied : A carpet cleaning compound can be prepared with the following ingredients: 40 parts fine sand, 30 parts fine sawdust, 15 parts paraffin oil and 15 parts water.

Mix these well in a large bucket. Place the mixture in a tin with a perforated lid to allow sprinkling. Remove all furniture from the carpet. Sprinkle the surface with this compound, and brush working towards the light.

Tea leaves may be saved from the kitchen and used in place of the cleaning compound. Salt sprinkled over a rug and swept will restore the original colour.

Washing Carpets

Rugs and carpets can be washed successfully at home if certain precautions are followed. They are : (*i*) The colours should be fast. (*ii*) The pile should not be affected by water. Some types of twists lose all their curling once they get wet.

(*iii*) Drying conditions must be good; otherwise dampness may encourage rotting of the rug base or ruin the floor.

Once these factors are checked, go ahead. Try washing a small rug before attempting a large one.

Dissolve a good soap, using about two cups to a gallon of warm water. Whip up a heavy lather with an egg beater. Apply the dry lather or suds with a brush or sponge to as large an area as can be reached, working in circles. Wipe off immediately with another sponge or a large piece of rough terry cloth. Do not rinse.

CHAPTER 38

HOUSEHOLD PESTS

The problem of insect pests is one of the most annoying aspects of the home-maker's job. Unwelcome guests in the form of flies, mosquitoes, cockroaches and other vermin visit even the cleanest home. In a clean home, however, they do not generally stay long because of the absence of dirty and damp corners in which alone they can thrive. Insects are comfortable only in dirty places.

A house that is regularly swept and dusted is not necessarily a clean house. Real cleanliness means the absence of what someone has called 'old' dirt—the dirt in cracks and crevices or in dark places behind the furnitures. The careful home-maker makes sure that the unseen parts of her home are as clean as those parts which are easily seen.

'An ounce of prevention is worth a pound of cure' is a particularly true adage in regard to household pests. Even if ridding the home of mosquitoes were expensive, which it is not, it would be cheaper than a debilitating seizure of malaria caused by the bites of mosquitoes. Naphthaline balls, dry-cleaning charges and other precautions against cloth moths do call for some cash outlay. This, however, costs far less than the loss incurred when a woollen suit or coat is damaged beyond repair by moths or when the expenses of darning, if that is possible, are undertaken. Ridding a home of insects and keeping it free from them calls for vigorous, unrelenting measures and a very high standard of cleanliness.

GENERAL MEASURES FOR THE CONTROL OF INSECTS

The following measures are suggested for controlling insects in the home :

1. Have all doors and windows in the home screened with wire gauze or mesh. If this is not possible for the entire house, screen the kitchen and the bath-rooms.
2. Keep on hand some aids for destroying insects, such as an insecticide powder (Gammexane or D.D.T.), a sprayer and spraying fluid. Keep a fly swatter handy in every room of the house.
3. Do not permit any pile of trash to remain near the home. Keep the house and its surroundings clean. Weeds must be cut and the path must be swept daily.
4. Fill all cracks and holes in the walls, ceilings and floors. Lime wash the kitchen and the pantry as often as possible.
5. When living in a flat, pay particular attention to all pipes and openings from the next household. Fill all cracks, wherever possible, with a quick-drying cement. Where this cannot be done, keep insecticide powder sprinkled near the openings.

6. Never leave food uncovered. Have metal, glass or other containers with tight-fitting lids for all staple food-stuffs. Never keep food in paper bags, cardboard boxes or other containers easily penetrated by insects.
7. Regularly sprinkle or spray insecticides into all cupboards and drawers, behind the furniture, in the corners and in all dark places.
8. Regularly air and sun all bedding, mattresses, the upholstered furniture, rugs and heavy clothing.
9. Do not tolerate piles of old magazines and papers in the home. They are not only fire hazards but also harbour insects.
10. Call in an exterminater or fumigate all rooms with sulphur at least once a year.

In the following pages, different household pests have been described and measures to control them suggested.

FLIES

The house fly is probably the most dangerous of all the pests found in the house (Fig. 17a). Flies are so numerous, so common and, to the average person, so innocent looking that their presence is taken more or less for granted. Flies in the adult state constitute the real menace, but some understanding of the life cycle of a fly will help the housewife in fighting them at all stages of their growth.

The common house fly lays her tiny white eggs in clumps that are visible to the naked eye. Horse manure heaps are preferred most by flies for laying eggs, although they use any animal or vegetable material in a decaying state. A small female fly may lay hundreds of eggs in a few weeks. These eggs hatch out small worms called 'maggots' in 24 hours or even less. Under favourable conditions, the maggots become fully grown in about four or five days. Then they burrow into the ground for the 'pupa' stage which may last from three days to over three weeks and which, in cold climates, may even last throughout the winter. At the end of this stage, the fly emerges; and within a few days, the female is ready to lay eggs. A female fly may in one season give rise to millions of new flies. This makes the killing of each fly important.

The fly crawls over waste and filth of all kinds and collects germs on its legs. The germs are then deposited on food and thus make their way to the stomachs of human beings.

Outdoor Control

Since a fly can travel enormous distances, regardless of the direction of wind, the average household is at a disadvantage regarding outdoor control measures. Each family should see, however, that all wastes are properly disposed of and that no breeding places are tolerated in or near its own premises.

Indoor Control

After the usual precautions of general cleanliness have been observed, specially that of keeping all food covered, the battle against the fly consists mainly of

'keeping at it.' During the period when flies are most numerous, every room should be thoroughly sprayed each day. Doors and windows should be tightly closed and the spray fumes allowed to penetrate everywhere.

There are many commercial sprays in the market. A very effective aresol bomb is also obtainable. A fly swat is very useful to have in each room of the house and can be bought for a few paise. This is a racquet-like piece of bound wire at the end of a long handle and is used to hit and kill flies.

It is better to hit a fly when it is flying than when it is at rest. Flies hit at rest often fall to the floor in a seemingly lifeless state. They are merely stunned, and not killed. In a few moments, they are capable of flying again.

MOSQUITOES

A villager was heard to remark at a film show on fly control : 'We don't have anything against flies, it's the mosquito that bites.' Although this villager had not been convinced that flies are dangerous, he was aware that the mosquito inflicts pain.

Only the female mosquito (17b) spreads malaria. She does this by sucking in the blood of a diseased person and injecting it into the next person bitten by it.

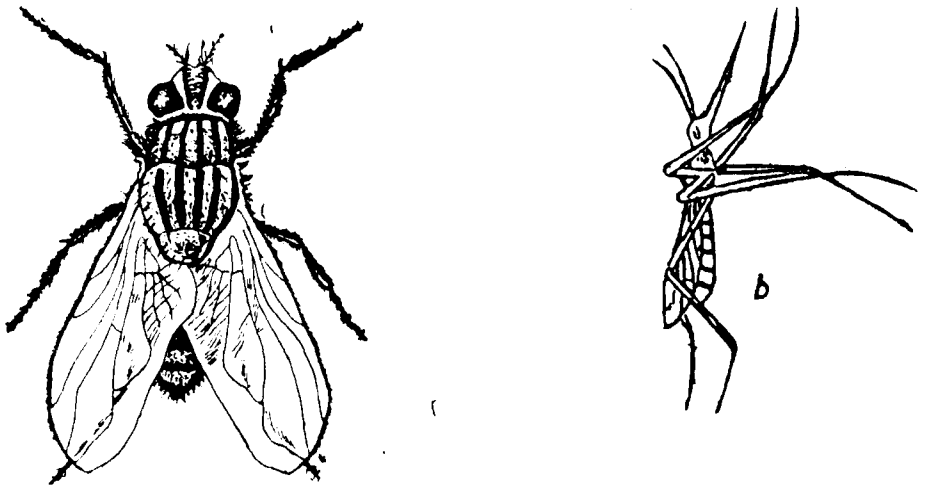


FIG. 17. HOUSEHOLD PESTS : (*a*) THE HOUSE FLY (*b*) THE MOSQUITO

It is possible to destroy the mosquito, as in the case of the fly, in the breeding stage. The eggs are laid on the surface of stagnant water puddles. Tiny swimming larvae soon appear. They next pass into the pupa stage, and within four to five days of that, become full-grown mosquitoes.

Outdoor Control

Since so much of the early life cycle of the mosquito is spent in water, the first measure of control is to fill up or cover all possible breeding places. Any vessel capable of holding water undisturbed for a sufficient period of time such as a broken

pot, can serve as a breeding place. Do not let old cans, broken clay pots or other containers like about.

Wells, tanks and drains should be cleaned regularly. Wells should be tightly covered, not only to keep out trash, levaes and other debris but also to prevent the breeding of insects. In some parts of the country, notably Assam, every household has its own tank. These should be kept free of scum and trash.

Indoor Control

Mosquito nets should be provided, but other less expensle measures may have to be taken.

At nigthfall, spray all corners of the room, specially behind and under the beds and other furniture. An inexpensive spray can be made by mixing hot soapy water and kerosene.

The burning of incense and neem leaves is of great help in keeping mosquitoes away, even though it does not kill them.

An insect repellent is a liquid of such a strong odour that it cannot be tolerated by insects. One of the best is the oil of citronella obtainable at any chemist's shop. The most effective method is to rub it on the ears, forehead, arms, legs and any other exposed part of the body.

Needham and Strong in their book, *Better Homes*, recommend a repellent made of :

Oil of citronella	2 parts
Spirit of camphor	2 parts
Oil of cedar	1 part

COCKROACHES

The cockroach is an unwelcome guest who comes to the home mainly to eat. These disgusting small creatures frequent those parts of the house where they can find food. The kitchen, pantry and dining room are their special haunts.

Unlike flies and mosquitoes, cockroaches tend to appear one at a time. Where there is one cockroach, however, there are others waiting for darkness to begin their roamings in search of food.

Sometimes a cockroach is seen scurrying about with a sac like projection at its rear end. This is a female and the bulging sac contains her eggs. She will deposit them in a dark and dirty place. The young will emerge after a few weeks. The time from egg laying to maturity is about one year. A thorough house-cleaning at any time during the year is likely to destroy the eggs and nesting places of cockroaches.

Cockroaches attack food supplies, and no clean housewife will use any foodstuff if she suspects that cockroaches have had access to it. Cockroaches do not necessarily eat a great deal but they leave excreta or digestive fluid behind them, spread all over the food. Thus they contaminate everything they touch.

Although specially attracted by sweets, cockroaches will eat anything—old

damp papers and books, leather, vegetable or fruit leavings, food scraps of all kinds, etc.

A house, where cockroaches are present in large numbers, will often acquire a stale and unpleasant odour, sometimes described as a 'roachy' smell. This can only be eliminated by a thorough cleaning and if the odour is very decided, the house must be fumigated.

Control Measures

In flats, the usual entrance for cockroaches is the common kitchen drain provided for the use of adjoining families. If both families are 'insect conscious' and keep their kitchens clean, there will no problem.

Each night, sprinkle liberal quantities of an insecticide such as Gammexane around the drain, across the general doorways and specially across the doorway leading from the kitchen to the rest of the house. At least once a week (oftener if necessary), pour boiling water down the open drain after pouring kerosene or a strong disinfectant in it. This will control odours from the drain and prevent the breeding of insects.

Insecticide powder, sulphur, borax or pyrethrum should be dusted over all places suspected of harbouring cockroaches. Fill all holes and cracks, specially those around water pipes, with plaster of paris or some other hard and quick-drying cement. Newspapers, torn up and boiled in water with glue and *atta*, will make a good temporary filling. Cockroaches may, however, eat their way through it if no other food is available.

The best cockroach poisons are dry sodium flouride and 10 per cent chlordane dust. Ten per cent D.D.T. dust is also good. The powder clings to the legs of the cockroach and is transferred to the mouth when the cockroach cleans itself.

Since cockroaches are mainly interested in food, the best method of control is to starve them out by keeping a spotlessly clean house.

BED BUGS

Of all the trials that can befall a house, infestation with bed bugs is the most annoying (Fig. 18). These repulsive creatures are very hard to find, even though their traces can be seen. Even at night if one has the sensation of being bitten, bed bugs can disappear completely in the time it takes to switch on the light. This makes their control difficult, as the battle is against an elusive enemy. A line of tiny red marks down a blood vessel is an indication that bed bugs have been at work, sucking the blood which is their only food.

Characteristics

The bed bug is a flat red-brown insect, roughly pear shaped and about one-fifth of an inch long. Tucked underneath its body is a long snout with which this creature sucks its fill of blood. The main part of its body is divided into segments that can scarcely be seen until the bed bug has had a meal. When filled with blood, the segments are clearly visible. The bed bug is then no longer a flat object but is distended to globular form.

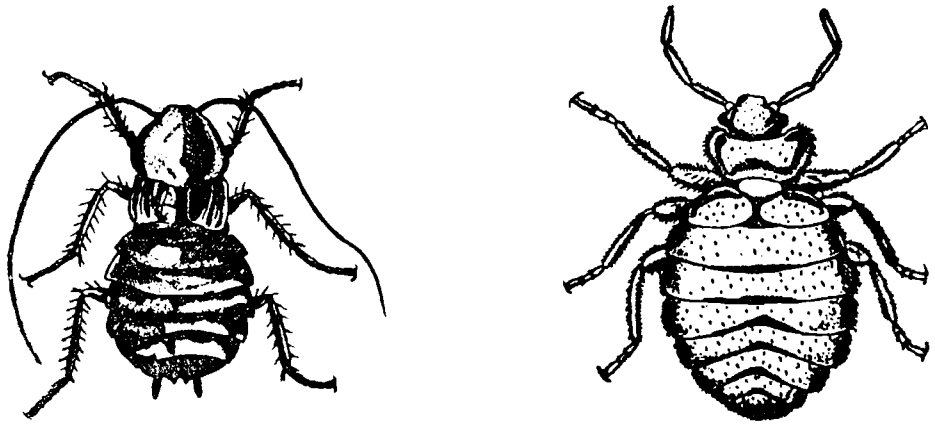


FIG. 18. BED BUGS

The bed bug cannot fly but can run with more than the speed usual for an insect of its size. It is able to withstand long periods of starvation and even of cold storage. The bed bug lives in furniture cracks or in any crevice big enough to shelter a minute, flat body.

Methods of Entry

Bed bugs are capable of walking from house to house and so no dwelling is safe if they are anywhere in the neighbourhood.

An easy mode of entry for bed bugs is through the travelling clothes, bags, holdalls and other belongings of persons using public conveyances. People, stopping overnight in a *wadi*, *choultry*, hotel, circuit house, dak-bungalow or the like should carefully examine all beddings and other articles.

Since they can hide in small cracks and crevices, bed bugs can enter the home in second-hand furniture. They are specially likely to be found in upholstered furniture. No careful home-maker will admit such furniture into her home until it has been thoroughly fumigated.

Control Measures

In a room suspected of harbouring bed bugs, not even the smallest opening must be overlooked. A favourite haunt is the electric wiring. Every inch of it must therefore be dusted with a strong insecticide powder.

The bed itself should be dismantled and the bed frame washed in a spray of water and kerosene. After drying, spray well or dust with powder.

Coil bed springs infested with bed bugs are very troublesome as they provide so many tiny hiding places. Remove the bed from the house and pour boiling water over it. Wash it thoroughly with hot soapy water containing kerosene. After drying, probe the twists and turns of the spring with a feather dipped in a mixture of kerosene and ordinary salt. If badly infested, the springs should be heated. This means building a fire under the springs and heating them thoroughly after which they should be repainted. These measures may not succeed unless the room is fumigated at the same time.

An infested mattress should be brushed well and then carefully dusted or sprayed, with special attention being given to edges and tufts. The mattress and bedding should be regularly put out in the sunshine.

A room or house badly infested with bed bugs will require the services of a professional exterminator.

CLOTH MOTHS

The cloth moth is another common pest (Fig. 19a). It causes damage to clothes and will riddle a garment beyond repair if left undisturbed for long. Not only woollen clothes but also rugs, blankets, hangings, stuffed specimens, insect collections, upholstered furniture, feathers and furs can be damaged by moths.

Eggs of the female moth are laid on the fabric where the young larvae or caterpillars will feed. They hatch in about a week and the white, slightly hairy caterpillars start feeding themselves soon after hatching. They will live and eat in this stage for an indefinite period; the more comfortable and undisturbed they are, the more they will eat.

All seasonal clothes which have to be put away must be freed of the eggs before storing. If this is not done, the larvae will damage them in spite of air-tight containers, naphthalene balls or camphor. Dirty clothes should be dry-cleaned and blankets washed. Everything that has to be put away should be thoroughly gone over with a stiff cloth brush. This brushing is very important as it may dislodge tiny clumps of eggs in the seams, folds, cuffs and other places.

Wrap articles first in plain paper sprinkling naphthalene balls liberally. Then wrap them in newspaper. Moths dislike ink but ink is liable to spoil the garments, creating yet another problem. After having wrapped them well, place the packages in trunks or cupboards that can remain closed. Heavy cardboard boxes can be used-if the edges are closed with gummed tape. It is wise to inspect the garments occasionally during the hot season.

Neem leaves and sprigs of such dried herbs as thyme, sage or lavender are said to discourage moths.

Stuffed articles like cushions and upholstered furniture should be brushed often to dislodge any eggs. An occasional spraying or dusting with insecticide powder will preserve them from damage. Long periods of neglect give moths an opportunity to ruin these articles.

Finally, if a moth should put a neat round hole in a conspicuous spot on a garment, any good tailor or dry-cleaning service will darn the spot invisibly. This is a bit costly, but less expensive than buying a new garment.

SILVERFISH

Families having a library or a large collection of books in the home will have to save them from silverfish (Fig. 19b). This tiny household pest gets its name from its appearance. It is silver coloured and the quick movements of the three long

tail-like projections at the end of its narrow pointed body make it look like a tiny fish.

FIG. 19. HARMFUL MOTHS : (*a*) THE CLOTH MOTH (*b*) THE SILVERFISH

Silverfish are fond of glue and starch and it is in quest of these items that they do serious damage to books and papers. Books left long unused or undusted may have their bindings at the back eaten away by silverfish.

Light, fresh air and general cleanliness will check silverfish. They are also destroyed by the application of insecticide powder at regular intervals. Books should never be allowed to remain undusted for long intervals. Piles of papers and magazines should not be kept in the home as they provide feeding places for silverfish and other pests.

Silverfish will also attack clothing that has been starched. Garments which are to be put away for a period of time should not therefore be starched for this reason.

WHITE ANTS

White ants or termites have a stronger appetite than other insects. A cockroach will be satisfied with a bit of food from the house. A termite is satisfied with nothing less than the house itself. Termites or white ants can and often do actually eat away the foundations of a house or building if left undisturbed long enough.

Although we do not have many wooden houses as such in India, we do have wooden door frames, window frames and foundation timber. These can be eaten by termites from within, leaving hollow shells which may collapse at any time bringing the entire structure down with them.

These tiny destructive creatures live in colonies and make themselves little earthen homes which can easily be recognized. These little 'galleries' are seen on the ground, on trees and on wooden pillars. As soon as they are detected, they should be destroyed with boiling water and kerosene. Cowan's white ant powder is a recognized destroyer of white ants. It can be obtained from any chemist's shop.

Wooden portions of houses should be treated with creosote tar or some other preservative before building. Unpainted wood is more likely to be attacked by white ants.

MILDEW

Mildew is caused by moulds which grow on anything from which they can get enough food, e.g., cotton, linen, wood, paper, silk, leather or wool. Though always present in the air, these moulds commonly develop during the monsoon, flourishing in damp, warm, poorly lighted and unventilated places. Mildew is likely to be very bad in a newly built house because of the moisture present in the building materials used.

Preventive Measures

As the moulds grow, fabrics and leather get discoloured and wood decays. If the mildew is left undisturbed long enough, shoes and clothing become so severely damaged that they rot and fall to pieces.

Again, the general precaution is cleanliness. Closets, cupboards, almirahs, and the like should be dusted regularly and washed occasionally. Simple dust can supply sufficient food for mildew to start growing. Clean clothing is less likely to be attacked than soiled garments.

The best way to prevent mildew is to keep things aired and dry . This, however, is almost an impossibility during the monsoon season. Keep as many windows and doors closed as possible when it is warm and damp. The warm moist air which comes in condenses on the cooler surfaces inside the house, thus increasing the amount of moisture.

On colder nights, open up the house as completely as possible. As the cooler air inside the house is warmed, moisture will be absorbed.

Burn a low wattage electric bulb continuously in closets and almirahs, where electricity is available. Occasionally leave cupboard drawers and almirahs open to prevent moisture from gathering and to stir up the enclosed air.

On sunny days during the monsoon season, put out clothes, shoes and leather goods in the sun for airing.

Removal of Mildew

Clothing : Remove mildew spots as soon as they are discovered. Otherwise the mould growth will weaken or rot the material. Brush off any surface growth. The brushing should be done outside the house.

Fresh Mildew Stains : Wash at once any fresh stains on washable clothing or household articles. Rinse the affected article well and dry it in the sun. If any stain remains, moisten it with lime juice and salt; and spread it in the sun to bleach. Rinse it thoroughly and dry. Extra care is needed if coloured goods are to be treated.

Sodium perborate is a safe bleach for washable materials. Sponge the mildew spot with a solution containing one tablespoon of sodium perborate to a pint of lukewarm water. Or dampen the stain and sprinkle the powder on it directly. After a few moments, rinse the article well. If damp baby clothes bath towels, or perspiration-dampened clothing give a bad smell, boil them in a solution made by adding two teaspoons of soda bicarbonate to each quart of water. Then launder them as usual.

Old Mildew Stains : Dip old stains on white cotton, linen or rayon in *Javelle* water or some other chlorine bleach for not longer than one minute. Then dip the article in a weak vinegar solution (two tablespoons to a cup of water) to stop the action of chlorine. Finally rinse it well in plain water.

Upholstered Furniture, Mattresses and Rugs : Take them outdoors and brush them thoroughly to prevent scattering of mildew spores in the house. Beat up thick soap-suds and sponge the spots lightly, wiping with a clean damp cloth. Use the soap foam and not the water so that the filling of furniture and mattresses does not get wet. Upholstered furniture may be sponged with a solution containing one cup of denatured spirit to each cup of water.

Leather : Wipe articles with cloth wrung out of dilute alcohol (one cup denatured spirit to one cup water). Dry in the breeze or under a fan or outdoors. Then wash with a thick solution of mild, neutral soap. Saddle soap may be used instead. Dry and polish with a good mat dressing. Rub the soles of shoes with wax polish to prevent mildew growth.

INSECTICIDES

Kerosene is a good general purpose insecticide to have in the house. When mixed with hot soapy water, it can be used for many purposes, such as washing floors, furniture, cupboards and the like, spraying, etc. Kerosene is almost universally obtainable and every household should keep at least a quart of it. Kerosene should not be used near open lights or fires due to the danger of fire.

It is hardly worthwhile to attempt making insecticides at home. Gammexane and D.D.T. are the trade names of two good non-poisonous insecticides manufactured in India. They can be obtained almost everywhere, even in large villages.

FUMIGATION PROCESS

A badly infested house should have the services of a professional exterminator. In many places, the local municipalities provide such services either free of charge or at nominal rates. Usually the job can be done in a matter of hours, and the home is protected for months. For several days afterwards, dead insects, mice, lizards, etc., can be swept up. A residue of crystals and spots will be left; this will provide protection against recurrence of pests for a long time.

If fumigation has to be done by the householder, it is usually accomplished by burning sulphur either in the form of candles, rock or powder.

Seal all rooms to be fumigated for eight to 24 hours. Pull furniture away from the walls, making sure that all metal articles are removed from the room. They get tarnished because of the action of sulphur fumes. Cover everything with sheets, paper or some other material.

Sulphur is more effective if the atmosphere is damp. The floors and walls should be lightly watered, or containers of hot water placed in the room. Close all doors and windows. Place the sulphur on a metal tray or a lid of an old tin which is supported over a bowl of water. This is necessary to avoid the risk of fire. Pour a

little methylated spirit over the sulphur. Light the sulphur. Sealing the doors from outside with gummed tape will give better results.

For a well sealed room, three pounds of sulphur for every 1,000 cubic feet of space will be sufficient. Air the room well before reoccupying it.

CHAPTER 39

HOME DECORATION

There are three items that can help in making the home more attractive without necessitating much expenditure. These are : pictures, house plants and cut flowers.

These are 'the little things that count' in making the home lovable. They can be utilized on a simple or an elaborate scale, depending upon the home-maker's taste and financial resources. Every artistic home-maker will make use of such items to create an atmosphere of beauty and restfulness.

PICTURES

Pictures bring colour, design and variety to the home. The final selection of subject-matter and colour is a matter of personal taste. The following basic rules will, however, apply to the selection and hanging of all pictures.

A picture of vibrant and strong colours will give vitality to a room done in subdued colours. A landscape or seascape on a long narrow wall will create a more spacious feeling in a room. In a very small room, pictures of a subdued colour and design should be hung. Do not hang a huge picture over a small piece of furniture, and for the same reason, do not hang a very small print alone over an important piece of furniture. A large picture should be balanced by a large piece of furniture. Small pictures look best when hung in groups (Page 263).

Hanging Pictures

Pictures and paintings in homes and public buildings desperately need to be taken off the ceilings. As a rule, they should be neither too high nor too low but as near the eye-level, sitting or standing, as possible (Page 263).

When grouping pictures of different heights, the bottom lines should be even (Page 263). Pictures should be hung only in 'steps' on the wall of a stairway. Pictures should be hung flat against the wall and not tipped forward as if hung on a hinge. Wires should not show on pictures, but if it is necessary, use two wires rather than one. Never use a triangular wire for hanging pictures. They create and add confusing lines in the room. Straight wires follow the lines of the wall thus creating a pleasing effect.

Magazine and Calendar Pictures

Some pictures found in magazines and on calendars are worth hanging if the colours are right for the room and if the subject of the picture is suitable.

Apply a coat of shellac to the back if the paper is thin. After it has dried, apply a coat to the face. While this coat is still wet, place a piece of thin gauze cloth over it and brush over it with shellac. In a minute or so remove the cloth, leaving a slightly textured effect. When thoroughly dry, put the picture on a smooth cardboard and press under a heavy weight. Have the picture suitably framed.

HOUSE PLANTS

House plants, like people, respond to love and attention. They will not grow and thrive if neglected. House plants must be watched and studied and their special needs catered to, if one is to have really beautiful plants that make the home more attractive.

CUT FLOWERS

Flowers can be as much a part of everyday life in India as in Japan where flower arrangement has been raised to the status of an art. Flowers are always available in our country in a fascinating variety of shape, colour and size. Flower containers vary from improvised ones like a length of bamboo or a coconut shell to elaborately made vases of brass, copper, ivory and other materials. In the village hut as well as in the marble palace, flowers can be used to beautify the home at a very little cost.

General Rules

Cutting : The best time is either the morning hours before the sun gets high or late in the afternoon when the sun has set. Flowers cut at these hours absorb water readily and hence wilt less. Using a sharp knife or shears, cut the stems diagonally as in this way they can absorb more water and stay fresh longer.

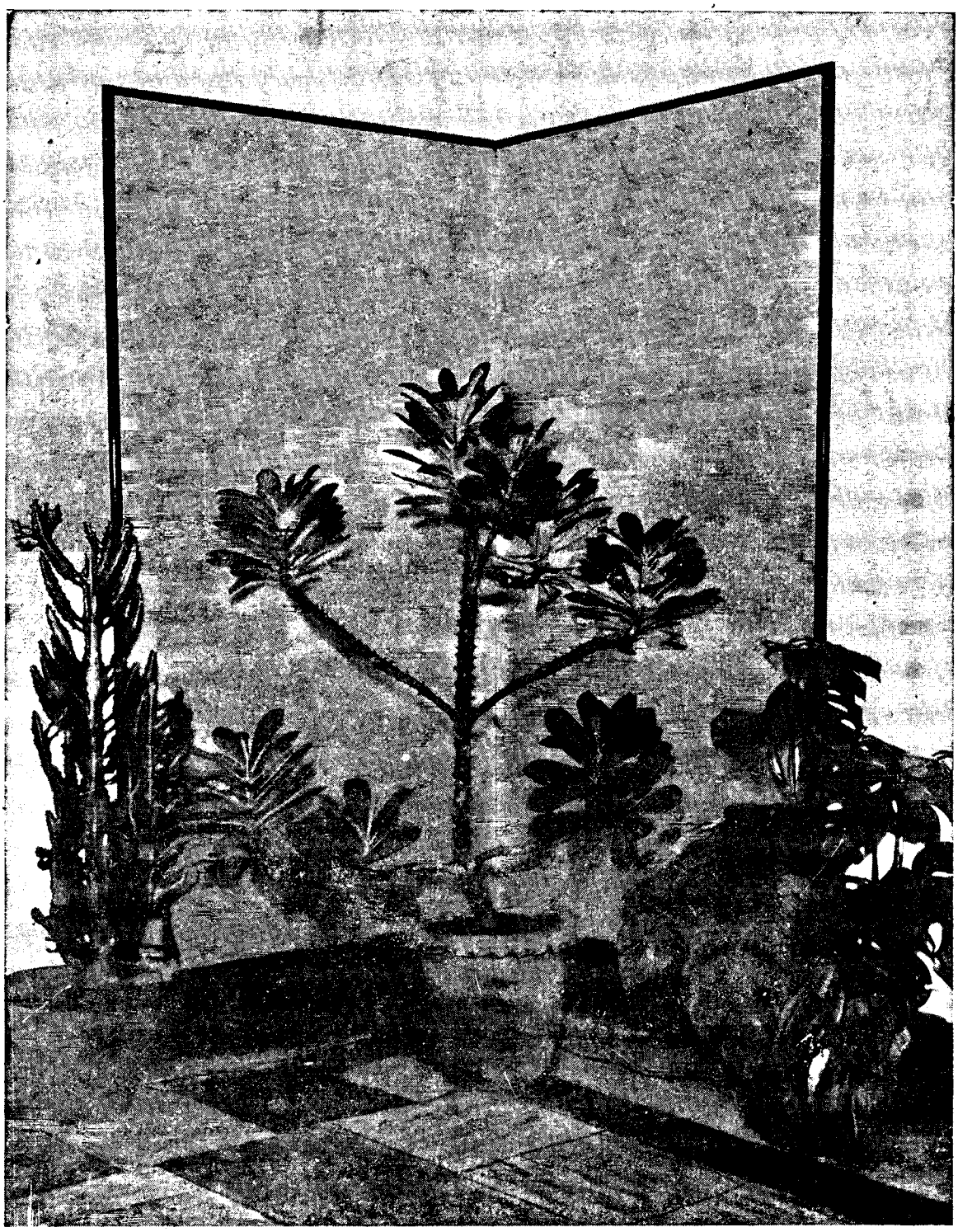
Sealing : Mash the stems of roses and chrysanthemums and other woody stemmed flowers to increase their ability to take up water. For dahlias, tulips and others with stems containing juices, close the ends by dipping in boiling water or sealing with a lighted match.

Checking Wilting : It is the air rushing into the stems of flowers which causes early wilting. Put cut flowers promptly into pails of cold water to keep the air out of their stems. Carry a pail of water to the flower beds and immerse the flowers as soon as they are cut. If you are going to buy flowers, plunge them into water as soon as you purchase the bunches. Let the flowers have a long good drink of water before they are arranged.

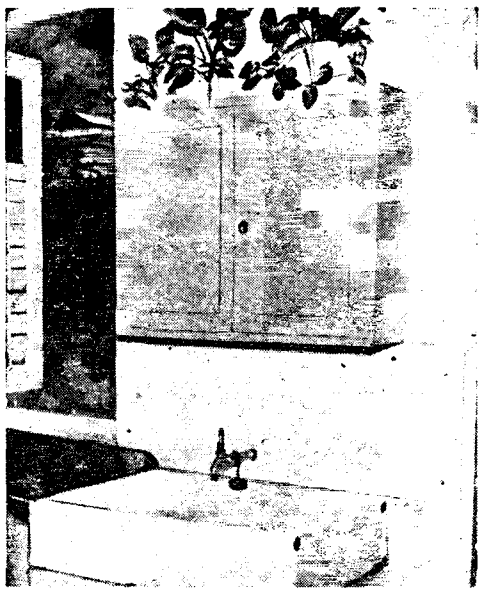
Daily Care : Change the water once a day, sprinkling a little on the blossom and leaves. Use clean vases. Every few days, cut off about half an inch from the stems to delay wilting. To perk up a favourite bouquet, set the flowers in warm water for a few minutes until they show signs of recovery. Then put them in cold water.

Flower Arrangement

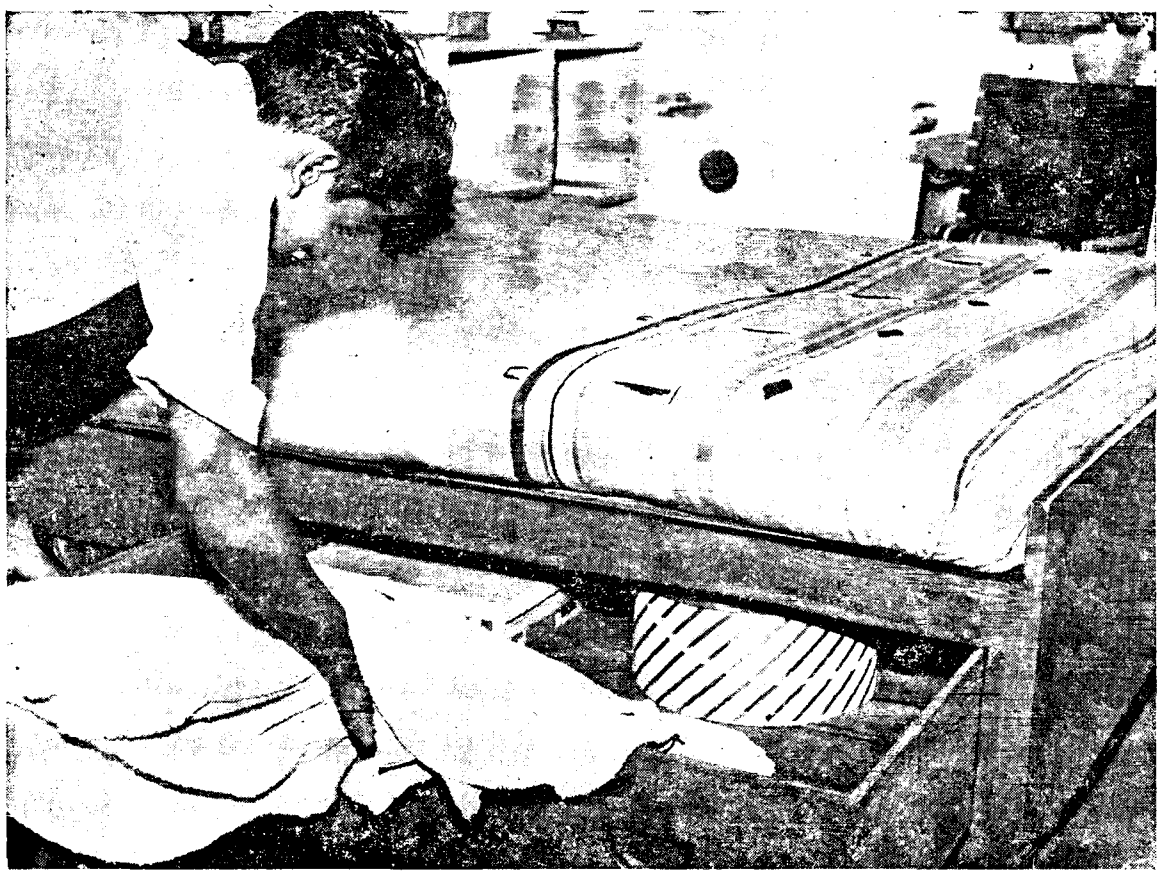
The simplest method of arranging flowers is based on the centuries old oriental technique of using three structural branches, i.e., high, medium and low so that imaginary lines can be drawn up from the top ends to form a triangle. The highest line is in the centre of the arrangement. The three basic branches form a pocket in which other flowers or branches are placed so as to stand at different levels. You may devise variations of this simple technique to suit the flowers and the container you have. The pamphlet, 'Flower arrangement' by Rampa Pal, published by the Directorate of Extension and Training, will be useful for reference.



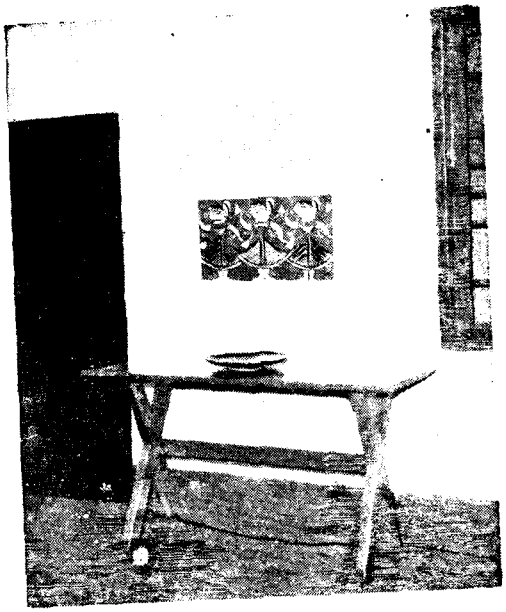
SOME ATTRACTIVE PLANTS FOR DECORATING THE HOUSE



A Simple Cabinet for the Kitchen with Space for Placing Vases at the Top

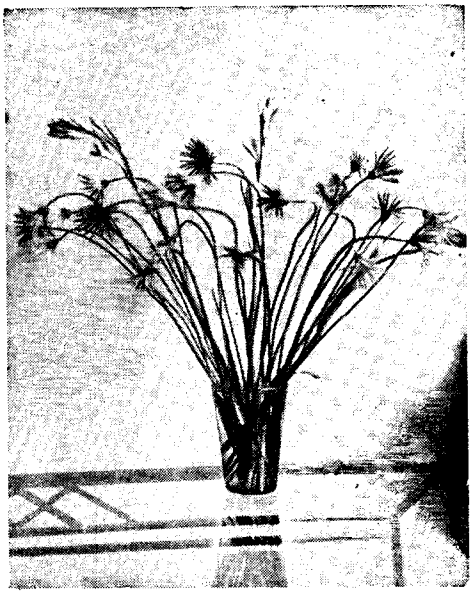


Storage Drawers Built into the Framework of a Bedstead



CORRECT LEVEL FOR HANGING THE PICTURE (CLOSE TO THE LEVEL OF THE EYE)

PROPERLY HUNG ORISSA PAINTINGS. NOTE THEIR BOTTOMS ARE IN ONE STRAIGHT LINE



A Glass Tumbler Serving as an Attractive Flower Container

A Basket Container for Flowers Having A Metallic Bowl Inside to Hold Water

You may also discard the technique entirely and float lotus blossoms in a shallow copper plate (*thali*) or fit it in a brass bowl amidst a low mass of brilliant colours spiked with green leaves.

Here is a hint about flowers for the dining table. Use a low, massed arrangement. A tall flower arrangement must not be in the way of the diners who may like to converse with each other across the table.

ORNAMENTAL FOLIAGE

Aloe barbatus	Evergreen leaves, fleshy; flowers orange on spikes
Asparagus sprengeri	Emerald feather fern, useful for floral decoration
Coleus blemei	Ornamental plants with variegated foliage
Dracaena	Handsome foliage; useful house plants assorted
Rhoea discolor	Decorative plant whose leaves are reddish on the lower side
Tradesccantia viridis	'Wandering Jew'
Zea	Ornamental corn

ORNAMENTAL GRASSES

Andropogon citratis	The lemon grass
Bambusa	Japanese bamboo
Bambusa vulgaris	Golden bamboo
Grass chinensis	Ornamental

ORNAMENTAL PALMS

Areca lutensens	Extremely graceful pinnate or feather leaved palm suitable for verandah decoration
Arenga saccharifera	Sugar palm useful for verandahs
Calamus tonuis	Cane palm or feathered leaved
Livistona chinensis	Fan leaved; very elegant
Oreodoxa regia	Royal Palm or bottle palm; tall and very greatful

SCENTED FLOWERS

Some of the scented flowers seen in the gardens are Jasmine, *Champa*, Rose and the *Hasnahana*—lady of the night. These are very popular. The Gordonia is common in Bengal and has a very sweet fragrance. A list of scented flowers which can be purchased from any good nursery is given below :

JASMINUM

Bela	A profuse bearer *Motia*—Large and double *Moturia*—Semi double *Rai*—Largest of all
Chameli or *Janti F. grandeflorum*	White scented
Chameli	*Swarna* or golden yellow
Hasnahana (*Cestrum nocturnum*)	Queen of the night; blossoms at night emitting a most delightful scent all around it for a wide distance

Jasmine	*Odaratum* scented
Jooee—Double (*F. auriculatum*).	
Jooee—Single (*F. auriculatum*)	Best of all

CHAMPAS

Calophyllum inophyllum	A tree of moderate size; produces bunches of white fragrant flowers
Hodychium (butterfly lily)	Bulbous plants (*a*) *Corenarium* (*Dulal Champa*); flowers pure white sweet scented (*b*) *Gardenorium*; flowers yellow and scented
Mesua (*Nageswar Champa*)	Flowers white with yellow centre, sweet fragrance
Michelia champaca (*Swarna Champa*)	Highly scented, golden yellow flowers
Ochna Suarrosa (*Ramdhan Champa*)	Bright yellow flowers; blossoms when 2 ft. high

MAGNOLIA

Magnolia fuscata (*vidyut Champa*)	Small famous shrub; cream coloured flowers; delightful smell
Magnolia grandiflora (*Him Champa*)	Flowers like white lotus; delightful fragrance; best among the *champas*
Magnolia mutabilis (*Candoli*)	Smell very pleasant ; extends over a wide range

SHRUBS

A well-placed shrubbery is very useful in giving the effect of either length or breadth to a garden. Shrubs constitute an important feature of a garden on account of their bright and attractive foliage and beautiful flowers.

The following is a list of some of the shrubs which can be purchased from any good nursery :

Acalypha mosaica	Small shrub with copper coloured foliage; highly ornamental
Achania malvaviscus	South American shrub with bright scarlet flowers profusely borne
Buddleia asiatica	Free growing shrub with silvery foliage; flowers white and erect; easily propagated by cuttings; flowering in February-March
Caesalpinnia bonduccra	'*Karanjwa*', very useful for a rough bounday hedge
Callicarpa americana	A fast growing shrub almost evergreen; produces violet coloured berries from pink purple flowers
Cassia artemisiodes	A most attractive shrub of medium sized growth; bluish green and delicately cut foliage; yellow flowers borne profusely in February-March
Dodonasa viscosa	'*Wilayati Mehndi*'; an evergreen shrub; makes an excellent hedge plant if constantly clipped
Dombeya mastersi	Flowers white and fragrant; borne in clusters
Euphorbia pulchorrima	'*Phoisnetta*'; soft wooded, fast growing shrub bearing large red brackets; deciduous from the middle of February to the end of March; single white flowers
Hibiscus mutabilis	Deciduous; of vigorous growth; flowers profuse, flowers are white but turn pink

Hibiscus cannabinus Alipur hybrids	Hybrids of this fast-growing shrub are available in many forms—some with green foliage and others bronze
Holmskioldia sanguinea	Flowers are brick red, produced in the cold season and last for two to three months; very useful for cut flowers
Phyllanthus myratifolius	Foliage very pretty and evergreen; very useful for screening for the purposes of privacy; useful for hedges
Plumbago capensis	A South African shrub of charm and distinction; prefers a semi-shaded position where it produces its pale blue flowers in profusion
Peaches	Large shrub with beautiful cherry like flowers in spring
Verbosina gigantea	A free flowering herbaceous shrub with small yellow flowers
Vitex negundo	Flowers purple; can be easily propagated by cuttings or seeds

CLIMBERS AND CREEPERS

There are several ways of showing off climbers. Some can be grown as screens, while others will thrive round pillars, up the trees, or along a pergola. For proper development they require support. They are decorative and enliven their charm by the ornamental flowers and leaves.

Light Flowering Climbers for Screens

A screen should be entirely covered by its climbers, but the tendency of a climber is to develop fanwise from the root, leaving the lower corners of the screen bare of foliage. This defect can be overcome by training the early side horizontally and by careful deflection of each shoot when it is long enough.

1. *Bignonia*	Has yellow flowers which appear several times a year, but mainly in the early hot weather; propagated by seed or cuttings
2. *B. venusta*	Is one mass of drooping orange flowers in January and February; a glorious sight when in flower; can be grown over a garage or roof, up a tree or along a screen of wire mesh
3. *Ipomoa palmata or Railway creeper*	This climber screens well, is very hardy and has small mauve flowers; propagated by seed or cuttings
4. *Jacqvemontia violacea*	The foliage is light and pretty; small blue flowers appear on and off most of the year; not showy but particularly suitable as a screen; propagated by cuttings
5. Passion flower	This is the type most commonly seen; purplish blue flowers
6. *Rhynchospermum jasminoides*	A useful climber as it will grow in semi-shade; sparkling white scented flowers appear profusely in the hot months; by cuttings or layers

Climbers for Arches of Pergolas

1. *Allamanda*	The large flowered yellow allamandas are spectacular when grown on arches or pergolas

2. *Antigonon* .. .. It is the common rose pink variety, which is hardy and very pretty

3. *Jasminum rex* .. .. Lovely climber with waxy white flowers which appear in profusion in the hot months; propagated by cuttings

4. *Honey suckle* .. .. The flowers appear rather sparingly but are delightfully scented; propagated by cuttings

5. Tecoma .. .. Has very beautiful terracotta flowers in clusters throughout the hot season

6. *Thumbergia mysorensis* .. .. Has yellow and red flowers borne in graceful pendant sprays; blooms in hot months; propagated by layers or by seeds

Heavy Climbers for Trees or Strong Pergolas

1. *Allamanda aubletii* .. .. .. Has bright yellow flowers which bloom freely; races up trees; propagated by cuttings

2. *Bignonia magnifica* .. .. .. Has yellow flowers; very suitable for growing along pergolas or up trees

3. *Bougainvillea* .. .. Very attractive when trained along a pergola; will grow up trees

4. *Choneomorpha macrophylla* .. .. A woody climber with big leaves and creamy white flowers; rather a curious scent

5. *Quisqualis indica* .. .. .. Bears scented pinky-red flowers in drooping bunches throughout the hot months; strong climber and races up trees; propagated by cuttings

6. *Thunbergia grandiflora* .. .. .. Has wide open pale blue flowers and heavy leaves; often grown up trees, on low roofs or over high walls; there is also a white variety; propagated by layers or cuttings.

FLOWERING TREES FOR THE GARDEN

Name of Tree	*Time of Flowering*	*Colour of Flowers*
1. *Bauhinia variegata*	March-April	White, pink or mauve
2. *B.purpurea*	November-December	Red
3. *Cassia marginata*	May-June	Terracotta red
4. *C. javanica*	May-June	Rose pink
5. *C. nodosa*	May-June	Bright pink
6. *Celvillea racemosa*	October-November	Scarlet orange
7. *Lagerstroemia*	April-May; September-October	Mauve purple
8. *Sterculia colorata*	April-May	Orange red

ORNAMENTAL FLOWERING TREES SUITED FOR DRY LOCALITIES

	Name of Tree	*Time of Flowering*	*Colour of Flowers*
1.	*Butea frondosa*	February-April	Deep red
2.	*Cassia fistula*	April-May	Yellow
3.	*Jacaranda*	March-April	Violet blue
4.	*Melia azadirachta*	April	Lilac
5.	*Thespesia populnea*	October-November	Yellow and reddish purple –
6.	*Tecomella undulata*	March-April	Yellow and reddish purple; Orange yellow

CHAPTER 40

THE KITCHEN GARDEN

The home garden beautifies the house. It lends charm to the everyday activities of the family. It includes trees, shrubs, creepers and flowers which provide beauty as well as food materials like fresh vegetables.

The kitchen garden should be carefully planned and maintained.

PLANNING THE KITCHEN GARDEN

The following aspects should be considered while planning the kitchen garden :

1. The number of members in the family; their food requirements; and the time and space available.
2. The location of the plot; the type of soil; and the availability of water.

GARDEN TOOLS

Very few tools are necessary for home gardening. A spade or fork, a strong cord for laying off rows, a garden pipe, a bucket for watering the plants, knives and pruning shears are the essential tools.

Tools will last longer if they are kept clean. Clean and sharp tools facilitate work and save energy.

SOIL PREPARATION

The plot for the vegetable garden should be located where it gets at least six hours of the sun in a day. The plot should be well drained. The best type of soil is deep, friable and free from debris. However, with proper soil management, it is possible to improve any soil.

Most horticulturists recommend that the soil for growing vegetables should be dug to a depth of eight to ten inches. The soil should be dry when it is dug. Well-rotten manure, compost or dry leaves may be used for improving the soil. Manure or other organic material should be spread evenly over the soil before it is dug.

The use of commercial fertilizers is advocated specially where plenty of manure is not available. Fertilizers may be sown, broadcast or worked into the soil to a depth of two or three inches. It is best, however, to apply the fertilizer about two inches away on both sides of the seed row and a little deeper than the seed. Apply about one pound of the fertilizer for every 25 feet of the seed row if the rows are two feet apart.

MAKING AND USING COMPOST

Compost is a decayed mixture of soil, manure, leaves, grass, seeds and crop resduees. Compost may be made by piling soil, manure, leaves and grass in alternate layers. While the layer of soil should be one to two inches thick, the other layers should each be four to five inches thick. The bottom and top layers should always

EVEN A SMALL KITCHEN GARDEN PROVIDES
MUCH FUN AND FOOD

be of soil. The pile should be kept moist. If cowdung is not available, fertilizers should be lightly sprinkled over the heaped-up plant material to hasten the decay. Compost is primarily used in improving the physical conditions of the soil.

PLANTING THE SEED

A common mistake committed by gardeners is to plant too many seeds. They also make the mistake of not doing any thinning. Planting the seeds too deep is yet another common error.

CARE OF THE GARDEN

A garden requires care. Insects, weeds and diseases must be controlled. A small and well-tended garden plot can produce much more than a larger one which is not cared for in the right way.

Cultivation

The primary purpose of cultivation is weed control. Although the surface soil should always be kept loose, it is necessary to cutivate it very often.

Watering

It is better to give the garden a good soaking about once a week rather than more frequent light sprinkling. The best way to apply water is to let it run in the furrows or beds until the soil gets soaked thoroughly. If this method is not practicable, water sprinklers may be used.

Controlling Pests and Diseases

If an attack of pests or diseases occurs, consult your Horticulturist or your Agricultural Officer immediately.

SECTION V

HOME MANAGEMENT

CHAPTER 41

WHAT HOME MANAGEMENT IS

Home Management as an art has been in existence since the very inception of the home. The concept of management by the home-maker has been clearly defined and the woman who runs her home efficiently and happily has been praised in the great religious books of the world, and in the writings of Confucius, Plato, Cicero and Virgil.

The scientific aspects of Home Management have gained more importance in this century on account of the increasing value of time, the limitation of resources, and the increasing number of roles that have to be played by the home-maker.

In simple terms, 'Management is making the best use of what you have, to get what you want.' Here, 'what you have' are the RESOURCES you possess and 'what

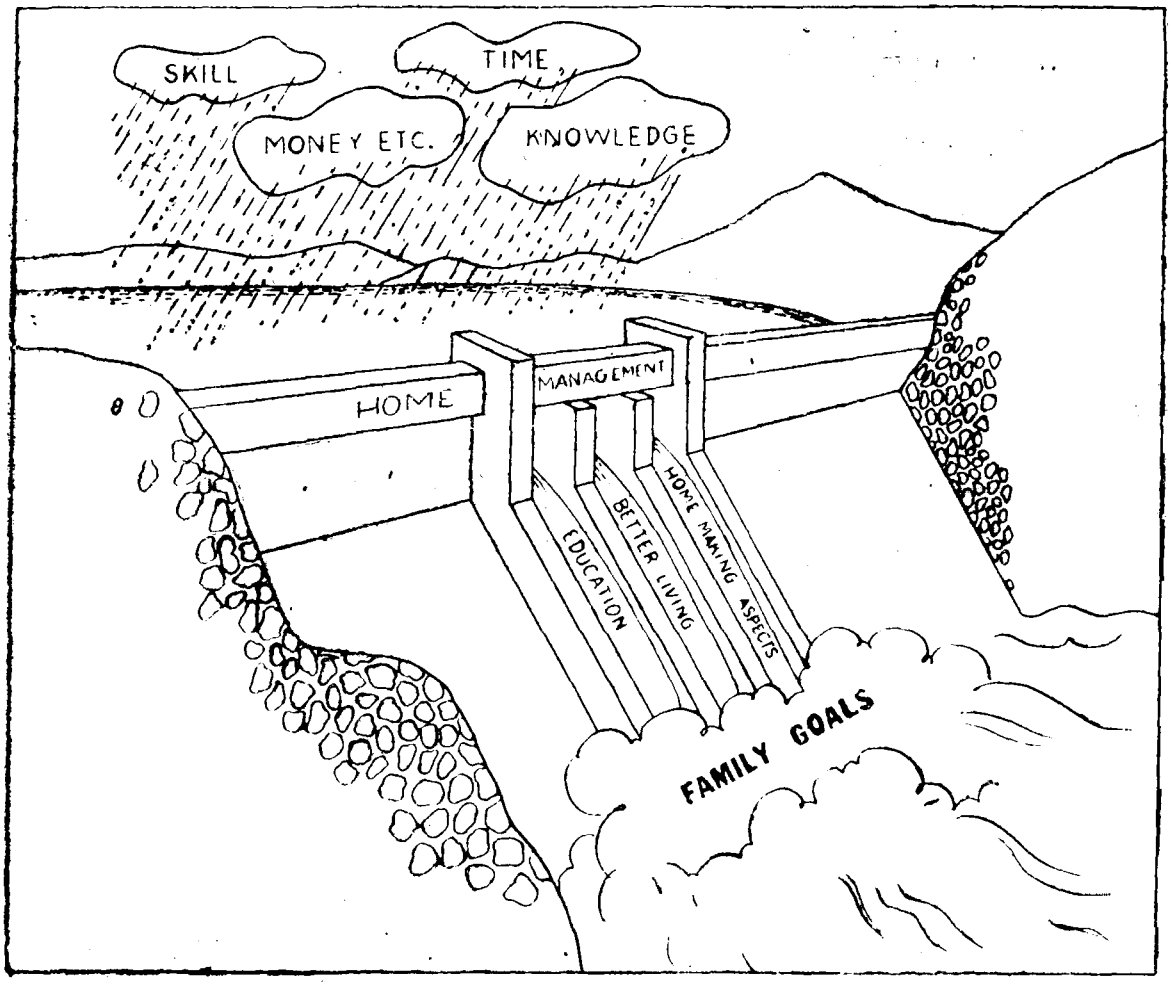


FIG. 20. HOME MANAGEMENT IS LIKE A L'M

you want' to achieve are the GOALS. The resources consist of various materials and talents possessed by the members of the family. 'Home Management consists of making decisions about using family resources to achieve family goals.' This process consists of three important steps, namely, planning, carrying out the plan, and evaluating the results for future guidance. An analogy from nature will help us in understanding this more clearly. Resources can be compared to rain, the supply of which, even in areas of abundant rainfall, is restricted to the rainy season. Home Management can then be likened to the dam which collects, controls and distributes the water in such a way that water is available throughout the year for a variety of uses.

Management is a mental process. It does not imply the mere carrying out of a piece of work; nor does it end with the completion of that piece of work. There are some homes where the mother works all by herself from morning till night, and completes the work satisfactorily. In other homes, the whole family carries out the work jointly. In the second type of homes, a longer time may sometimes be required to finish the work, because of discussions among the members or because some aspects of the work are being carried out by a novice. And yet this would be considered a better managed home, if the members derive full satisfaction. The satisfaction obtained by doing the work is just as important as completion of the work. The home whose resources are used to the satisfaction of all is considered to be well managed.

The activities of the home are not the concern of the mother alone; they are the responsibility of the entire family. Hence the mother should be a leader, rather than just a worker; and each member should be in a position to assume leadership in his own way. For example, if guests arrive, while the parents are away, the daughter or son should be able to look after the visitors.

The motive forces in management are values and goals. Values are the ideals and traditions held dear by the family concerned. Goals are what the family wants to achieve.

Values are very important to individuals and families. Aesthetic values and the values of affection, health, comfort and ethics are esteemed by all people regardless of race or creed. Values are of two types, intrinsic and instrumental. Intrinsic values are those which are valued and accepted for their own sake such as love, health, comfort, religion, art and beauty. Instrumental values are those which serve as instruments for securing happiness such as food, clothing, shelter and education.

The members of the family should be convinced of the values they treasure most and set their goals accordingly. They must obtain information regarding the resources available and the problems that have to be faced and solved to achieve their goals. They should develop skills in carrying out the household duties and in working together for obtaining satisfying results.

Every home is managed, in one way or another, either well or badly. How do we determine whether or not a home is well managed ? As an illustration, take the home of Sundaram in the village 'Palayam' coming under the National Exten-

sion Scheme. In Sundaram's home at 5 p.m. his wife Sita is spinning on her 'charkha', humming a song. The house is neatly swept and tidy. A big 'Kolam' adorns the front entrance. Sita is wearing a clean and well-mended sari. Her two-year-old son has just had a drink of milk and is playing with his seven-year-old sister. The rice has been cooked in the hay-box and is kept hot. There are a few tomatoes from her garden and freshly laid eggs from her poultry for the night meal. Sita knows that she need not start cooking the vegetables till 6·30 p.m. when her husband would be at home, relaxing. The hot water left on the smokeless *chulha* will suffice for his evening bath. All is serene in this house, and the contentment of the family is felt everywhere. In this house, it is evident that the services of the Gram Sevika have been fully utilized. The family has benefited by the construction of the smokeless *chulha*, the use of the hay-box, poultry keeping and the kitchen garden.

At this hour, in the same village, in another house (Gopal's) a great din is heard. Gopal's wife, Padma, is struggling to light the fire with firewood which had become wet in the morning shower. She does not have a place to store the wood and so leaves it in the backyard. Her two-year-old son is howling with hunger because the milk reserved for him was used up to entertain Padma's friends who visited her in the afternoon. Padma is worried that her husband, on returning home, shall get angry, when she asks him to go and buy kerosene oil for the lamp and vegetables for the night meal. Padma did not utilize the knowledge and help that was available to her under the Community Development Programme. That is why such confusion has resulted in the management of her home.

In both these houses, people live. Orderliness and happiness prevail in Sundaram's house due to thoughtful planning of time and careful use of available resources and information. On the other hand, in Gopal's house, the activities just 'drift' unplanned from day to day, creating problems and resulting in confusion.

Home Management in Modern Times

Home Management is specially important in the modern age. The home has developed from the self-sufficient unit of the joint family system to a unitary and interdependent part of the society. With the advent of industrialization economic and social structures in India have changed. Technological develop and improvements in the methods of communication have helped to lighten the den of household tasks. At the same time, industrialization has brought with it problems as labour shortage, higher costs of living, a faster tempo of life awareness of the limitation of time. The dawn of independence and the of the democractic free society have also made their impacts on the home life. The word of the head of the family is no longer the absolute law. The views of younger members are accorded greater attention and the trend is for group thinking and planning rather than domination by in the home.

Similar changes have been brought about in the social pa The joint family system has gradually yielded place to unit hom

tion creates the need for certain modifications in family life. For instance, today's young girls do not have the same opportunities for learning the traditional methods of home-making in the traditional way from their mothers or grandmothers. Since many girls go to school, they do not get an opportunity to watch their mothers in their household tasks or to assist them in cooking and thus get trained in the culinary and other household arts.

In the olden days, the home was a wealth producing, distributing and consuming agent; but today, it is becoming more and more a consuming unit. Even in rural areas, cereals, pulses and condiments are bought in 'sandais.' Clothes, toilet articles like soap, and many other goods are being increasingly bought from outside rather than made at home. It is necessary for the members of the family to know how to buy wisely. A large variety of articles is available in the market and the family has to choose what is best for it.

To the home-maker who wants to manage her home properly and efficiently, a knowledge of home management is helpful and essential. Home Management is a blending of science and art, and is applicable to the various aspects of home-making. It comprises the study of :

(1) Planning and organization of action, and the control and utilization of the various resources of the home for the proper benefit of the members of the family,

(2) Family economics and budget which aid in the proper distribution of the family income, and

(3) All aspects of home-making, such as meal planning, the proper choice of foods in relation to cost and requirements, the selection and construction of clothing, laundering, child care and the care and maintenance of the household.

The housewife should not spend undue time and energy in the preparation of food. And yet the food prepared by her should be tasty and wholesome. In a middle class Indian home, the home-maker may even spend as much as seven urs a day in planning, preparing and serving food. If this major activity is well ied, she will not only not find it a burden but finish it in four to five hours and ive time to spare for other activities. Even where she need not carry out the work, she must be able to direct the helpers intelligently.

ome women do not take as much interest as they should in the selection of . A proper knowledge of clothing would enable the home-maker to select sely, wash clothes properly and make clothes last longer without much of money and effort. A substantial sum may be saved, if some of ments are stitched at home. The garments last longer if washed a

asks, specially the tasks of cleaning, are burdensome to housewive Not only does cleaning consume energy and time, it is also no his field, planned expenditure of energy, time and resource wife in completing the job in a shorter time with les

expenditure of energy enabling her at the same time to derive greater joy from it.

Proper planning, controlling and evaluating of the method and the use of the correct type of tools and equipment facilitates such planned expenditure. The family members should make a list of the goals they wish to achieve. They must study these and plan their activities to reach these goals. Family values are influenced by tradition, culture and the individual preferences of the family members. For instance, the house cannot be kept tidy by the efforts of one person alone. The whole family should strive for it and even the youngest member should extend a helping hand towards achieving this goal.

A family may set up several goals, due to the varied interests of the members. It is likely, therefore, that certain goals compete with one other. For example, Rama, the village leader, wants to give higher education to his son Krishna and at the same time, save enough money to buy more land. To get the money needed for purchasing land, Rama needs not only his son's help on the farm but also the money required for his son's education. In this case, the two goals are competing with each other and the decision made by the family would depend upon what they consider more important or of greater value.

Certain goals are common to all the families such as (*a*) development of the individual or (*b*) achieving satisfying human relationships through recognition and acceptance of human differences and of the family's responsibility to the community.

Thus, the family values and goals play an important role in home management.

A man values certain things in life and to get them, he sets up certain goals. In the process of achieving them, he uses his discretion, knowledge and abilities. He enjoys the work he does towards achieving each goal and when he completes it, his satisfaction is greatest. Once the work is completed, he sets up another goal and strives towards its attainment. The goals are thus ever changing. This is the sign of good management.

CHAPTER 42

DECISION MAKING

In our daily life, problems arise constantly and have to be solved. Decisions have to be taken daily. Some are simple, such as deciding whether the carrot salad should be mixed with curds or lime juice, or whether a medium green or deep red 'choli' is to be worn with a pale green sari with a red border. Some problems are more complex such as deciding whether the wedding of a friend celebrated hundreds of miles away should be attended, or whether the money which would have been spent on conveyance should be utilized for purchasing a gift for the newly-married couple.

In the examples cited above, some problems are simple and can be easily solved as in the case of the carrot salad, where whatever the family likes or what is available on hand decides the issue. Where the problem is more complicated, clearer thinking is needed.

Four steps are involved in making decisions. They are :

(*i*) Recognition of the problem;
(*ii*) seeking alternative solutions;
(*iii*) thinking through the alternatives; and
(*iv*) selecting one of the alternatives as the solution.

The merits of the decisions taken are evaluated afterwards.

The first step is not difficult for any one who plans her activities and does not 'drift into being.'

While seeking alternatives, one should possess knowledge of the problem and its alternative solutions. For example, even an ordinary act like the selection of a sari for a festive occasion like Deepavali or Christmas involves the process of choosing between alternatives—whether silk or cotton; if cotton whether khadi or handloom; when and where to purchase it; whether the payment should be in cash or in instalments, and so on. A person who possesses a large stock of information will find it easier to find the alternative.

The third step involves discrimination; thinking through the alternatives demands an imagination to foresee the consequences. For instance, deciding whether to attend the friends' wedding or send her a present and, if the latter, what present to choose calls for clear thinking. In such cases, the home-maker has to rely on her

ınd previous experience.

ıtep, *i.e.*, choosing between alternatives is linked up with the previous

ɔns may involve the whole family and not just the individual. For
ıay have to face the problem of saving money for the daughter's
education. Two equally important considerations are thus set

before them. In such cases, group decisions will work better. Generally in Indian homes, certain aspects of family life, *e.g.*, the financial aspect and major decisions are left to the head of the family alone, with the women guiding the day-to-day living without much aid from men. The ideal situation would be when the men consult the women in all major decisions and the women seek the men's help in the major and minor decisions that they make. This mutual understanding and help will bring great satisfaction to the family. Although such group counsels will consume more time and involve the sharing of interests, they are worthwhile, considering the outcome.

When more than one interest is represented and conflicts arise, there are different ways of resolving the conflict. The least desirable way is for one member to 'dominate' over the others, regardless of their feelings. Though one may succeed in this manner, the satisfaction derived is less. For example, a husband and wife plan to go on a holiday for a week. The wife insists that they spend the holidays in her brother's house, whereas the husband wants to go to his sister's place. The wife may stubbornly declare that she will go only to her brother's house, even if the husband refuses to go. This is a clear case of 'dominance.'

A slightly better though not a satisfactory method is of giving in or of 'submission' to the dominating persons. In the above example, the husband may give in and accompany his wife to her brother's house, even though he was not originally for it. Here also as in the previous case, less satisfaction is derived by both the parties but the oppressive conflict is avoided.

The third method is 'conversion.' The wife describes the reasons for going to her brother's house and the benefits derived therefrom so convincingly that the husband agrees and is happy and satisfied about the trip.

The fourth method is 'compromise.' This method is better than all the earlier methods for resolving the conflict. In this, both the husband and wife go halfway to meet the problem. They agree to spend a part of the holiday in the manner the husband wishes and the rest as the wife desires. This brings much satisfaction to both.

'Integration' is the best method of all. A new and satisfying solution is obtained by discussion and mutual consent. The couple may decide to invite the wife's brother and his family, and the husband's sister and her family, and plan to spend the holiday with them in the most satisfactory manner. Whatever may be the method of resolving the conflict, the ned as a result of each decision will guide future planning

In decisio ly correct solution to any problem. There is alwa blem. The solution which gives the grea e particular situation and time he most desirable one.

values and goals

CHAPTER 43

MANAGEMENT OF RESOURCES

Home management has been seen as essentially the mental process of deciding how best to use the family resources to achieve its goals. Hence, resources play an important role in management. When we come across an intelligent and alert person, we call him resourceful.

Resources may be broadly classified into two groups: (i) material resources and (ii) human resources.

MATERIAL OR NON-HUMAN RESOURCES

Immovable property such as houses and movable property such as jewels, money, implements, etc., are some examples of material resources. Material resources include all the material goods possessed by the family as well as those belonging to the community. The material resources furnished by the community are postal and transport facilities, electricity, water supply, libraries, parks, playgrounds, schools, hospitals, shopping centres and other public utilities. As these are used by the family, they are considered part of the resources of the family.

HUMAN RESOURCES

The human resources are more subtle than the material resources. Time, energy, skills, interests, abilities, knowledge and attitudes are some of the important human resources possessed by the members of a family. Some human resources are provided by the community such as medical advice, health inspection, education, social education and social welfare.

Time is the minute, the hour, the day or even the lifetime of a person to carry out the work or the programmes or to achieve the goals. This important resource is available to all persons regardless of caste, creed, wealth, poverty or any similar consideration.

Energy is needed to carry out the vital physiological activities, such as breathing or circulation of blood, as well as physical activities. Unlike material resources, human resources are not readily [illegible] They are often taken for granted. For instance, a mother [illegible] her rosy and healthy children, and neighbours may say [illegible] ick in the world. Actually, the family is well-fed [illegible] he *knowledge* of balanced diets and [illegible] oods. She prepares greens into su[illegible] epares sweets and snacks at h[illegible]

before them. In such cases, group decisions will work better. Generally in Indian homes, certain aspects of family life, *e.g.*, the financial aspect and major decisions are left to the head of the family alone, with the women guiding the day-to-day living without much aid from men. The ideal situation would be when the men consult the women in all major decisions and the women seek the men's help in the major and minor decisions that they make. This mutual understanding and help will bring great satisfaction to the family. Although such group counsels will consume more time and involve the sharing of interests, they are worthwhile, considering the outcome.

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In decision m ely correct solution to any problem. There is roblem The solution which gives the great he particular situation and time e most desirable one. values and goals

shop at the rate of 6 paise per cup making up a total of 12 to 18 paise per day. For the same amount, 6 cups of a better quality tea can be prepared at home. It will perhaps be even better if the members of the family cultivate a taste for buttermilk or for coriander seed tea (brewed out of coriander seeds, dry ginger and jaggery), both of which are less expensive but more nutritious than tea. Here the human resource is the *attitude* of the family, namely, a taste for a simpler and better type of food or drink.

If the father or the son of a house is interested in gardening and raising fruits and vegetables for home consumption, the human resource in this case will be 'interest.' The daughter of another house may have artistic talents which can be utilized for home decoration. The human resource here is 'talent.'

The optimistic attitudes of a family, its eagerness to help others in times of need, and its cheerfulness in facing misfortunes are all human resources because they help the family to progress towards higher goals.

Some resources can be considered as being both material and human resources. For example, from one point of view, time and energy can be classified as human resources. From another point of view, they can be considered as material resources, as for instance, when labour is hired or exchanged for money. If an artisan cannot complete his work by himself, he engages an assistant to supplement his skill and time. If the home-maker cannot pound the rice or grind the *atta* by herself, she gets it done by engaging a labourer. Moreover, nowadays, human energy is substituted by other types of energy; electric devices replace human labour and a centralized water supply system makes it unnecessary for the housewife to draw water from the well.

GENERAL CHARACTERISTICS OF RESOURCES

Limitation is one of the main characteristics of resources. In the history of mankind, we have yet to come across a country or an individual who has had enough of everything. Even in a large continent, land is limited and restricted by the seas around it; the natural resources like fuel, metals, energy and water are all limited. The limitation is quantitative as well as qualitative.

Quantitative Limitations

The quantitative limitations are more tangible. For example, each house has only a definite plinth area; a farmer has only a definite number of acres of land or only a specific income; an individual has only 24 hours in a day to complete his daily duties; a woman has only a certain amount of energy to complete her household tasks ; and the limitation of money is universal. Because of these limitations, the material goods possessed by people are always limited.

Qualitative Limitations

Qualitative limitations, although less obvious, are equally important. people possess a high degree of artistic talent for music, dance or painting all artists have become 'Ravi Varmas,' not all poets are 'Tagores.' In a students are taught needle work but only a few exhibit any extraordin

A house may be small and yet comfortable and convenient, whereas a bigger house may not be so.

Interrelation of Resources

Another characteristic of resources is that they are interrelated. Usually, in any managerial process, one resource alone is not used. For example, if there is one resource in a mine, namely, iron ore; then to prepare the iron for use, coal, electric power and other sources of energy have to be used. The amounts of resources to be used are also interrelated. Money (material resource), energy and time to go to the bazaar, knowledge, and ability to select properly are the resources utilized while purchasing a cot for the house. Thus the resources are interrelated and interdependent, both qualitatively and quantitatively.

Alternative Uses

All resources have alternative uses. For example, a piece of rock may be cut into stones to pave the road or carved into a statue to adorn a park. A gift of Rs. 100 may be spent on travel or on a set of utensils for the household. However, when a resource is used for one purpose, it is not available for another use. A moment used is gone for ever; that moment can never be recovered. A rupee spent on vegetables cannot be used to pay the child's fees at school.

Substitution of Resources

One resource may also be substituted for another resource in solving a problem. In many cases, a combination of resources is used. A full-time home-maker may have enough time and skill (human resources) to do all the sewing for the family by hand. If there are other demands on her time, she may procure labour-saving devices which will shorten the time spent on sewing or cooking or both. She thus combines her time with a material resource to achieve her goals. If the same home-maker takes up a paid job outside her home, she may no longer have the time for sewing, but have more money to give her sewing to a tailor or to buy ready-made garments. Here money is used as a substitute for time. Another example of the substitution of resources is provided by a father who wants to provide a toy-cart for his child. He can either collect a few pieces of wood and make a toy-cart out of them with his skill and the equipment at home or buy one with money.

Thus the five aspects of resources may be summarized as :

(*a*) Resources are limited—qualitatively and quantitatively.
(*b*) They are interrelated and interdependent.
(*c*) The same resource can have many uses.
(*d*) A resource once used is not available for another purpose.
(*e*) One resource may be substituted for another.

Utilization of Resources

Because of these five aspects, the utilization of resources becomes very complex. cess in life depends not so much on the resources available, but on the he resources are used. We see some families where there is material wealth t happiness. In some other homes, in spite of poverty, contentment and evail due to the good management of resources. The use of resources

is mainly guided by the goals set by the family. The needs of all the individuals, the well-being of the family as a whole, and the cultural interests of the society should be considered while using resources to achieve satisfactory results. When such a philosophy is followed, there will be a balance between the various resources used and the needs satisfied, resulting in a happy atmosphere at home.

Of the various resources mentioned above, the three most frequently utilized are time, energy and money.

MANAGEMENT OF TIME

What is Time ?

Time is the one resource which is equally distributed among all persons. It is the most perishable of all resources. A moment lost is lost for ever. Management of time involves the process of decreasing the time devoted for a particular work, without sacrificing the quality of work. A home-maker is most pressed for time during the years when the children are young between one and nine years. At this stage, they not only need greater attention, but are also in no position to help in the household tasks.

Generally, the housewife spends her waking hours in the following activities:

(*a*) Feeding the family—preparation of food, cooking, serving and clearing;
(*b*) Clothing—selection of clothes, sewing, laundering, care of clothes and mending;
(*c*) Care of the house—cleaning, arranging and decorating the house;
(*d*) Care of the family—looking after the children (feeding, clothing and bathing them, etc,) relaxing with them and nursing the members who are ill;
(*e*) Financial matters—budgeting, account-keeping and saving for the future;
(*f*) Social activities—visiting friends, doing social work, and fulfilling cultural and social obligations such as attending weddings,
(*g*) Other managerial activities and directing the family members in their activities;
(*h*) Producing, distributing and consuming wealth;
(*i*) Spiritual responsibilities—conducting poojas, and teaching and observing the religious duties.

The proportion of time spent on each of these activities varies with each family and depends on its financial and social status, on the age and sex of the different family members, on their goals and attitudes and on the environment.

Planning the Time-table

Like any other managerial process, the spending of time should be planned. A tentative time-table may be worked out by each home-maker for her own guidance. The following steps should be followed in planning the time-table:

(*a*) A list of all the activities should be made.
(*b*) The approximate time needed for each activity should be noted down.
(*c*) The total time needed should be calculated and checked with the time available.
(*d*) The sequence of activities should be planned so that no time is wased;

After a plan is made, it should be tried out as carefully as possible and later evaluated. Time-tables are assential for running educational institutions and group activities smoothly. In the home also, time-tables are necessary for sound home making.

MANAGEMENT OF ENERGY

The study of energy is complex because the amount of energy possessed by each person is different. Even where a person possesses adequate energy to do a work, he may not be interested in executing it; or he may feel tired, not due to lack of energy, but due to such causes as overwork, unfavourable environment, monotony or boredom.

Experiments have been conducted to determine the energy spent on household tasks in terms of 'Calories.' (For full description of Calories see the section on Nutrition.) According to them such activities as dusting furniture, washing utensils, preparing meals on a small scale, machine sewing and polishing metalware, have been classified as 'light household work.' Sweeping and mopping, washing ironing clothes, and polishing furniture are 'medium household work.' 'Heavy household work' include such jobs as scrubbing the floor which involves a greater expenditure of energy.

Energy management involves reducing the expenditure used for a specific activity.

Work Simplification

As time and energy are closely related, a knowledge of 'work simplification' by blending them is useful. Work simplification is the technique of accomplishing a task by the using the least amount of time and energy. The principle of work simplification has long been recognized and applied in industry. In recent years it has been tried out in households in countries like the U.S.A. In our country, this idea is just being recognized. Methods of work simplification may be applied in all spheres of home-making.

FIG. 21(a). THE WRONG WAY OF WASHING VESSELS : NO ORDER AND METHOD.

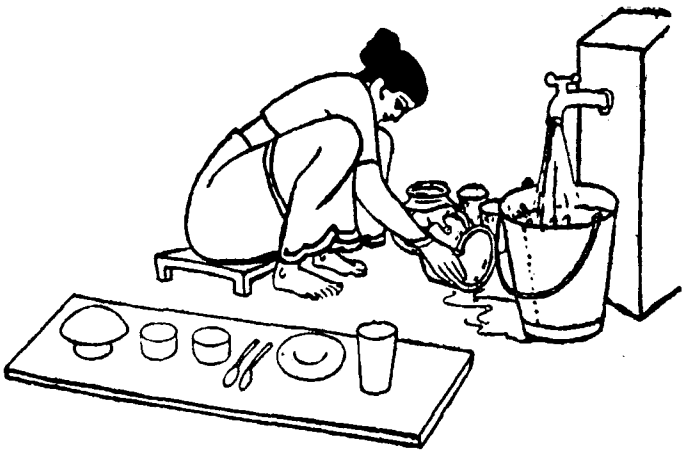

FIG. 21(b). THE RIGHT WAY OF CLEANING VESSELS : DIRTY VESSELS ON THE LEET, CLEAN ONES ON THE RIGHT.

FIG. 22(a). BENDING AND BATHING THE CHILD : THE WRONG WAY

FIG. 22(b). SITTING AND BATHING THE CHILD : THE RIGHT WAY

FIG. 23(a). BENDING AND SWEEPING : THE WRONG WAY

FIG. 23(b). STANDING AND SWEEPING : THE RIGHT WAY

The steps by which a certain work may be simplified are given below:

(*i*) The simplest method is changing the body position and reducing the number of movements. A woman, for instance, will be able to bathe her baby with far greater ease while she is sitting rather than while she is standing and bending over to do the work. Similarly, standing and sweeping the floor with a long handled broom places much less strain on the housewife.

In the same way, by stacking dirty utensils on her left side and clean utensils on her right, a woman will greatly simplify the task of washing utensils.

(*ii*) The next method is to change the type of equipment used and to rearrange the work areas. A simple example of change in tools is the changeover to a smokeless *chulha*; a more convenient fire-place and a cleaner kitchen would definitely result.

At present, several types of labour-saving devices are sold in the market. A steam cooker is a real asset to the home-maker, because several kinds of food can be cooked in it at the same time. Different types of choppers are also useful. Care should be taken to select only those articles which are essential and suited to the needs of the home-maker. Having purchased them, the housewife should also learn to use them properly.

A complete sewing kit, with a pair of scissors, different kinds of needles, and white and coloured threads in a compact box, is a help to the home-maker. If the members of the family are interested in sewing, a sewing machine will be very useful. A treadle machine leaves the hands free to do the stitching.

The heights of work areas, such as the platform for food preparation, the washing place, the *chulha*, etc., should be such that the home-maker can comfortably

FIG. 24. PLACE HEAVY ARTICLES ON THE LOWER SHELVES. ON THE LEFT IS AN EXAMPLE OF PROPER STORAGE ; ON THE RIGHT, OF IMPROPER STORAGE

Indirect Income includes the goods and services available through the medium of exchange, namely money.

The family income should be considered in relation to the size, composition and location of the family. For example, two families each getting Rs. 150 per month cannot be considered as having identical incomes. One family may consist of only three members, and the other, of six members. The former should normally be better off than the latter. The same income may, however, bring more goods in a village than in a big city.

Budgeting

The best method of managing a money income is through budgeting. A budget is a plan for managing money; it is a plan of the future expenditure made to achieve maximum satisfaction. Like any other managerial process, it consists of planning, carrying out the plan and evaluation.

The budget plan should be based on :

(*a*) The income of the family.
(*b*) The goals set by the family.
(*c*) The present needs of the family .
(*d*) The future needs of the family.

The budget so planned should be followed while spending the money and a correct statement of the accounts maintained. While the expenditure is being incurred, certain changes may, if necessary, be made within limits. The expenditure should be checked from time to time. A certain amount of knowledge regarding shopping is essential if the plan is to be successful. Information about the type of articles to be purchased, the shops where they are available cheaply, and the best season for buying should be gathered.

The budget should be evaluated from ti
ted budget, the budget for the
In farm families, where the
be prepared for the whole

The budget is use

(3) Saving may be useful for taking advantage of some good opportunity for investing money like buying a house when it is on a bargain sale.
(4) It can be used to buy such durable consumer goods as a bicycle or a new plough.
(5) It is needed for investment.
(6) It helps found property for future generations.

Savings prove useful not only to the family but to the community as well if they are invested wisely. Savings should not be locked up either in the form of cash in a safe at home or in the form of gold and silver jewellery. There are several institutions for saving, such as the bank where a savings account may be opened, the post-office savings bank and the small savings scheme, chit funds, *Nidhis*, etc. All these should be utilized profitably.

In modern times, insurance is one of the methods which financial agencies use for inducing savings. There are different kinds of insurable risks, such as loss of life, loss of personal income through sickness, accident or fire, property risks, business risks, etc. By making a small regular payment at fixed intervals, one can insure oneself against these contingencies.

Samples of Budgets

Samples of budgets for urban and rural families of the same size with two sons (aged 12 and 8) and two daughters (aged 10 and 3) and with the same incomes are given below:

TABLE 42

BUDGET SAMPLES I

Items	*For an income of Rs. 80 per month in a city*	*For an annual income of Rs. 1,000 per year in a village*
House rent, light and conservancy	10·00	nil (o
Food		
Cereals, i.e., rice or wheat	30·00	
Dal	4·00	
Oil for cooking	6·00	
Vegetables, fruits and extras	6·00	
Sugar	2·00	
Tea leaves	1·00	
Milk	5·00	

TABLE 42—*contd.*

Items	*For an income of Rs. 80 per month in a city.*	*For an annual income of Rs. 1,000 per year in a village.*
Fuel	5·00	from home
Children's books and stationery, etc. (for education, sometimes this is for miscellaneous)	1·00	15·00
For sickness, festivals, clothes, etc.	5·00	60·00
Agricultural operations	—	225·00
Savings (this is sometimes less and sometimes more)	5·00	100·00
Total ..	80·00	1,000·00

All the different types of income should be listed including the goods and services available from the community. The pay received, any other personal income, rent from house or land, produce from the garden, profits from any cottage industry, materials produced at home and all facilities offered by the community are some examples of the items to be listed. The approximate money value for each must be given and totalled.

The needs and wants of the family are next listed. A family has normally to spend on such items as food, clothing, shelter, fuel, lighting, household care, education, health, recreation, personal expenditure, conveyance, charity, religious festivals, family ceremonies, saving and insurance.

The money income is then distributed to fulfil the various needs in which the essential items should get priority. The first item is food. Normally, 50 to 80 per cent of the family income is spent on food. As the income increases, a smaller percentage of income is spent on food. As it decreases, a greater percentage is spent on food. For example, considering the number of family members to be the same, a man drawing Rs. 600 per month may spend Rs. 300 or 50 per cent of his salary on food. A man drawing Rs. 200 per month may spend Rs. 120 or 60 per cent while a man getting Rs. 100 per month may spend Rs. 70 or 70 per cent on food.

The first family has more money available for other kinds of expenditure than ond and third families. Approximately 10 to 15 per cent of its income is by this family on house rent and about 10 per cent on clothing.

t in order of importance comes education. The rest of the income is distri- meet other needs. A total of the proposed expenditure is then arrived ked with the total available income. Then the income and proposed are balanced. If the proposed expenditure exceeds the income, an attempt le, either to increase the income or to cut down the expenditure. The e flexible so that there is scope for adjustments. As the total expendi- y affects all its members, the budget should be planned together by ife and grown up children.

TABLE 43
BUDGET SAMPLES II

Items	*For a salary of Rs. 200 month in a city*	*For an annual income of Rs. 2,500 in village*
	Rs.	
House rent, light, water tax and conservancy	25·00	nil (own)
Food		
Cereals	30·00	500·00
Dal	5·00	
Oil	8·00	100·0
Ghee	8·00	from home
Vegetables, fruits and extras	15·00	from home
Sugar	8·00	100·00
Tea leaves	3·00	40·00
Milk	10·00	from home
Masalas	5·00	60·00
Fuel	8·00	from home
Children's books	4·00	60·00
Clothing	15·00	200·00
Miscellaneous (hair oil, soap, medicine, newspapers, etc.)	15·00	200·00
Utensils cleaner or maid servant	5·00	60·00
Agriculture and animal husbandry	nil	700·00
Saving	36·00	480·00
TOTAL ..	200·00	2,500·00

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SECTION VI

CLOTHING

CHAPTER 44

CLOTHING THE FAMILY

To derive the maximum satisfaction from the money available for clothing, one must know how to select clothing, how to wear clothes properly and how to make them last longer through proper care.

Most mothers have encountered problems arising from improper clothing. Little Ram refused to go to school one morning, but would not say why or did not realize why. A careful check indicated that he had been excluded from play by other children because his clothes were dirty and because he looked so different from the group. Little Radha preferred staying at home to playing with the girls in the village because she felt ashamed of her dress, which had been shabbily made from an old sari.

A certain amount of confidence and security is obtained by the individual from an appropriate dress. The well-groomed young lady who appears before a selection committee wearing neat, clean and well-pressed clothes has poise and confidence. Another lady may appear shy, reserved and insecure due to her general appearance and lose the opportunity to get the job. The individual's personality and his success in life may be influenced by clothing. Clothes do not necessarily 'make the person' but they do go a long way towards building up a feeling of satisfaction and well-being.

Mothers, teachers and Extension workers should study the effect of clothing on the development of personality. They should carefully analyse the part that the planning, selection, construction and care of clothes plays in forming the family's habits and character traits and in the community's acceptance of the family.

SOCIAL ASPECTS

In spite of flexible standards in and the lack of emphasis on clothing, most individuals experience occasions of feeling extremely well or extremely poorly dressed. This means that any study dealing with the individual in society should take into account his attitude towards clothing.

There is a highly significant difference among individual attitudes towards the importance of dress. Thus, a girl who feels that it is important to look well because others will judge her by her looks is more likely to be affected in her mood and action by her dress than the girl who feels that she owes it to her friends and family to be well-dressed or who wants to dress well for aesthetic reasons. A well-dressed person is more relaxed, comfortable, contented, confident, secure and even happier and friendlier.

The changes in mood that occur because a person is feeling poorly dressed are more varied than those that occur because he is feeling well-dressed. When

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71483

wearing unsuitable clothes, some people appear worried, ill-at-ease, nervous, bothered, fidgety, uncomfortable or embarrassed. These factors may cause the person to spend a lot of time thinking about 'how I look' or wondering 'what people think of me' and 'if others are looking at or talking about me.' The person feeling poorly dressed may be cross and irritable with others, more impatient, less friendly, self-conscious, less confident and may even feel inferior. This may result in his feeling that he is not a part of the group, that he is out of place or has been left out. It may even make him uninterested and uncooperative in the vital problems of home and family life.

PERSONAL ASPECTS

It is a recognized fact that clothing can affect the personality and the emotional and physical development of an individual. There is thus a direct relationship between clothing and the qualities of social participation, leadership and cooperation so necessary for the total development of the family members.

FUNCTIONS OF CLOTHING

The functions of clothing have been described below :

1. Clothing is necessary to protect the body from external injuries and from the ravages of climate and weather. Clothing also helps prevent certain disease germs and parasites from entering the body.
2. Clothes are worn for comfort, both physical and mental. The average person is more relaxed if he has the right clothing on his body.
3. Clothing helps to give the individual an agreeable form. It conceals the body according to the dictates of propriety.
4. Clothing enhances beauty. The artistic urge of the individual can be satisfied, to some extent, when he or she selects attractive fabrics or pleasant colours, lines and designs. Clothes may be so worn as to make the individual more attractive or to attract the attention of others. To be overdressed indicates poorer taste than being plainly dressed. Without being made a vulgar display of one's riches, clothing can be a means of self-expression, a manifestation of one's aesthetic qualities and an outlet of one's creative ability.

CHAPTER 45

PLANNING AND BUYING OF CLOTHES

Various factors influence the proportion of the family income that can be spent on clothing. The greatest proportion of the income is usually spent on food, followed by housing and clothing. However, many families often spend beyond their ability on clothing to give an impression of higher financial standards. Expensive marriage garments and ornaments are often purchased in an attempt at living up to established community customs or upholding the family's place in society. This is bad and often leads to trouble in the long run.

Clothing is used to protect the body from cuts, blisters, insect bites, sunburn and extremes of weather. Therefore, the climate influences clothing budgets and clothing habits. Fewer rupees are required for clothing a family in central India than one in north India.

To some extent, the social life of the family within the community set-up also determines its expenditure on clothing. A village family does not need the same type of clothes as a family that participates in the more formal social activities of city life.

Clothing needs and expenditures are also influenced by the job or profession followed by the individual. The doctor or the teacher has to spend more on clothing than the cultivator. The working woman requires more clothes than the housewife.

The size of the family affects its clothing needs. The clothing budget must be frugally spent, particularly in a large family. If each member of the average-income family is to be dressed well at all times, clothes must be carefully selected, well cared for, handed down or made over.

It is only through proper training that one acquires the ability to select clothing suitable for the individual, the occasion or the purpose in mind, without exceeding the available budget.

Making durable and attractive garments at home is one of the means of stretching out the money available for clothing. Compare the cost of the cloth with the charges made by the local tailor. Generally, the cost of the fabric is equal to or slightly more than the cost of tailoring. Therefore, if the housewife does the family sewing, the expenditure on the same amount of clothes is reduced by almost half. The family can then, if it so chooses, have twice as many clothes by spending the original amount.

How well-dressed the family appears and how low it manages to keep its expenditure on clothing depends on its knowledge of the best fabrics available at the different prices, the most durable fabrics for the service expected, the care and upkeep required for different fabrics, the proper cut and fit of the garment, etc.

PLANNED SPENDING

A lot of money is wasted if clothing is purchased due to sudden whims or desires without any planning. You should know how much you have spent or how much of your family's income is generally spent on clothing. Is your expenditure on clothing in proportion to the money spent by you on food, shelter, health or education ?

To answer these questions, you will have to calculate how much has been spent on clothing in the last twelve months. Look through the locked boxes, almirahs and trunks ; list every garment which has been purchased in the past year and note down its cost. Add up the total expenditure on clothing and compare it with the family income. You will be surprised to see that a great proportion of the income has gone into this one item. You may even feel that the family should have appeared much better dressed for the amount of money that was spent on clothing.

Careless buying can prove expensive and wasteful. If garments are impulsively purchased because of an attractive colour or price, without due consideration being given to the garments on hand, the service the new garments might give or the question whether the new garments will fit into the present wardrobe, then the money has been poorly spent.

Make a plan for the purchase of clothes by first checking the garments on hand carefully. Find out how many can be worn for another year and what items must be discarded or given away. After this has been done, decide what new items of clothing must be purchased for each season. You will probably realize that a new *choli* will give another year's life to an old sari or that the careful selection of a coat may save some rupees for several years. Now that this has been done, decide on the basic colour scheme of your wardrobe, so that saris, *cholis*, wraps, bags, bangles, *chappals*, etc., blend together. With one basic colour, the wardrobe requires fewer items and fewer rupees and yet seems extensive while the owner appears better dressed. Now that you have analysed the clothes on hand and the clothes that must be purchased, you must estimate the amount that will be required to purchase them. You must plan to stay within your budget.

Wise Choice

A wardrobe planned as one unit is more satisfactory than haphazard purchases. Each of the latter may be attractive by itself but when worn with the rest of the outfit, the effect may be spoilt. Very often the person who spends the most on clothes is not the best dressed. A person who has the ability to plan and choose wisely can appear well dressed even on a slender budget.

It has been noticed that girls and women purchase most of the fabrics for clothing and household use. Every girl should therefore learn as much as possible about fabrics, ready-made articles and good tailoring so that she can shop intelligently.

A budget will help in wise buying, since it places a limitation on the expenditure for the year and the items to be purchased. Faced with this fact, the purchaser will shop more carefully.

Price Factor

Another problem is to decide whether it is wiser to buy a poorer material at a lower price or to pay a few more Paise for a better cloth. There are times when it is wiser to buy a less expensive material that is fairly good in appearance than a more expensive fabric that will last longer. Children outgrow their clothing quickly and when there are no younger brothers or sisters who can use these garments, a cheaper fabric may be the wiser purchase. Everyday garments undergo a greater wear than the garments used only on special occasions. Since such household fabrics as towels, bedsheets and blankets will be used as long as they last, they must be of a good quality. With proper care, better quality fabrics will, in most cases, ultimately prove to be the most economical.

It is cheaper to sew family clothing and household articles at home than to purchase them ready-made or get them made by the average *darzi*. If the mother or daughter is skilled in stitching, two garments can well be made of good cloth for the price of one garment purchased from the bazaar.

Upkeep Cost

A knowledge of the different fabrics is of vital importance to every consumer. Regardless of whether you sew your own clothes or not, you can save many rupees if you have a good knowledge of the various fabrics used in the home.

The upkeep of a garment should always be considered in relation to the original cost. Unless a sari can be laundered at home, the money spent on dry-cleaning it every now and then may eventually total up to more than the original cost of the sari or else the sari may not be used sufficiently to justify its cost. Moreover wrong methods of dry-cleaning may damage the fabric. People who cannot afford the additional cost of dry-cleaning should avoid purchasing clothing that requires this type of cleaning. Fancy brocades, heavy satins and some woollens may be ruined by ordinary washing. Children's garments are very often made of velvet or satin which looks far worse after the first washing than inexpensive cotton does. If the housewife has to wash all clothing, she must buy washable fabrics.

Fabrics may be purchased at a 'sale' only if they are needed and are of a good quality. Fabrics should not be bought merely because the price has been reduced. There are usually only a few 'bargains' on an average sale. The fabric may be shop-soiled and of poor quality; if so it will fade, shrink, stretch, or become thin and flimsy after washing. Regardless of how cheap the items may seem to be at the time of buying they will become expensive, unless they serve the purpose for which they are purchased.

Constant study and observation are required for buying clothes wisely. Changes may take place in the fabric, quality, construction or price. It is no small task to keep the family attractively and appropriately dressed or to make the most of the money spent on clothing. By closely inspecting fabrics or garments, studying the label if there is one, making simple tests in the shop and buying only from reliable shops, you will be guaranteeing your money's worth in clothing.

SHOPPING HINTS

More value will be received for the money spent on clothing if a careful study is made of the local bazaar customs and shopping habits. Prices are lower in shops which do not extend credit. Shops that offer credit charge extra on all items to take care of the higher establishment costs. Cooperatives offer the most for the rupees spent, since they are non-profit organizations.

The season's clothing is usually costlier in season. Raincoats and umbrellas are generally more expensive during the monsoon than during the dry season. At the end of the season, many articles of clothing are sold very cheap merely to get them out of the shop, such as woollen sweaters in spring. Out-of-season buying can be useful to the housewife. Shops which offer extra service, such as telephone service or delivery service are usually more expensive.

The consumer should assume such responsibilities as avoiding shopping during rush hours, handling the fabrics displayed for sale carefully, behaving courteously at all times and not falling into the irritating habit of repeatedly returning or exchanging the goods purchased.

Know what you are buying and do not blame the shopkeeper for your mistakes.

CHAPTER 46

SELECTION OF GARMENTS

Most shops offer a wide variety of colours, designs and materials for the individual to choose from. Some people have the natural ability to choose the colour, design or fabric which best enhances their appearance ; others must acquire this ability. To have becoming clothes, consideration must be given, on the one hand, to the personality of the individual and his figure, and on the other, to the design, the fabric and the colour of the cloth. Each of the factors which decide the choice of a garment is discussed separately in the following pages.

THE PERSONALITY FACTOR

Personality is an intangible something about every person which cannot easily be defined. It is responsible for our receiving approval or disapproval by the people with whom we come into contact. It is the sum total of our characteristics as expressed through our features, size, posture, speech, disposition and every other trait that marks the individual. Since personality can be so varied, it has been broadly classified into three groups, *i.e.*, dramatic, feminine and athletic, with the following characteristics :

DRAMATIC	FEMININE	ATHLETIC
Forceful	Dainty	Wholesome
Dignified	Small	Energetic
Serene	Joyous	Medium built
Deep voice	Clinging	Easy in movement
Serious	Curly haired	Boyish
Slow in movement	Demure	
Stately	Vivacious	
Straight haired	Quick in movement	

It is important to remember the traits of your personality while selecting clothes. Clothes can blend with the personality, subdue it or dominate the individual. Clothing should be striking and in good taste, but never conspicuous. A dress should be such that it enhances the appearance of the wearer, just as an appropriate frame adds to the beauty of a painting. It should be the background (and only that) against which the individual makes his most pleasing appearance.

The feminine personality can be completely overshadowed by an elaborately embroidered gold and red sari, whereas the personal characteristics can be emphasized by wearing chiffon, soft silk or thin cottons in soft pastel colours. This selection would definitely be unsuitable for the dramatic or athletic type. The tall and stately person can afford to wear more dramatic colours, bold and figured designs and

severe lines such as broad stripes and plaids. The athletic type calls for more substantial fabrics.

If every individual were to make a frank analysis of the traits of her personality she will find that she is more comfortable and at greater ease in clothes that blend with her general make-up.

THE FIGURE FACTOR

The figure is just as important as personality traits. You should analyse your figure and decide which traits should be minimized or concealed. Stand in front of a mirror and check your figure according to the following chart :

FIGURE CHART

Height	Waistline
medium	average
short	small
tall	large
Weight	Back
average	straight
underweight	stooped
overweight	sway back
Bone Structure	Arms
small	average
average	thin
large	large
Face	Hands
oval	average
round	small
long	large
square	Feet
Complexion	good
good	bad
bad	Bust
Shoulders	average
average	small
narrow	large
broad	

The person who is found good, average or medium on the chart can wear almost any type of clothing. In the case of others, clothing must be planned to make their figure traits appear normal. Colour, fabric, line and design can be utilized to offset bad figure characteristics. A tall figure appears shorter in a sari of one colour and a *choli* of another, in horizontal stripes or large figured designs and in soft subdued colours. A short figure looks taller in a one-colour outfit, vertical

stripes, small-figure designs and soft colours. A heavy figure will be emphasized by bright or light colours, big or bold figured saris, snugly fitting garments and heavy or stiff fabrics. Thin or underweight individuals can appear heavier by wearing fulls, ruffles, gathers, crisp fabrics like organdie, and garments of light or bright colours. A large person should wear soft colours in more tailored fabrics and leave the dainty, sheer or billowy fabric for smaller people.

An oval or heart-shaped face is ideal. A round-faced person should avoid parting and combing her hair in such a way that the forehead is covered. Round-necked *cholis* and short strings of beads do not suit such a face. Square jaws are made more noticeable when framed by a square neckline or low-combed hair. Soft oval neckline and long beads should be used to attract attention away from such a face. V-necklines are not meant for a person with a long, thin face, as it emphasizes the length of the face. An oval neckline or a round neck is better suited for such a person.

Broad or narrow shoulders are made more conspicuous by a tight-fitting *choli.* Allow sufficient ease to avoid attracting attention. A soft drapy *pallu* can hide the broad shoulder, while a crisp sheer fabric makes the narrow shoulder appear broader.

Thin arms look best in sleeves that fit easy, not too full or too tight. A figured or striped *choli* and coloured bangles give the appearance of extra weight to the

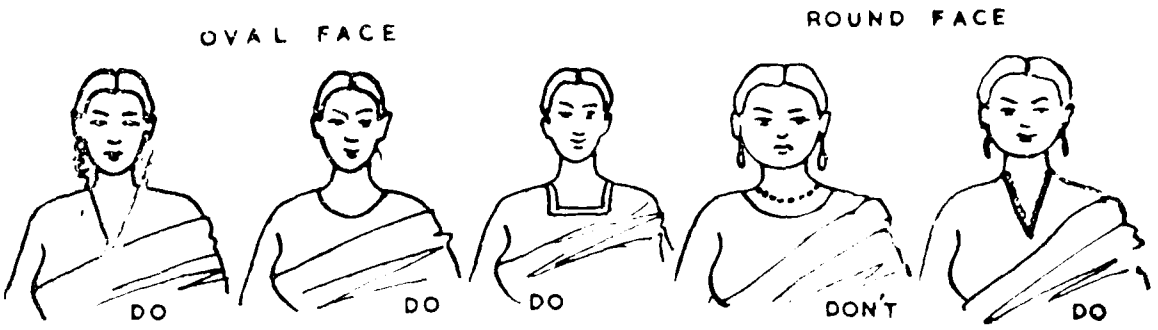

FIG. 25. NECK DESIGNS FOR OVAL AND ROUND FACES

arms. Large arms can be covered with well-fitting three-quarter length sleeves; tight and short sleeves or sleeveless blouses should then be avoided.

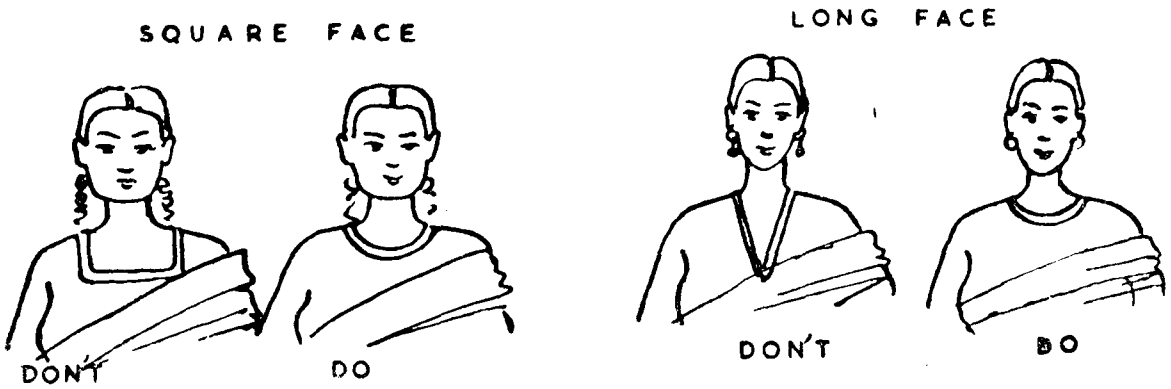

FIG. 26. NECK DESIGNS FOR SQUARE AND LONG FACES

A thin bust appears fuller if the *choli* is made of a crisp fabric, with gathering or other fullness. Avoid a snug *choli* or blouse. A large bust can be de-emphasized by wearing very short or three-quarter lengths sleeves, so that the bottom of the sleeve is above or below the fullest part of the bust. Avoid low V-necklines or beads that fall to the fullest part of the bust. Outfits in one colour are most suitable in this case.

A large waistline looks larger if the *choli* is of one colour and the sari of another. This combination is ideal for the person with a small waist. If the back is stooped or sways in, avoid tight-fitting blouses or *cholis* of solid coloured fabrics. The blouse should be properly cut to fit this defect by first making a basic pattern on which the necessary corrections are made.

Emphasize only attractive features. Hands that are not attractive should not be made conspicuous by the use of nail polish or ornate jewellery. Poorly shaped or neglected feet should be made inconspicuous by wearing plain shoes or sandals of dark colours. A poor complexion or unattractive facial features will not be so noticeable if the attention is drawn to the sari or to the hands by the use of colourful and lovely fabrics or ornaments. Such a person should avoid ear-rings, necklaces and interesting necklines which tend to attract attention to the face. Good health can correct a bad complexion.

COLOUR CONSIDERATIONS

Love of colour and form are innate in human nature. From time immemorial, colour has played a very significant part in Indian textiles. In India, colour was considered a spiritual necessity, no less important than the physical need of food. Every colour had a symbolic meaning. For instance, blue or *neel* was the symbol of vitality and shining splendour. It was the colour of Lord Krishna. Red, the symbol of *sohag* and good luck for the bride, indicated joy and happiness. Yellow or *vasanti* was the colour of *vasant* or spring and young mango blossoms.

It is true many weavers of India have preserved the colourful beauty of fabrics and the uniqueness of traditional designs with an inherent sensitivity. But there is much in our cheaper fabrics that is far from pleasing.

The knack of using colour successfully is subtle and elusive. The colour sense, like other artistic faculties, varies enormously in individuals, but everyone can develop his natural faculty for colour appreciation. Each person should know enough about colour and colour combinations to keep the entire wardrobe balanced. Without planning, a sari may not be attractive or may fail to harmonize with the other items of clothing such as *cholis*, *chappals*, bangles, bags, etc.

The colour preferences of each individual are influenced by her present wardrobe, the occasion, the season, cultural preferences, as well as by such personal characteristics as size, personality and complexion. There are certain principles which will help the individual in using colour successfully, regardless of whether or not she has a natural gift for colour combination.

Present Wardrobe

The colours already present in the wardrobe are an important consideration in choosing the colour of any garment. It is not necessary to have a large collection of clothes to be well-dressed, but it is important to choose all garments carefully. The smaller the amount of money available for clothing, the greater the amount of care and thought that should be given to the selection of clothing.

Some people buy a garment on the spur of the moment because it appeals to them and then when they reach home they find that it does not go with anything they already have. Such hit-and-miss buying is nothing but sheer extravagance. Even if the colours do not clash, an unrelated costume can never give a pleasing effect.

If one can afford only one expensive sari or one coat, one should harmonize it with the *choli* and other items on hand. Clothes that must be worn for several years should not be too conspicuous in colour. The basic garments can be brightened up year after year by a variety of inexpensive colourful accessories, such as a new *batwa* or bag, blouse, bangle, beads or other jewellery, *chappals* or *nagras*.

Individual Variations

One's personality has a great deal to do with the brightness of the colour which will be found becoming. The active person with a strong, natural complexion and forceful manners will be able to wear the most intense and striking colour combinations. The quiet and reserved person will find that rich, dark and dignified colours best express her personality traits. The selection of colours to suit one's personality is very important, for it has more to do with the becomingness of a garment than any other factor.

It must be borne in mind that the tone of the skin is the background of one's personal picture and that the hair is the frame which enhances all other tinges by its brilliance and keeps attention focussed by its harmony with the whole picture. Generally speaking, almost everyone can wear each one of the colours, provided the right hue and blend is chosen and the effect is not spoilt by unsuitable textures. Nevertheless, some colours are safer than others since they have a wide range. As a rule, individuals with dark hair, eyes and skin look more attractive in the warm colours, such as purples, violets, rich reds, oranges and yellows. All blues and blue greens make white hair seem whiter, so do black and white. One must be careful to avoid colours that are too near the colour of the skin. If colours that blend with the garments and the hair are selected, it helps give an appearance of being well-dressed at all times.

Occasion

The occasion for which a garment is to be worn influences the choice of its colour. Colour in clothing should blend with the activities of daily life. Bright and cheerful colours are suitable for festivals, parties or marriages. Soft, subdued and dark colours are more appropriate for business, travelling, etc.

Garments for daytime wear should be selected in daylight and those to be worn at night should be selected under artificial light. The difference between daylight and artificial light may make a considerable difference in the becomingness of a colour.

Season

The season of the year influences the choice of colour. Warm colours, such as reds, oranges, pinks and yellows are usually preferred in winter. Cool colours, such as white, blues, lavenders and greens are more refreshing during summer.

Size

Colour can appear to increase and decrease the size of an individual. Bright and light colours will emphasize the size. Black, dark blues, greens, greys and browns tend to make a person look smaller. A stout person with a good figure will find black an excellent choice, but if her figure is poor, she will find that black makes her undesirable features too obvious. A person of an average size will not have to consider her figure while choosing the right colour.

Colour Combinations

Some colour combinations are harmonious and some are not. The ability to combine colours harmoniously in an outfit or wardrobe depends chiefly on one's knowledge of colours, shades, tones and the blends of colours that give variety. From the basic colours of red, blue and yellow, hundreds of shades or combinations have been made. Green is made by mixing blue and yellow. If more blue is added, the colour becomes a bluish green ; if more yellow is added it becomes a yellowish green. These two off-shades of green do not go together for a pleasing combination. Light and dark shades of bluish green can be worn together successfully. Some colour combinations have been suggested below :

Brown and tan,
Dark blue and light blue,
Dark yellow-green and light yellow-green,
Dark purple and pale pink,
Tan and blue or green,
Blue red and blue-pink,
Dark blue, red-orange and yellow-orange,
Dark green, light green and orange,
Black, white or grey with any intense colour.

Texture of Fabrics

The texture of the fabric can make a colour look attractive or unattractive. For instance, a woollen shawl in a certain shade of blue may be very flattering because of the softness of the fabric, but the same colour in a shiny satin may be unbecoming because of the harshness of the lustre. There is also a difference in the effect of thin and thick fabrics on the same colour or shade. Lavender may be unbecoming in a heavy silk sari ; but in a sheer voile or chiffon, it is more flattering because of the effect of the skin and the garment showing through the sari.

FABRIC VARIETY

Because of the wide variety in quality, type and price of the cloth available in shops, it is necessary to have some information about fabrics before buying them.

The way in which a fabric is made affects its appearance, texture and durability. The dye and other finishes affect its use over a period of time.

Construction of Fabrics

A fabric may be produced by weaving, knitting or felting.

Woven Fabrics

These are used most often. This method of cloth construction is used both by hand weavers and commercial concerns. Strong and durable cloth can be produced by interlacing lengthwise and crosswise threads at right angles in various patterns.

The plain weave : This weave is found in voile, taffeta, plain silk and khadi. It has alternate threads going over one and under one. The threads can be woven closely together to form a very durable fabric ; if the threads are woven loosely and far apart, the fabric will be less durable. If the yarn is fine, the fabric will be sheer and light-weight, but if the yarn is heavy or coarse, the resulting fabric will be heavy. This weave is monotonous but can be made interesting by the use of coloured threads or by some type of applied design.

The basket weave : The basket weave is a variation of the plain weave. Two threads interlacing over one another are used instead of one. This weave is not as firm or durable as the plain weave, for the threads tend to catch on rough surfaces and get pulled out of place.

The corded weave : This is another variation of the plain weave. One thread is heavier than the other, giving an interesting effect. The durability of such a fabric is reduced, because, with wear, the small threads break where they cross the heavier threads. There is also a tendency for the small threads to slip out of place.

The twill weave : This can be used to produce a fabric more durable than that produced by any other weave. In this weave each filling thread passes over and under a group of lengthwise threads at regular intervals. Each succeeding row is made by splitting the group of warp threads, but still crossing at regular intervals. This weave makes attractive fabrics for hard wear, such as material for men's trousers.

The satin weave : The satin weave gives a high lustre, but a less durable fabric. In this weave, each filling thread passes, at irregular intervals, over one and under four to twelve lengthwise threads to form a pattern. The pattern does not show in the fabric because of the lustre of the yarn and because the greater number of yarns are on the right side. The lustre is due to the number of lengthwise yarns showing on the right side, reflecting light. The durability of the fabric is reduced because the yarns are interlaced less frequently and, therefore, it is easy for them to slip out of place or to get caught and pulled by a rough surface. The satin weave is used in dress fabric and table linen.

There are several other weaves each with many variations. However, the weaves already discussed are the most commonly used and produce the most desirable fabrics, from the point of beauty, variety and durability.

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Knitted Fabrics

Knitted fabrics are constructed from one or two yarns which are interlooped. Because of this method of construction, in many knitted fabrics a broken yarn will continue to be pulled out of the loops. The hole thus increases in size and a 'run' or 'ladder' develops.

These are more elastic than woven fabrics, and, therefore, give better service if a snug fit as well as freedom of movement is desired. Since knitting produces a porous fabric, it is warmer, more absorbent and more easily cleaned. The knitted fabric is specially suitable for underwear, sweaters, scarves, shirts and children's clothing. It is easy to launder, requiring little or no ironing.

Felted Fabrics

These are made by matting loose fibres together but are less durable than woven or knitted fabrics. Felt may be made of fur, wool, cotton or rayon. Fur and wool felt are commonly used for hats, cushions and table pads.

Various Fibres

Cloth is made from vegetable, animal and mineral fibres. Silk and wool are animal fibres ; cotton, linen and rayon are vegetable fibres ; nylon and gold or silver thread originate from minerals. The durability of a fabric is affected by the fibre from which it is made. Strong fibres produce strong cloth, while long fibres tend to make strong yarns.

The Cotton Fibre

The cotton fibre is short, but unlike most short fibres, it can be made into a strong yarn because the natural twist in the fibre helps it to hold together. The longer staple fibres are used to produce fine, silky and lustrous cotton fabrics. Cotton absorbs moisture quickly and dries quickly. It is fairly cheap. It is comfortable in warm or cool weather and can stand frequent laundering.

The Linen Fibre

The linen fibre, also called flax, comes from the stem of the flax plant. It makes a fairly long, strong and straight fibre. Linen absorbs moisture quickly and dries more quickly than any other vegetable fabric. Linen can be bleached ; it does not shed lint ; it has a smooth, sleek surface which does not wear out easily and which is lustrous ; it is easily laundered and wears well. Linen has three disadvantages. It is expensive. Unless treated, it crushes and wrinkles badly. It does not take or hold dyes well.

The Woollen Fibre

Wool is the fleece from sheep or goats. The fibre varies in length from one to eight inches. It is a scaly fibre, and this makes it ideal for felting. Due to its scales, much care is required to keep wool from shrinking and felting while it is being laundered. It holds odours and dust, and can be scratchy to the skin. Fabrics made of wool are warm because the fibre is kinky and the kinks and scales on the fibre slow up the passage of air through the fabric, making it warm. Wool absorbs moisture slowly and dries slowly, but it can absorb a large quantity of water with-

out making the wearer feel wet or cold. Wool is fire-resistant to some extent. The woollen fabric can be made very soft and is durable and light-weight. Wool retains dyes longer than all other animal or vegetable fibres.

The Silken Fibre

Silk is a very fine filament or fibre, secreted by the silkworm. This fibre has a natural lustre. It is long, smooth and strong. Its smoothness often causes the threads of the fabric to slip out of place easily unless specially treated. Silk fabrics do not wrinkle easily and even when they do get wrinkled, the wrinkles hang out in a few days. White silk tends to become yellow with age or frequent laundering. Good silk is expensive, but wears longer.

The Rayon Fibre

Rayon is an artificial fibre. It is made from cotton linters, wood pulp or some other cellulose. Rayon fibres are smooth, straight and long. However, the rayon fibre can be treated to resemble cotton, wool, silk or linen. It wrinkles easily. Due to its high lustre, rayon is good for satin. It has to be delustered for other uses.

There are several types of rayon fibres, all of which are similar in appearance but must be handled differently. The rayon fibre (acetate) frequently used in taffeta and some sheers will melt under a hot iron and become permanently wrinkled if squeezed in washing or creased in ironing. The other rayons can be ironed with a warmer iron. All rayon is weak when wet and strong when dry. It must be handled carefully when wet.

The Nylon Fibre

Nylon is also an artificial or chemical fibre. It is made from coal, air and water. Nylon fibres can be made of any length. It is more elastic than silk and can stand hard wear longer than any natural fibre. It is resilient and resists wrinkling. Nylon dyes easily. It resists soil, absorbs little or no moisture, launders easily, dries quickly and requires little or no ironing. Nylon is cold in cool weather and hot in summer. It melts and is ruined if pressed with too hot an iron.

Fabric Finishes

Various finishes may be applied to the fibres, yarns or fabrics to make a more durable, attractive or suitable cloth.

Dyeing is a common finish, applied to the fibre, yarn or woven cloth. Cloth retains its dye longer when the yarn rather than the finished product is dyed; in the latter case it may even turn out to be spotty. Dots are made on coloured fabric by bleaching out the desired design ; this frequently weakens the fabric.

Bleaching is another finish and is used to whiten the natural colouring of the fibre. Cotton and linen require more bleaching than wool or silk.

Printing a design on a plain fabric gives the fabric variety and beauty without injuring it. Printed stripes, plaids and checks should be inspected carefully to see that they have been applied on the straight threads of the cloth.

In sizing, materials such as starch or sugar are often applied to loosely woven fabrics to make them appear heavier or more closely woven. These sizings wash out in water and the fabric shrinks and becomes flimsy Permanent sizing adds to the

beauty and strength of a fabric. Silk may be weighted with metallic salts, gum or other substances to make it heavier. A small amount of weighting does not hurt a fabric.

Mercerized cotton looks like silk and takes dyes more readily. It has a high lustre and is strong. In mercerization the fabric is stretched tightly while it is in a strong alkaline solution and pressed.

The moire finish, producing a wavy effect on silk, rayon and cotton, is obtained by pressing the fabric between engraved rollers. Rayons are generally finished by this process. This finish on acetate rayon is quite permanent.

Napping is done by pricking the fabric with wire teeth to make it fuzzy. This adds to the warmth of a cloth.

A wrinkle-proof or crush-resistant fabric is one which has been chemically treated to retard wrinkling. These fabrics require less pressing. Shrink-proof finishes reduce the shrinkage of fabrics in washing to the minimum. Some shrink-proof methods guarantee shrinkage to be less than one per cent of the total yardage.

Fibre Tests

As already pointed out, it is important to know what sort of a fibre has gone into the making of a fabric. Some of the important tests are described below :

Burning Test : Burn the warp and filling threads separately. Hold the threads to the flame of a lighted candle ; remove the thread. Note the colour of the flame, the rate of burning, the odour and the ash. Fibres burn in the following characteristic ways :

Cotton and linen burn rather rapidly with a yellow flame and give off the odour of burning paper. They leave a grey ash.

Wool burns slowly with the odour of burning feathers or hair. It leaves a black ash.

Silk burns with the odour of feathers or hair. It burns slowly unless held directly in the flame. As silk burns, black 'beads' form and drop off. When rubbed between the fingers, the 'beads' form a fine, black ash and smell like burnt insects.

Viscose rayon burns rather rapidly giving a yellow flame and an odour similar to that of burning paper. It leaves a grey ash, but no 'beads.' Cupro ammonium rayon burns somewhat slower than the viscose variety, giving the odour of burning paper and leaving a small amount of black ash.

Acetate rayon burns with a yellow flame but more slowly than other rayons. As it burns, the material curls back quickly, forming a very hard, black char. When acetate rayon is burnt, it gives out a characteristic vinegar-like odour.

Acetone Test : This test may be used to distinguish acetate rayon from the other rayons. Drop acetone or nail polish remover on the sample. Acetate rayon will get dissolved in a few minutes. Other rayons will not be affected.

Ink Test : This may be used to distinguish cotton from linen. However, it is not entirely reliable. Drop ink on the sample. If it is cotton, the ink will

spread unevenly, and the spot will have a heavy inky centre. If it is linen, the ink will spread evenly making a round spot. This test is no good for mixed fabrics or for those with certain special finishes.

Breaking Test : This may also be used to distinguish cotton from linen. Break thread. If it is made of linen the break leaves a sharp point ; if it is made of cotton, at the end will be fuzzy.

Yarn Test : The strength of a piece of material depends to some extent on the strength, length and twist of the yarn it is made of. Ravel the material and untwist a thread. Note the length of the fibre and the twist of the thread. Break the thread to determine the strength.

Texture Test

Hold the sample to the light. Are the threads uniform ? Is the weaving close ? Are the filling and warp threads approximately the same in size and number so that the material is a balanced fabric ? Pin a seam in the sample. Pull on this seam. Do the threads slip and pull at the seam ?

Dye Penetration Test

Ravel out both edges of the sample. Is the colour even on the ravelled edges ? Untwist one of the ravelled threads. Has the colour penetrated into the thread or is it on the surface only ?

Crush Resistance Test

Twist the material tightly between the fingers. Does it wrinkle badly or does it spring back into shape ?

Slzing Test

Scrape the finger nail across the material and look closely for starch dust. Or drop iodine on the sample ; a deep blue colouration indicates the presence of starch. Another test is to boil the sample in successive changes of water for 30 minutes and to compare the sample with the original material in appearance and weight.

Colour Fastness Test

Fastness to Washing : Use three samples of the material for this test. Sew one to a piece of white cotton material, another to a piece of white silk, and the third to a piece of white woollen. Wash the three samples for two minutes in a warm 1½ per cent soap solution. Rinse and dry. Remove the samples from the materials. Examine the white material to see if there has been any 'bleeding' of colour. Cotton, silk and woollen pieces are used so that the unknown dye will be absorbed in the bleeding. The cotton will absorb cotton dye; the silk, the silk dye; and so on.

Fastness to Sunshine : Attach a sample of the material to a window pane having a southern exposure. Leave the sample exposed for a week or longer if the sun is not bright. Remove it from the window pane, place it in a dark place for two hours. Compare it with the original piece of material.

Fastness to Perspiration : Make a solution using one pint of water, five tablespoons of salt and 10 tablespoons of vinegar. Soak the sample in the solution for 15 minutes. Remove and dry it. Repeat the process twice, drying the sample

each time. Compare this sample with the original material. If the sample is stained, the material will be stained by perspiration.

Shrinkage Test

Use two 12-inch square pieces of the material to be tested. Save one piece for comparison. Wash the other piece for two minutes. Rinse it and dry flat. Press by lifting the iron up and down on the sample. Do not rub. Compare the washed sample with the unwashed one in size. Each yard of the material will shrink three times as much as a 12-inch sample.

Reaction to Strong Soap Test

Make a soap solution using one pint of water and one tablespoon of lye. Place the sample in this cold solution and note the reaction. Heat the solution and note the reaction. The same results will be noted when the material is washed in a strong soap over a period of time.

Bleaching Test

Wash samples of wool, silk, cotton and linen in ordinary household bleaching agents (see bleaches). Use *javelle* water or hypochlorite and hydrogen peroxide. Hypochlorite should not be used on silk or on wool. Hydrogen peroxide may be used on silk and wool safely. Linen and cotton may be bleached with hypochlorite. Any bleaching agent will tend to weaken the fabric.

Wool Purity Soap Test

Dissolve one tablespoon of lye in half a cup of water. Place a sample of the material in this solution and let it remain for 30 minutes. If the material is all wool, it will completely dissolve in the lye solution. If the material is a cotton and wool mixture, the wool will dissolve and the cotton will be left.

SELECTION OF FABRICS

Cloth comes in different widths. The amount of yardage required for any garment depends on

(*i*) the pattern and style used ;
(*ii*) the width of the cloth ;
(*iii*) the size of the person ; and
(*iv*) the skill in sewing.

The fabric may be plain, printed or striped. If it has a design, the background and design should be related so as to produce an all-over pleasing pattern. If any part of the design or any colour in the design stands out, a spotty effect is produced. In selecting a figured fabric, the size and kind of the design selected will depend on the individual for whom the cloth is being selected. Figured fabrics should be made up as simply as possible, since cutting and seaming often spoil the effect of the prints.

Plaids and stripes are most attractive, if occurring in a proper scheme. However, the variety of plaids presents several problems to the average seamstress. Additional yardage is required for proper matching of the plaids. All parts of the garment must be cut in the same direction and even the left and right sides of the pattern

cannot be ignored. Such fabrics make attractive garments, but skill, patience and extra yardage are required.

Some prints have complicated designs, such as bunches of flowers with the stems going in one direction or stripes formed with the repetition of a figure. If the fabric is folded during cutting, or placed upside down, the different sides of the garment will appear to have been cut from two different fabrics. This has to be avoided at all costs.

The easiest fabric for a beginner to cut and stitch is an all-over print or a plain piece. There is no need to worry about matching the design and any imperfection in the construction will be hidden in the design itself. An all-over print tends to give beauty to a simple garment.

Border prints must be planned and cut according to a special lay-out, so that the border can be used as decoration for the garment. This type of a design is not a wise choice for the person just learning to stitch.

The home-maker can check up her cloth selections according to the following questionnaire :

1. Can she afford the fabric ?
2. Is the price reasonable ?
3. Does the fabric look good ?
4. Is the design in the fabric pleasing ?
5. Is the design in the fabric becoming ?
6. Is the colour of the fabric pleasing ?
7. Is the colour of the fabric becoming ?
8. Will the fabric wash well and not fade or shrink ?
9. Is it suited to the garment needed ?
10. Is the fabric suitable for her to work on considering her experience of sewing ?

CHAPTER 47

MEASUREMENTS FOR GARMENTS

A basic or block pattern is a perfectly plain pattern, drafted to fit a particular individual. With skill and practice attractive designs according to the current style can be made from a basic pattern. Accurate measurements are essential in pattern drafting. The body measurements must be carefully recorded and then marked on the drafting paper.

BODY MEASUREMENTS

Body measurements should include the following measurements taken as explained below :

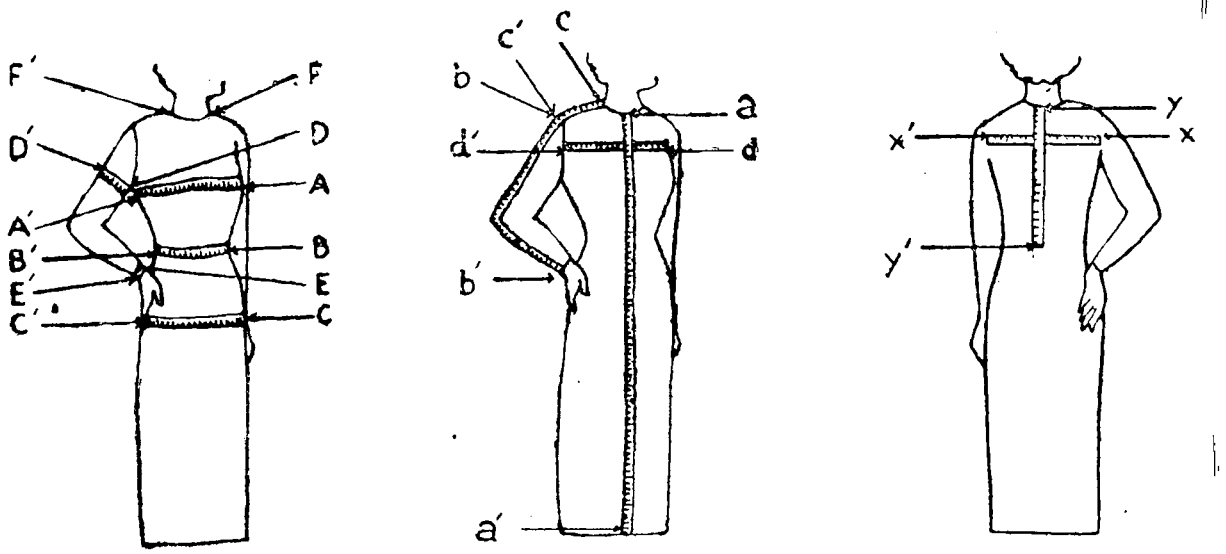

FIG. 27. CORRECT MEASUREMENT : (a) ROUND MEASUREMENTS; (b) LENGTHWISE MEASUREMENTS; (c) BACK MEASUREMENTS

1. *Bust* : Place the measuring tape round the fullest part of the bust. Raise the tape slightly at the back and keep two fingers inside the tape to prevent too close a measurement. (A—A')
2. *Waist* : The waist measurements are taken at the smallest part of the waist. (B—B')
3. *Hip* : Measure round the widest part of the hips, about seven inches below the waist. (C—C')
4. *Width of back* : Measure across the shoulder blades, half-way down between the shoulder and underarm. (x—x')
5. *Nape to waist* : Measure from the most prominent bone in the nape of the neck down the centre back to the waist. (y—y')

6. *Full length* : Hold the tape at the waist and continue measuring to the full length required. (a—a')
7. *Sleeve length* : The sleeve length is taken from the hollow to the waist. (b—b')
8. *Round arm* : Take the measurement round the thickest part of the arm between shoulder and elbow, with the arm bent. (D—D')
9. *Wrist* : Measure closely round the wrist. (E—E')
10. *Neck* : The neck measurement is taken around the base of the neck. (F—F')
11. *Shoulder* : The shoulder length is taken from the neckline to the arm socket. (c—c')
12. *Chest* : The chest measurement is taken from the point where the arm leaves the body across the chest. (d—d')

TOOLS FOR DRAFTING

Few tools are needed for drafting patterns. Making and measuring tools are, however, essential. The most important things required are mentioned below :

Paper : Brown paper, newspaper or stiff cotton cloth can be used.

Measuring tape : A good oilcloth or cotton tape is needed.

Yardstick and Footruler : Any brand with clear markings will give good service.

Pencils : Two or three coloured pencils for various markings should be procured.

String : It is to be used as a compass when drawing curves. Any quality will do.

Table: It is needed for spreading the cloth to be cut. If a table is not available, any flat surface will serve the purpose.

BASIC PATTERNS

The home-maker has to make garments for different people in the family. For a perfect fit, individual adjustments are necessary. Some basic patterns for garments commonly needed by the members of a family are given below.

Basic Blouse Block

A basic blouse block pattern can be easily made for any girl or woman. After the basic pattern has been made, various alterations can be introduced to make the garment attractive and interesting. Cut several paper patterns from the basic block and try out the desired alterations. Body measurements should be taken carefully and checked for accuracy. After the basic block has been drawn, cut the garment out in old or inexpensive cloth ; tack the parts and try it on. A three-fourth inch seam allowance must be added to the seam lines. A basic blouse pattern can be prepared from the following measurements :

Back		*Front*	
A-C :	Back length from neck to waist	A-C :	Length from shoulder to waist
A-D :	Back length from neck to bust line	A-D :	Length from shoulder to bust line

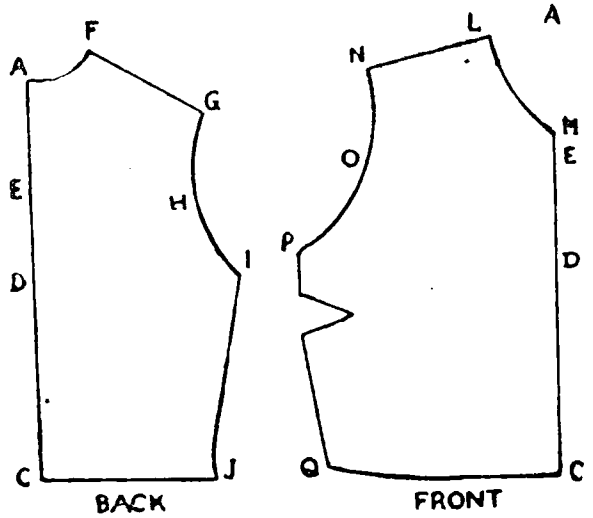

FIG. 28. BASIC PATTERNS FOR BLOUSE

Back		*Front*	
A-E :	Back length from neck to shoulder blade	A-E :	Length from shoulder to chest
A-F :	$2\frac{1}{2}''$-$\frac{1}{2}''$ up. Draw curve for back neck	A-L :	3″
F-G :	Length of shoulder. Drop G 1″ below A	A-M:	3″; curve the neck line
E-H :	Half back width	L-N :	Length of shoulder. Drop N 1″ below A
D-I :	Quarter of bust measurement minus 1″. Draw armhole G-H-I	E-O :	Half chest measurement
		D-P :	Quarter bust measurement plus 1″ ; curve the front armhole N-O-P
C-J :	D-I minus 1″	C-Q :	D-P minus 1″

Dart in blouse (front) : Measure 2″ down from P, then $3\frac{1}{2}''$ in and from this point branch out $\frac{1}{2}''$ on either side at the seam line. For this, keep the front side seam $\frac{1}{2}''$ longer than the back side seam.

Basic Sleeve Block

For a sleeve block, the following measurements are required

AB, CE } Width=$\frac{1}{4}''$ of the bust measurement minus $\frac{1}{2}''$

AC, BE } Length=as desired.

BD=$\frac{1}{4}$ of length of bodice or blouse block.

Join AD with a dotted line and draw an outward curve for the back sleeve.

Divide AD into half and mark it M.

N is the midpoint of MD.

O is half an inch below N.

For the front sleeve curve, join AM with an outward curve and then MOD with downward curve.

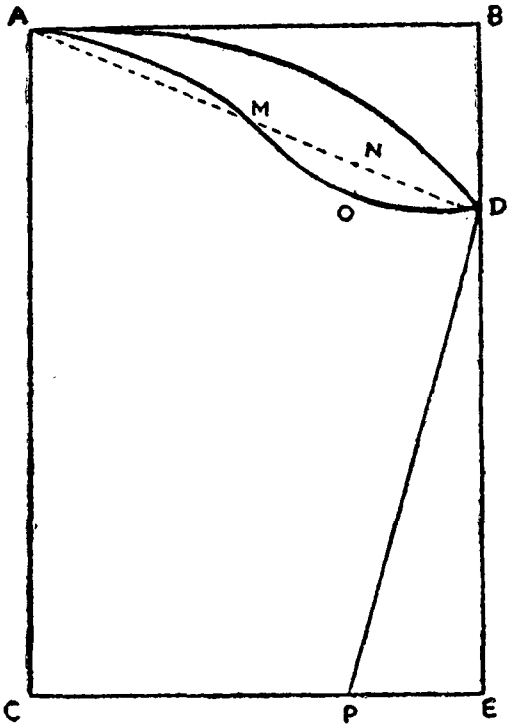

FIG. 29. CONSTRUCTION DETAILS OF A BASIC SLEEVE BLOCK

CP is half of the round arm measurement.

Join DP for the seam.

Brassiere

For a woman who desires to look well-dressed, the undergarments are as important as the outer dress. A good fitting brassiere is essential to a well fitted blouse or *choli*. A brassiere can be made very easily according to the following suggestions :

Standard Measurements

Length	=	6″	Adapt these to suit your own measurements
Round waist	=	28″ (below bust)	
Round bust	=	32″	
Length of each back strap	=	7″	

Construction Lines : Draw the base line AB=½ round the bust. From A take AC=length of the back strap. From A (depending on how wide you want the

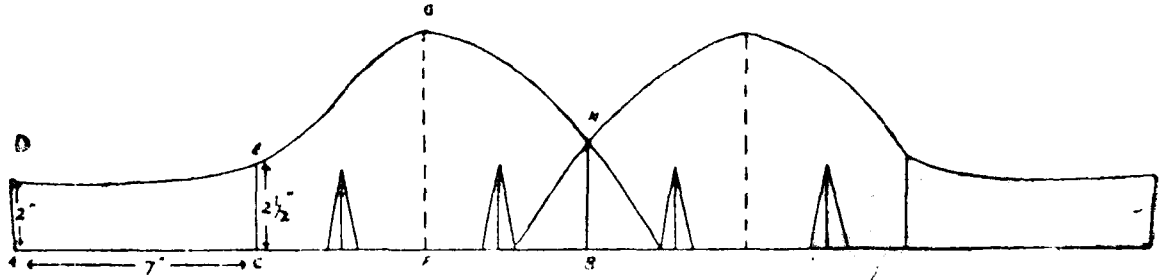

FIG. 30. OUTLINE DETAILS OF A BRASSIERE

end of back strap to be) take AD=2″ and EC=2½″. Join ED with a curve. Divide CB into half and mark the centre as F. From F take FG equal to the full length of the bust=6″. At B take BH=3″. Join EG with a curve as shown in Fig. 25. This can be adapted to any other desired design. If a plain brassiere is needed, the pattern remains the same.

Darts are used to form the cup. There are two darts starting from the length of the waist to the fullest part of the bust. To give support to the figure, a double band can be attached to the lower part or the base of the brassiere. The band can be given a better resiliency by the addition of elastic at the centre and at the waist on either side and at the back.

For a good fit, the brassiere is cut on the cross. There should be a side seam so that the front is not pulled too much. If elastic is used at the back, 2″ of the back band is cut and the elastic attached to it. The edges are finished with crossway facing or a ribbon may be attached.

Kurta (adult)

Material Required .. .. = 3 yd. of cloth 36″ wide
Chest measurement .. .. = 36″
Length of Kurta .. .. = 36″

Centre Panel :

Length ×2 =72 in. (Back length plus front length)
Width=16″ (Half chest measurement or 18″—2″=16″)
Fold width into two
Fold length into two
Size of material after folding—36″×8″.

Neck :

BF=BE=3″=1/12 of chest measurement
Join EF with a curve

Pocket Opening :

BG=12″=1/3 chest measurement

Kalli or Side Panel :

Two for each side : 27″×13″ each
Length of side panel=27″ (3/4 chest measurement)
Width of side panel=13½″ (1/4 chest+1/8 chest measurement)
LP=9″=¼ chest measurement
PM=4½″=1/8 chest measurement
Join PQ as shown in Fig. 31

Underarm Pieces :

(For greater fullness)
Size of material=4½″ square

Sleeve :

Sleeve is cut on the weft with a selvedge at the hem
Size of material=24″×18″ (two pieces or two sleeves)
Length of sleeve=24″=2/3 chest measurement
Width of sleeve=9″=1/4 chest measurement

Construction Lines of Sleeve :

Fold width into two. Keep fold to left as in Fig. 31

Mark UXYZ as in Fig. 31.
Mark O, 1" from Y, along YZ.
Join O to O_1, to shape sleeve.
Join kalli to centre panel on its straight side, to give the flare at the bottom.
Join underarm pieces as shown in fig. 31.

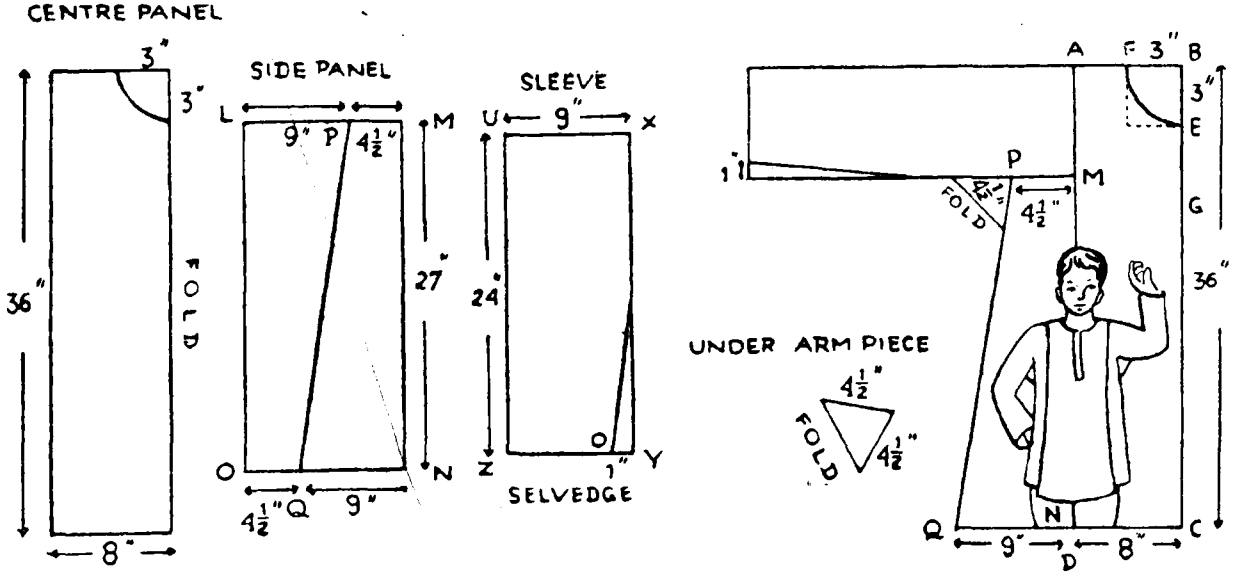

FIG. 31. CONSTRUCTION DETAILS OF A KURTA

Sari Petticoat

The following measurements and method are used for a sari petticoat :

Measurements :

Length	=	36"
Waist	=	26"
Hip	=	38"

Size of Paper :

Length	=	Length of petticoat=36"
Width	=	36" (width of material)

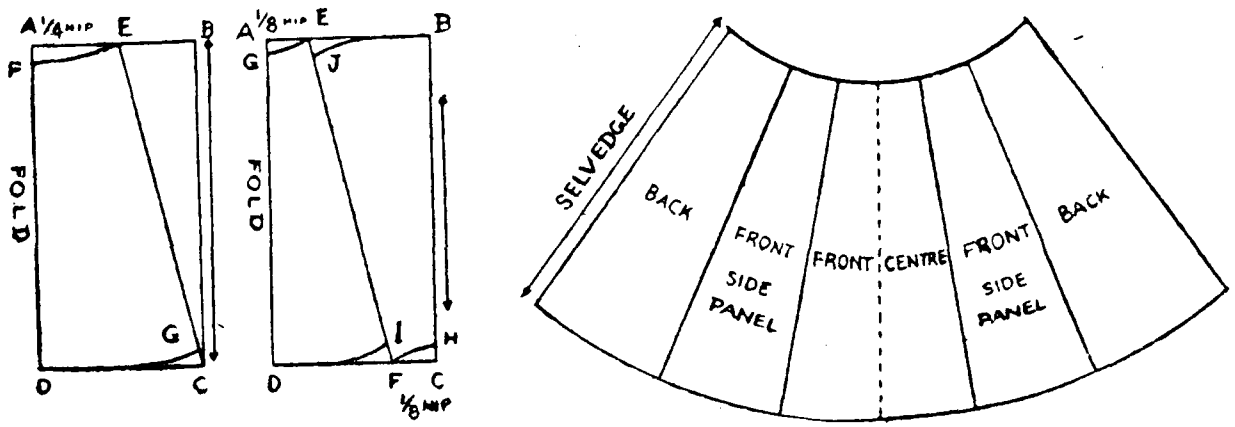

FIG. 32. CONSTRUCTION DETAILS OF A PETTICOAT

Folding of Paper :

Fold the width in half. Keep the fold on the left.

Front :

AD=length (36″). AD is on the fold
AB=½ width (18″)
AE=1/8th hip
CF=1/8th hip
AG=HC=1″

Join EF. Also join DI and BJ with curves for shaping the hem.
ET=GD=FJ=HB
EF and FH are waist curves
AEID is the central panel

Back :

AD=length (36″)
AB=1/2 width (18″)
AE=¼ hip
AF=1″
Join EC. Draw the curve DG for shaping the hem.
EF is the waist curve
FEGD is the panel

ALTERATION METHODS

A basic pattern should be made from a piece of old cloth before trying it for a new garment. Try it on for a fit. Make the required alterations on this garment by cutting, inserting extra cloth, using darts or taking up fullness. Re-cut a new basic pattern from the cloth garment. It must be remembered that all patterns are altered down the centre of each piece or across the centre of each piece. Never add to or take off on the seam lines. The same principles of pattern alteration apply to the skirt and all other patterns, such as knickers, skirts or trousers.

CHAPTER 48

CONSTRUCTION OF CLOTHES

How attractive and suitable a garment is depends on its material, pattern, cutting, fitting and stitching. The construction of garments requires some equipment for cutting and stitching, even if the garment in question is a very simple one and is to be sewn by hand alone. The right kind of tools makes sewing easier.

The home-maker who wishes to turn out good sewing must remember the following hints about equipment and the method of work :

1. Procure the proper sewing equipment and learn how to use it.
2. Take care of your sewing equipment. Have a good storage space for your sewing tools.
3. Work on a low table. If you sit on the floor to sew, you should sit erect while sewing.
4. If you are right-handed, sit so that the best light comes over your left shoulder. In this way a shadow will not fall on your work. The reverse applies to a left-handed person.
5. Hold your work up to you. Do not lean over it.
6. Keep your hands clean while sewing.
7. Wear a thimble for neat and even stitching. A thimble prevents sore fingers.
8. Use short thread, say, a cubit length.
9. Do not bite the thread or wet it in the mouth. Cut the thread slantingly or roll it between the thumb and a finger, and run through the eye of the needle.
10. Never use bent, rusty, blunt or too large needles.
11. Tack your work carefully. Tacking helps in good stitching.
12. Be sure you understand all sewing directions before you cut or stitch a garment.
13. Fold the sewing neatly when it is to be put away for a while.
14. Do not throw pieces of cloth or string on the floor.

SEWING TOOLS AND MATERIALS

The home-maker should use a metal, wooden or cardboard box to hold all her ...ipment. She should keep all sewing tools in the box and keep the box ...s in the box for thread, needles, pins, thimble, scissors and markers
A list of the tools required for any kind of sewing by hand is
...mstress becomes more skilful, additional equipment may be
better.

Scissors

The cutting-out scissors should be large and sharp with one blade broad and the other pointed. The pointed end should be placed on the table and the scissors kept as close to the cloth as possible. The material should be lifted very little and to prevent it from slipping, the left hand should be kept on the material to the left of the scissors. The scissors used for cutting out cloth should not be used for any other purpose, such as cutting paper or cardboard. They should be kept clean and oiled at the joints.

Needles

Select fine quality steel needles with smoothly finished eyes and sharp points. The sizes for ordinary use run from No. 1 to No. 12, No. 1 being the coarsest. Sizes 10 to 12 are considered fine. Select fine needles for use on sheer or light-weight fabrics and use fine thread. Large needles and coarser threads are used on heavier fabrics.

Pins

Buy good quality brass pins. They should be short but slender. Sharp, pointed pins will not make large holes in the fabric. Keep pins in a pin cushion. A pin cushion held on the wrist with an elastic band is convenient.

Thimble

A thimble makes sewing by hand easier and quicker. It protects the finger when the needle is being pushed through the fabric. The thimble should fit the middle finger of the right hand.

Thread

Sewing thread is available in a variety of sizes. The sizes of cotton thread run from No. 8 (coarse) to No. 200 (fine), 50 to 100 being the most commonly used sizes. Stitch all cottons and woollens with mercerized cotton thread. Use silk thread on silk and rayon. Sewing thread should always be a shade darker than the cloth.

Measuring Tools

Careful measuring takes the guesswork out of sewing and even a beginner can make well-fitting garments. A hem gauge and a measuring tape of oilcloth or strong cotton cloth are essential for good sewing. The hem gauge can be cut from a piece of cardboard or folded paper.

Pressing Equipment

Strictly speaking, this may not be a part of sewing equipment but pressing is essential for good sewing. A good iron, a well-padded ironing board and a press cloth should be obtained. The rule is press before you stitch, press as you stitch and press after stitching.

SEWING MACHINE

A considerable amount of home sewing can be done by ha
machine makes sewing easier, quicker, more durable and mo
ing machine should be carefully selected, properly used a
The book of instructions issued by the manufacturer

and care of the machine. We sure to obtain this booklet when purchasing a sewing machine. The following are the general hints for the care and use of a sewing machine.

1. Learn the names of the parts of the sewing machine, how they work, how to take care of each part and where to buy new parts.
2. Keep the machine covered when it is not in use. Dust and dirt will ruin it.
3. Oil the machine after 8 to 10 hours' use. If it has not been used for a week, oil it before using. Add one drop of oil to each hole, according to the instruction book. Stitch on a scrap of cloth to remove excess oil. Use the sewing machine oil recommended by the manufacturer.
4. See that the machine needle is sharp and not bent. A blunt needle may pull or cut the threads of the fabric.
5. Thread the machine correctly.
6. To avoid tangled threads, pull the bobbin thread and the spool thread to the back of the pressure foot. Place the cloth under the pressure foot.

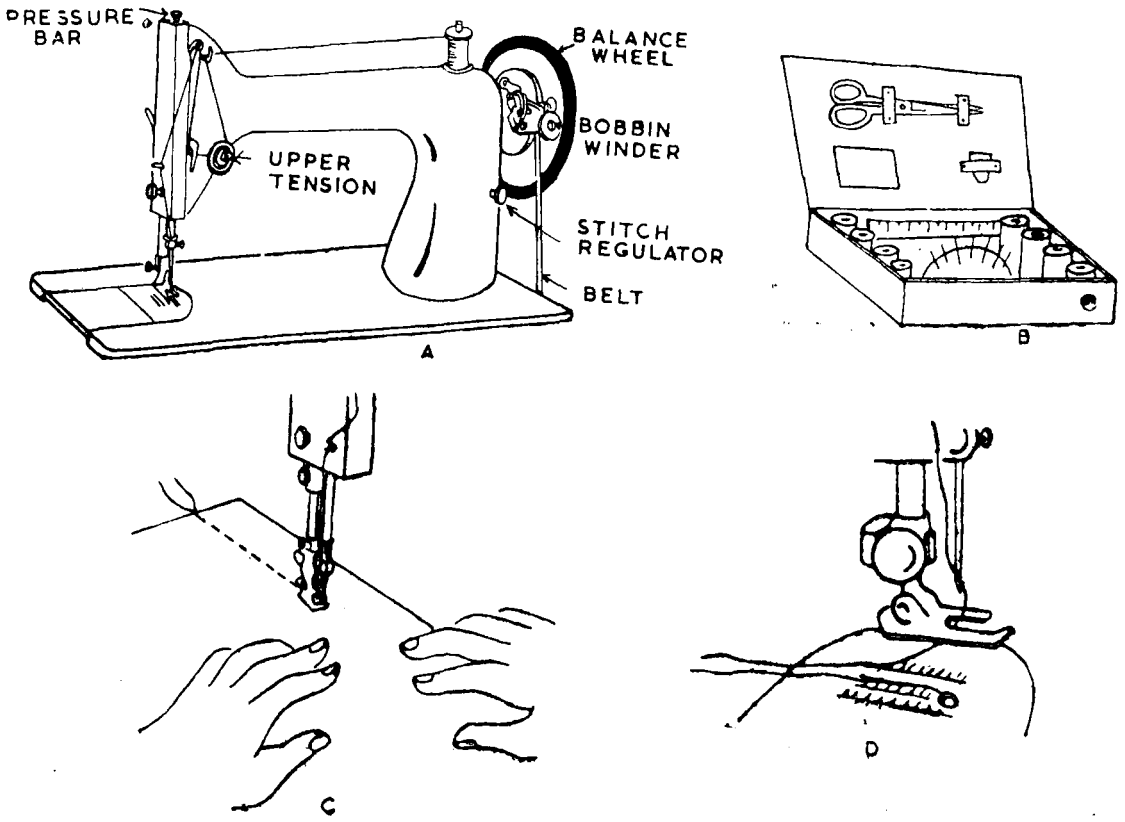

FIG. 33. A. THE SEWING MACHINE AND ITS PARTS. B. THE SEWING KIT. C. STITCHING IN PROGRESS. D. THREADED AND READY TO START

Turn the balance wheel until the needle is in the cloth. Lower the pressure foot and start sewing.

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7. While stitching, guide the fabric under the pressure foot by gently placing your hand on the fabric and guiding it towards the needle. Do not pull the fabric from the backside of the pressure foot.
8. If the tension is correct, the stitches will look the same on both sides of the cloth. This is called a balanced tension. Adjust the upper and lower tension until the stitching looks the same on both sides. The lower tension seldom gets out of adjustment.

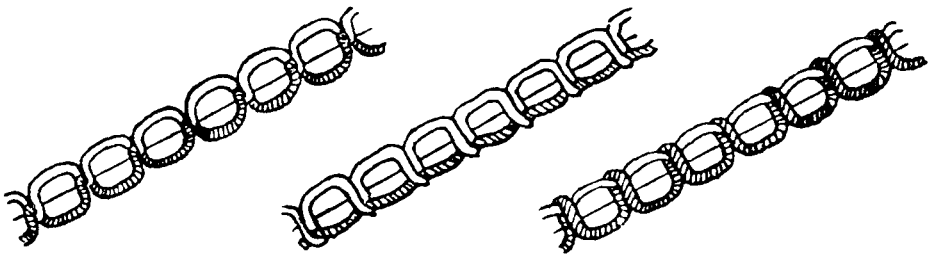


FIG. 34. STITCHES SHOWING FROM THE LEFT, BALANCED TENSION, LOWER TENSION TIGHTER, UPPER TENSION TIGHTER

9. Fabrics that are soft and thin require fine needles and threads, a loose tension and short stitches. Heavy fabrics need coarser needles and threads, a tighter tension and a long stitch. Try the stitch on a scrap of cloth before starting to sew.
10. Keep the bulk of the fabric to the left of the pressure foot.
11. To cut the thread, lift the pressure foot and then cut the threads. NEVER break the thread with your hands.
12. Do not force the machine when it is not working well. Get it repaired.
13. Keep the belt tight.
14. Use both feet on the treadle type machine, keeping the right foot slightly in front of the left.
15. Keep a piece of cloth under the pressure foot when the machine is not in use.

CUTTING A GARMENT

The beginner should choose a fabric that is easy to handle so that the learning process will not be hampered by the material itself.

A firmly woven cotton is a good fabric for the beginner because it is easy to handle during cutting, sewing and pressing. It is important that the first garments made by beginners should be satisfactory in general appearance. The following basic rules for selecting the fabric, drafting the pattern and cutting the garment accurately will aid in turning out a good garment.

PREPARATION OF FABRIC

Before they are ready for cutting, most fabrics require such preparations as correct folding, pressing, shrinking and straightening of the ends.

Shrinking

Pull a thread across one end of the fabric, and cut the fabric along the thread so that the cloth will be thread-straight. Fold the cloth down the centre, keeping the two sides and the straightened ends even. Fold the cloth evenly several times, until it will lie flat without wrinkling, in the bottom of a tub. Let the cloth remain in warm water for several hours. If the water is coloured by the dye, rinse the cloth several times by lifting up and down. Do not unfold. Remove it from the water without wringing and hang it on the line to dry. If the cloth remains folded throughout this process, little or no pressing will be required.

Straightening

Cloth is woven with lengthwise and crosswise yarns crossing at right angles to each other. These yarns are called the lengthwise or crosswise grain or grainline or the straight of the fabric. Although there may be exceptions, as a rule, each piece of the garment must be cut on the correct grain. The grain must be kept in its woven position during construction to make the garment hang and wear well.

Pull a thread or two so that the fabric may be cut on the exact thread and the end of the fabric will be grain perfect.

Although woven with lengthwise and crosswise threads at right angles to each other, a new fabric may be temporarily pulled out of shape by folding or pressing. To find out whether the threads in the fabric are at right angles to each other, place the fabric flat on a rectangular table or on a newspaper in such a way that the selvedge is even with one edge. The cut edge will be even with the edge of the table or paper if the yarns are at right angles to each other. If the crosswise edge is not even with the straight edge of the table or paper, pull the fabric diagonally toward the shorter corner until the yarns are in position and the fabric is straight.

Press the fabric before cutting. Folds or wrinkles in the piece make cutting inaccurate and result in ill-fitting garments. Press also the pattern because a wrinkled pattern is liable to lead to wrong cutting.

II. PLACING THE PATTERN

Take out all pieces of the pattern needed for the garment to be cut. Put away the extra pieces. Check the cloth to see if there is a right and wrong side,

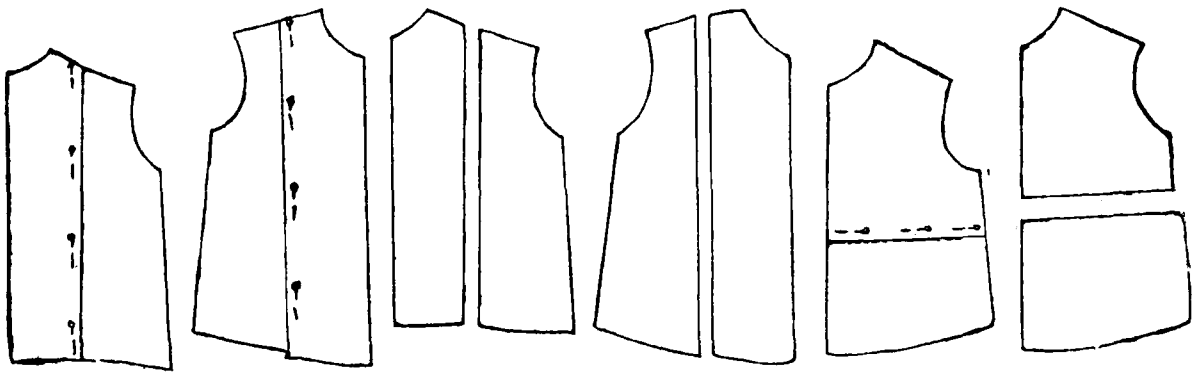


FIG. 35. PLACEMENT OF PATTERNS ON CLOTH FOR CUTTING

or an up and down design or plaid. Cloth must be cut in the direction of the plaid. Fold the cloth with the right side in and pin the cut ends together to keep the cloth straight.

Lay the cloth on a table so that the edges and ends of the cloth are parallel to the ends of the table. Place the pattern around until all pieces have been placed on the fabric. Place a weight on or pin each piece of pattern. Use a measuring tape or foot-rule to check the straight line of the fabric with the straight line of the fabric.

Pin each piece of the pattern on the cloth. Pin the pattern about an inch from the edge of the cloth and place pins about six inches apart. Take up about a quarter of an inch of cloth and paper on each pin. Place pins at rightangles to the cutting edge of the pattern. Be secure that all pattern pieces are laid on the cloth before cutting begins.

III. CUTTING

Use a pair of scissors for cutting. Do not lift the cloth up as it is cut. Hold the fabric in place with the left hand and cut with long even strokes. Cut along the grain. Leave $\frac{1}{2}''$ on all the sides for the seam line.

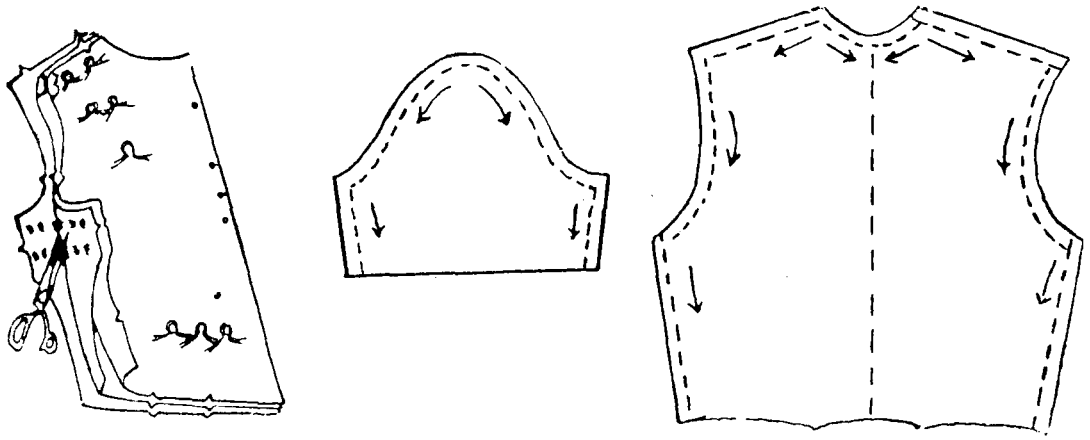


FIG. 35. STAY-STITCHING OF CLOTH BEFORE STARTING ACTUAL STITCHING

IV. MARKING

Places for darts, pleats, pockets, buttons, etc., should be marked on the cloth before removing the pattern. These markings can be made with tailors' chalk or tacked with coloured thread. Check all markings carefully with the pattern. To be on the safer side, mark the right side of the fabric.

V. STAY-STITCHING

Place a line of machine or hand stitches along the bias edge of the cut garment to prevent stretching. Stitch from the highest point to the lower edge of the garment. The line of stitching should be just inside the seam line, e.g., for a $\frac{1}{2}''$ seam, stay-stitching will be 3/8″ from the cut edge. Do not turn the corners. Stitch one

edge and stop. This stay-stitching will aid in retaining the original shape of the garment until it has been permanently stitched.

FITTING GARMENTS

Pin and tack the matching pieces of the garment together. Use about half an inch stitch for tacking along the seam edge. Try the garment on, just as it is to be worn, right side out and over the usual undergarment. Do not fit a blouse or shirt with a blouse or shirt on.

The dress-maker should remember the following questions and check up her work. To see if the direction of the grain of the cloth is right, she must ask herself : Does the thread of the fabric hang straight from the neck to the waist, at the back and front ? Is the thread of the fabric straight across the bust and the cap of sleeves? It may be necessary to lift or lower the seam lines in order to correct the hang of the garment.

For the correct direction of the seam lines remember the following : Seam lines that lie and hang straight keep the garment in proper location when worn. The shoulder seam should fit smoothly on the shoulder. The neckline should be close to the neck at the sides and back. It should be comfortable but not too tight. The armhole seams should make a good curve underneath the arm and over the top of the shoulder. The side seams should hang straight down. If the seams fall out of line, lift the garment until the seam is in the correct position. Take the garment off. Retack and try it on again.

PUTTING THE GARMENT TOGETHER

After the final fitting, the garment is ready to be put together. It will be necessary to remove some of the tacking before stitching can be done. As a rule, the following points will be found useful :

1. Stitch all lengthwise seams first, and then press them open or flat, as required. If you press as you sew, considerable time and effort will be saved and the garment will look much better. Sheer fabrics may be stitched on strips of paper if the machine stitching tends to pucker. Remove the paper after stitching.
2. Stitch sleeve seams from the top of the sleeve to the bottom, and stitch shoulder seams from the neck to the shoulder. Join gored skirt seams by stitching from the hem to the waist.
3. Stitch all crosswise seams and press them before joining them to the other parts of the garment.
4. Stitch jersey and velvet with a loose thread tension and lighten the pressure of the pressure foot. Sheer fabrics require a light tension.
5. After curved seams are joined, clip the seam allowance to prevent the seam from drawing.
6. When a design must be matched perfectly, slip baste on the right side instead of the usual wrong side.

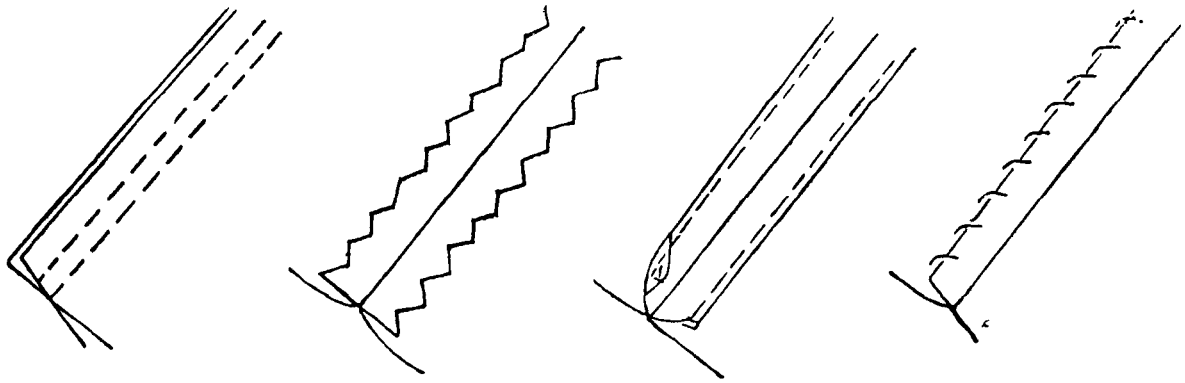
7. Cut seams unevenly to avoid bulk.
8. Handle all work carefully to avoid stretching and wrinkling of the fabric.
9. Place the garment on a clothes-hanger after it is pinned, basted or stitched together to keep it in shape.
10. Complete each part of the garment before beginning on another one to avoid extra handling. Due to too much handling during the sewing process, often a newly-stitched garment looks as if it has been worn before.
11. Work fast, but accurately. Do not sew the life out of the garment.
12. Work on a table or a board.

Seams and Finishes

A seam is made by a row of stitching holding two or more edges of fabric together. The type and finish of the seam selected depend upon its location on the garment, the type of the fabric and the wear the garment will receive.

The width of the seam varies according to the size of the seam used. It should be basted before it is stitched. Most sewing machines carry a seam gauge attachment which is useful in stitching seams or hems evenly. A 2-inch strip of adhesive tape from the machine needle can be stuck to the machine, just the width of the hem or seam and used as a gauge for stitching.

The plain seam is made by placing the right side of the two pieces of cloth together and stitching along the seam line. This seam is good on firmly woven fabrics and can be finished in several different ways. It is usually $\frac{1}{2}''$ to $\frac{3}{4}''$ in width. If it is less than $\frac{1}{2}''$ it will not give good service when the garment is worn.



DOUBLE STITCHED FINISH PINKED FINISH EDGES MAY BE BROAD EDGES TURNED UNDER AND STITCHED

FIG. 37. DIFFERENT TYPES OF SEAM FINISHES

The French seam is made by stitching two pieces of cloth together with the right sides out. After stitching, trim the seam to within 1/8″ of the stitching line. Press the seam edge to one side. Turn the garment, crease the first seam so that it is on the edge. Baste the seam and stitch within 1/8″ to 1/4″ of the edge on the wrong side of the garment. Press the seam flat from the right side. This seam is used on sheer fabrics and baby clothes.

In working the Flat—Run and Fell seam, keep one edge 1/8" lower than the other edge. Do the run and back stitch 1/8" below the lower edge. Turn in the extra material of the upper edge and hem it after flattening it thoroughly.

Fullness in Garments

Most garments require fullness at some point to ensure comfort. This is introduced in the form of darts, tucks, gathers, shirring or pleats. Fullness details may serve as decoration.

Darts are used to take in fullness at the back of the neck, front or back shoulder, top of the sleeve, at the elbow, underarm, or the waistline. They should be basted,

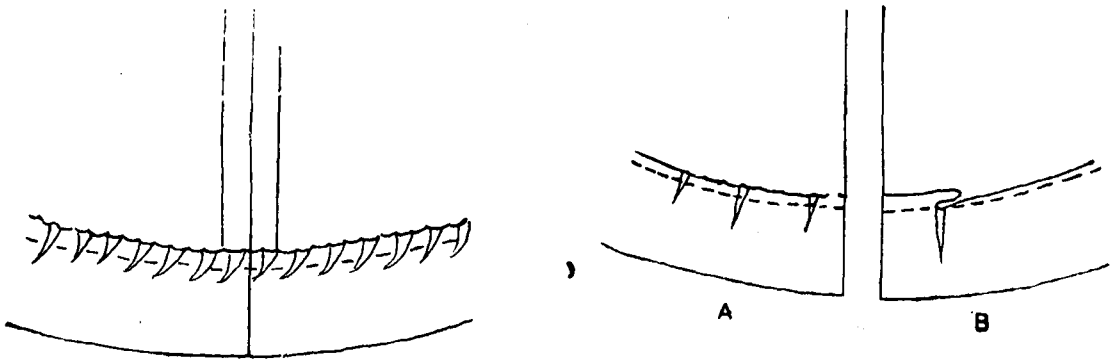


FIG. 38. GATHERING OF CLOTH FOR FULLNESS

pressed and stitched to a fine point at the end. They should be stitched from the top to the end. Shoulder darts should be pressed towards the neckline ; waist and hip darts to the centre ; and underarm darts should be pressed down. Darts made on heavy fabrics should be slashed down the centre, pressed open and the raw edges overcast.

Tucks are used for the same purpose as darts, but are not stitched to a fine point. The fullness falls free. When making tucks, use a gauge to keep the width and distance even.

Gathers are used where extra cloth must be set into a small space. Gathers may be made by hand or machine. To make even gathers, use a long machine stitch and place three rows of stitching ; then pull up the gathers on the wrong side. The bobbin thread on the machine pulls easier than the top thread. Stitching over paper, and tearing the paper away, makes gathers easier to pull up. All three rows should be pulled at the same time. The gathered section should be joined to the other part of the garment by stitching across the middle row.

Shirring is finer than gathers and more decorative. It consists of several parallel rows of gathering. The bobbin threads of two or three rows should be pulled up at one time. The threads on each end of the stitching should be tied. It is advisable to put a stay piece of fabric under the shirring to prevent the threads from breaking.

Pleats provide fullness that is evenly spaced and perpendicular to the floor. One should use a cardboard gauge to mark off the equal spacing of pleats,

then baste and press before stitching. Pleats should be stitched from the bottom point to the top-most point. This gives a better hang or drape to the pleat.

Neckline Finishes

The neckline finish is often the most decorative part of the blouse. Since it is so near the face, it attracts attention before the other parts of the garment do. The neckline should be cut and finished so that it forms a desirable frame for the face. The neck edge may be finished with a facing, a bias binding or a collar and opened down the front, back or on the side.

Binding

Bindings often serve a twofold purpose: decoration and a finish for raw edges. They fit better on curved edges when made of true bias pieces of material. A bias is the diagonal of the cloth made by folding the cloth with the lengthwise threads directly over and parallel to the crosswise threads. Crease along the diagonal, then cut on the crease. Mark the width of the strip on the wrong side with a light pencil line drawn parallel to the diagonal line and the width of the binding from it. The ends of the strips should be cut straight with the thread of the material. To sew two bias strips together, place them with the two right sides together, with the two ends meeting, so that the bias edges of one are at right angles to the other, and the point of one extends about $\frac{1}{4}''$ beyond the other. Stitch across one-fourth of an inch from the edge.

To apply a binding, tack it to the edge to be bound with the two right sides together. Stitch and remove the tacking and press. Fold the binding around the raw edge on the wrong side. Turn the raw edge of the binding under and hem to the line of stitching on the wrong side.

Facing

A facing is a flat finish which shows only on one side. It may be bias, fitted or straight. A straight facing is used only on a straight edge. On shaped edges, the facing may be bias or fitted according to the width of the facing and the shape of the edge. If the facing around a curved edge is to be one inch or more in width, or if there are sharp corners as in pointed or square necklines and scalloped edges, a fitted facing gives a smoother finish than one cut on bias.

The fitted facing is cut exactly in the same pattern as the edge to be faced. Pin and tack the edge of the racing to be finished and stitch. Remove the tacking, press the seam open and turn the facing to the underside.

Collars

Collars are commonly used to finish the neckline of a garment. There is a wide variety of sizes and shapes of collars, such as the Peterpan, the Convertible, the Mandarin or Chinese and the Tie or Shawl collar. It may, in addition, be flat or rolled, single or double, bound or faced.

Cutting Collars

Both flat and rolled collars can be cut to fit the neck of a garment after the neckline is established.

To cut a paper pattern for a flat collar, after the neckline has been fitted :

(*i*) Fold the waist down centre front and back, with shoulder seams matching ; and pin carefully.

(*ii*) Pin to the paper with the straight edge of the paper down the centre back of the waist, having the neckline fit smoothly on the paper.

(*iii*) Draw the neckline of the garment on the paper, making it about $\frac{1}{4}$" shorter at the centre front.

(*iv*) Remove the blouse from the paper and cut the collar in the desired shape around the outer edge.

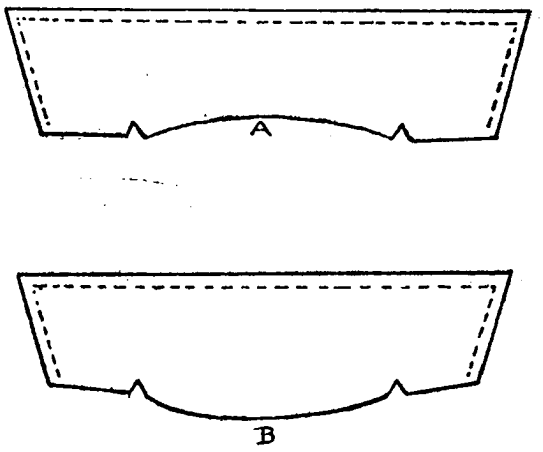


FIG 39. CONVERTIBLE COLLAR
(a) CUT NARROW IN CENTRE BACK,
(b) CUT UNDER IN CENTRE BACK TO INCREASE ROLL

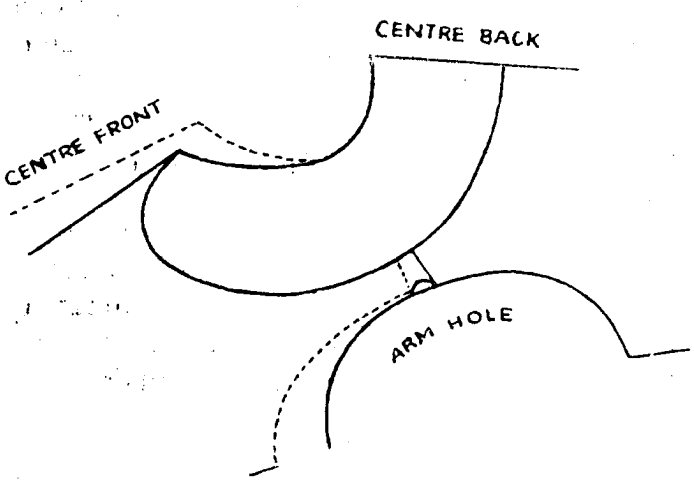


FIG. 40, METHOD OF CUTTING A ROLLED COLLAR

In cutting the rolled collar, proceed as for a flat one, except that instead of having the neckline of the collar the same shape as that of the garment, cut it with a straighter line. The straighter the inside line, the more the collar rolls. Pin the neckline of the blouse together as for the flat collar and pin this to the paper almost to the shoulder seam. Then, instead of having the garment lie smoothly on the

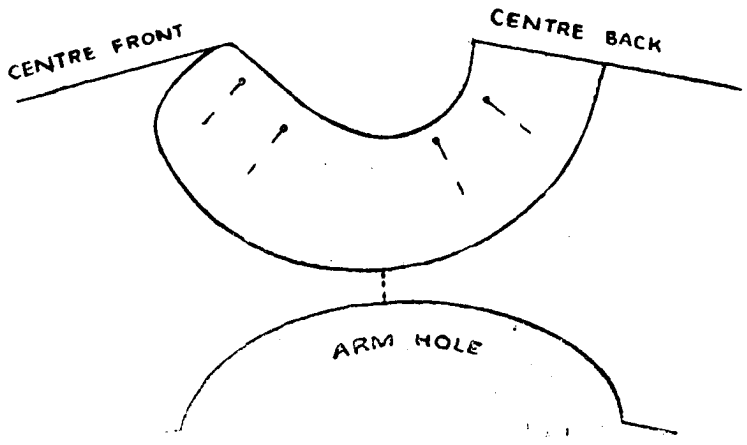


FIG. 41. METHOD OF CUTTING A FLAT COLLAR

paper, lay a fold along the shoulder seam. The fold is wide at the armhole and tapers off before it reaches the neck.

A convertible collar always rolls. The shape of the collar determines the amount of roll. The collar is usually cut straight along the outside edge. If you wish it to roll only slightly, you should turn it out along the inside edge, so that it is narrow in the back. If you wish it to roll more, it must be cut wider in the centre back.

Collars are always completed before they are attached to the neckline of the garment. To make a convertible collar, place the two pieces together with all edges matching and the right sides of the fabric together, then tack and stitch around the three edges, leaving it open along the inside edge which is sewed to the garment.

In making a shaped collar the seam around the outer edge should be notched at intervals to remove some of the bulkiness of the seam. After stitching the seam, turn the collar right side out and press carefully, creasing exactly on the seam-line.

To attach the collar, mark the centre back of the collar. Pin the underside of the collar to the right side of the dress. Pin the top side of the collar to the facing. After tacking, stitch it. Turn under the raw edge of the top of the collar and hem it down by hand to cover the seam across the back of the neck. Turn under the raw edge of the facing along the shoulder seams, and slip stitch them to the seams.

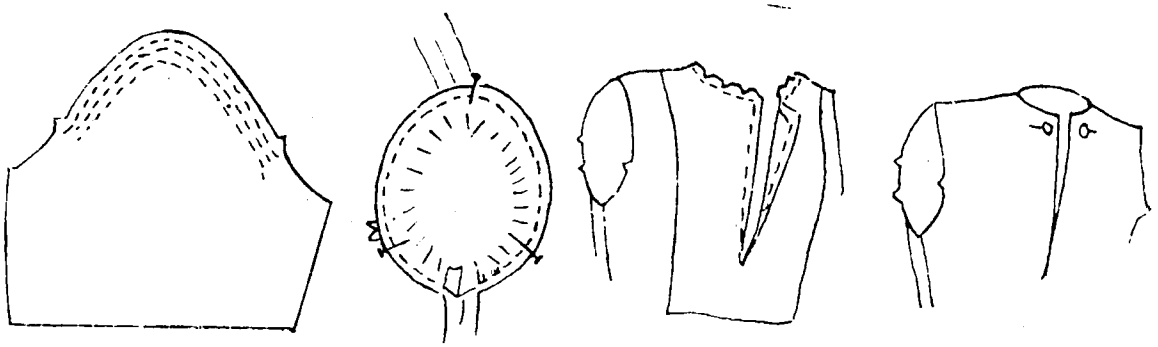


FIG. 42. SETTING OF SLEEVES IN POSITION

Set-in Sleeves

One of the most important features of a good-looking blouse or *choli* is a well set-in sleeve. A plain sleeve is one which fits smoothly into the armhole without tucks, gathers or darts. It may be long, short or three-quarters' length.

A well set-in sleeve has the following features :

1. A smooth rounded cap. No pleats or gathers unless these are in fashion.
2. Ease in the underarm area as well as in the cap area.
3. A good armhole line resulting from straight, even stitching and well-matched seamlines.
4. The longest threads in the sleeve drop from the highest point of the shoulder perpendicular to the floor.
5. The crosswise threads in the sleeve are parallel to the floor ; the end of the sleeve hangs straight.

6. No wrinkles in the sleeve.

Since a well-cut sleeve is at least one inch larger than the armhole, the fullness must be adjusted and eased in. Run three rows of machine or hand stitching around the cap of the sleeve—one row of stitching on the seamline, one above and one below. This stitching will be removed after the sleeve has been stitched into the garment. Stitch the underarm seam of the sleeve, stitching from the underarm down ; and press the seam open. Place the sleeve in the armhole—the two right sides together. Match the underarm seam of the blouse and also the top of the sleeve to the shoulder seam and pin in place. Draw up the three threads of the stay-stitching until the sleeve fits smoothly in the armhole. Adjust and distribute the fullness around the armhole. Do not ease any of the fullness directly underneath the arm. Baste the sleeve in on the seamline. Stitch in on the middle row of the stay-stitching. Remove the basting threads and the three gathering threads. Press the seam out into the sleeve.

The perfectly set-in sleeve must have an extra inch of ease but no gathers or fullness should show when the sleeve is finished.

Hem Finishes

A hem is used to finish the edge of petticoats, saris, sleeves and household linen. A good hem is even in width and does not show on the right side. On a dress-hem, the stitches should not be as close as those used for hemming table cloths. There are various ways of finishing the edge of a hem.

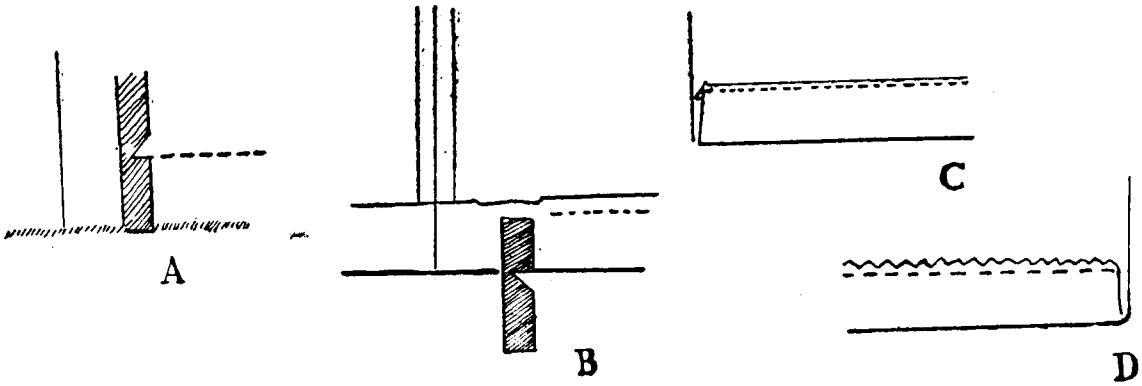


FIG. 43. A. MARKING THE HEMLINE. B. MEASURING THE HEM WIDTH; EXTRA WIDTH SHOULD BE CUT AWAY. C. TURN 1/4" INSIDE. D. EASING IN HEM FULLNESS BY MEANS OF A GATHERING THREAD.

Buttonholes

A neat buttonhole can be made by following the proper process step by step. There is no short-cut to a good buttonhole. Accurate measurements are important if several buttonholes are to be made on the same piece of the garment. Run a coloured basting or tacking thread along the line of the two edges of the buttonholes. Follow the under mentioned rules for making good buttonholes :

1. Mark the exact position of each buttonhole with a basting thread.
2. Run a row of machine stitching around the mark (A) very close to the line.

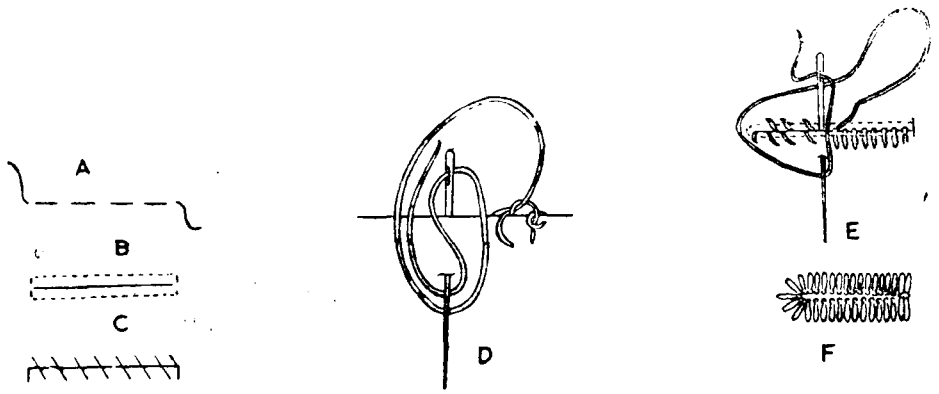


FIG. 44. MAKING AND STITCHING OF BUTTONHOLES

3. Cut the buttonhole on the centre line. Make the hole $\frac{1}{4}$" longer than the button. Place a pin at the end to prevent cutting too far.
4. Work the buttonhole by putting the needle through the slit and throwing the thread from the needle eye under the point of the needle. Pull the needle through and pull the stitch up to the top of the slit. The stitches should be deep enough to hold the fabric.
5. Take stitches close together. Make a fan or a bar at the ends of the buttonhole.
6. Work stitches around the buttonhole. Keep the stitches smooth, close to each other and of the same depth.

When sewing buttons on to a garment, use as coarse a thread as the fabric will stand. Sew through two or more thicknesses of the cloth to keep the button from pulling out. Remember the following instructions while sewing buttons :

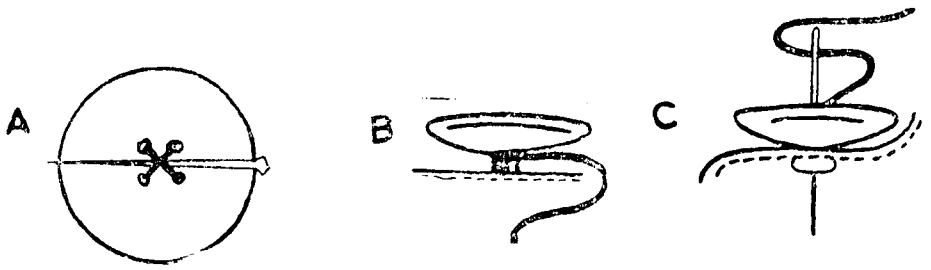


FIG. 45. SEWING OF BUTTONS

1. Attach the button. Sew over a pin to make the shank as shown in Fig. 45a; make several stitches.
2. Remove the pin, pull the button up and wind the thread around the shank, as shown in Fig. 45b.
3. A small button may be sewed on the wrong side of the garment, if the cloth is heavy, to serve as a stay, as shown in Fig. 45c.

CHAPTER 49

CARE OF CLOTHES

Proper care of a garment keeps it in a good condition and increases its life. For instance, there are right and wrong ways of taking off clothes. These may differ from person to person but if one tries, the right way which is also the easiest way can easily be discovered.

One should take time to unfasten snaps, hooks, buttons and zippers. Pulling shoes off before unfastening them will stretch them out of shape. Why drop clothing on the floor or a chair when there is a place to hang them? It will only increase the need for pressing, washing or dry-cleaning them. Besides resulting in extra costs, these things make clothes wear out sooner. Clothing that is carefully folded and put into a drawer will not only last longer, but look better when it is worn.

The home-maker should mend all rips and tears. Snaps, fallen buttons or other fasteners should be fixed in place. Things like a ripped seam or a tear give people the idea that the wearer is careless and untidy.

No person can ever hope to look her best in soiled clothing. Regardless of how many rupees are spent on clothing or how many outfits a person has, she will not appear well-groomed until all items of her clothing are clean and free of the odour or stain of perspiration. Each girl and woman should see to it that she learns how to wash and iron properly, and how to do simple dry-cleaning. Elementary aspects of these household jobs have been explained in the following pages.

COMMON LAUNDERING AGENTS

Many substances are used by housewives in their laundering. Some of the important ones have been described here.

Detergents

A washing agent or a detergent is any cleansing agent or solvent which aids in the removal of soil. The detergents commonly used in laundering are soap, *reeta* nut and synthetic detergents. Soil, whether on clothes, floor or hands, is a combination of grease and dirt. Water alone cannot mix with grease unless it contains soap or detergents which have a greater affinity for grease than the fabric. Then the grease will combine with the detergent, leave the fabric and remain suspended or floating in the water until flushed, rinsed or drained away.

Soap is used to reduce the surface tension of water and to convert the insoluble dirt on clothes into soluble substances which can be dissolved in the washing water. One should choose a good make of soap. Cheap bazaar soap may contain harmful substances. Too much soda in soap is bad. Bar soap is generally used for rubbing on fabrics when a hard soap is required. It is also used for making soap jelly for washing purposes. Soap is available in different forms.

Soap jelly can be easily made at home by dissolving approximately four ounces of soap in each pint of water. To make soap jelly, shred soap and allow it to dissolve over a low fire. Pour it into a jar and let it cool. When cold, it forms a jelly. Use when necessary. Scraps of soap can be saved and converted into jelly.

Soap flakes are made from good quality soap with a little free alkali. This is produced as an extremely fine film and then broken up into flakes which dissolve readily in warm water and form a gentle lather which eliminates the necessity of rubbing soap on the fabric.

Soap powders are of different grades. The finest are made from soap reduced to powder along with other chemicals such as sodium perborate which whitens fabrics due to its oxidizing properties. Some powders contain a large amount of powdered sodium carbonate which makes them unsuitable for woollen or delicate fabrics.

The home-maker can make soap at home by following the undermentioned directions. Use the following recipe :

Soap from soft fat (any oil whether non-edible or edible)	*Soap from tallow*
5 cups cold soft water	7 cups cold soft water
1 can lye (13 oz. caustic soda)	1 can lye (13 oz.)
6 lb. soft fat	6 lb. of mutton or beef tallow
2 tablespoons of borax	2 tablespoons of borax
1 to 2 tablespoons of perfume if desired.	1 to 2 tablespoons of perfume if desired.

Method of Preparation

Put the correct amount of cold water into a two quart utensil (earthenware or glass). Slowly add 13 oz. of lye and stir until it dissolves. Cool the solution to 80°F.

Put melted fat into a six quart utensil (earthenware or glass). Add the lye solution in a slow and steady stream. Stir slowly until the mixture is thick and creamy.

If desired, add any or all of the following : borax, some perfume and colour.

To make bar soap, pour the mixture carefully into a soaked wooden box lined with a wet cloth. When the soap is well set, remove it and cut it into cakes of a convenient size. Stack these bars of soap in such a way as to enable air to circulate around each cake.

Synthetic Detergents

Soapless detergents can be used in place of soap for washing clothes. Different varieties are available in the market. The majority are derived from petroleum but they include compounds of sodium and complex phosphates as well as sodium perborate. In addition, new fluorescent whitening agents are added. These are organic compounds which are deposited on the fabrics in the same way as a dye. Their effect is to reflect back, as visible light rays, the invisible ultra-violet rays falling on the fabric and thus produce an optical effect of brightness.

Soapless detergents have an additional advantage over soaps, in that they do not form insoluble calcium and magnesium compounds as soap does and therefore leave no deposit on the clothes. Hence they are particularly valuable in hard water districts.

Because of the complex nature of the new detergents, care should be taken to use them in proper strengths. The makers' instructions should be followed carefully.

Reeta or Soap-nut

Reeta or soap-nut is grown in abundance in India and Ceylon. This fleshy berry can be dried and stored. *Reeta* nut is slightly acidic unlike soap which is alkaline. The lather produced by the solution is better than that of soap, for it is less affected by the hardness of water.

Reeta nut solution is ideal for delicate fabrics like coloured silks and fine cottons where the colours may bleed. This is because these fibres can stand a trace of acid better than that of alkali. The cleansing agent in *reeta* is saponin. The solution is also excellent for washing gold and silver work.

Even woollen garments can be washed by *reeta* nut, although white woollen garments turn yellow if washed again and again in this solution.

To make a good *reeta* or soap-nut solution, take ½ lb. *reeta* nut and 2 pints boiling water. Crack the nuts; remove the stones; break-up the shells ; and add the boiling water. Stir well; strain; use the solution when it is cold. *Reeta* solution can be stored for about a month without its getting rancid.

Stiffening Agents

Gum Arabic : It is an exudation from the *acacia* shrub, found in Africa and in the East. This valuable gum is used extensively on fabrics which do not require heavy stiffening. It is marketed in both powder and lump forms.

In preparing it for use as a stiffening agent, the following method should be used:

Take four ounces of gum arabic and one pint of boiling water. Crush the gum arabic; put it into a basin; and pour the boiling water over it. Stir occasionally. When it has dissolved, strain through a muslin piece into a jug and then bottle it. A little formalin, if added, prevents it from going bad. One to four teaspoonfuls added to a pint of water may be used for stiffening thin coloured muslin, chiffon, lace, voile and other fine materials.

Gelatin : Gelatin may also be used for stiffening clothes. To prepare a good solution, take 1 oz. of gelatin and 1 pint of boiling water. Let the gelatin soak in water for about 30 minutes, then add 8 to 15 pints of hot water. The exact amount depends on how stiff you want the garment to be. Strain the solution. A new crisp finish can be given to garments by rinsing them in this solution. Gelatin solution is very good for freshening sheer cottons, coloured cottons, linens and rayons. But it is more expensive than gum arabic or starch.

Starch : The following method is used to prepare a starching paste : one tablespoon of corn flour, rice flour or *maida* ; 1/3 cup cold water; 1/4 teaspoon of borax (optional) ; ½ teaspoon clear fat, soap, paraffin or anv white wax (to help the iron glide smoothly).

Mix the flour in a little cold water and stir the mixture into boiling water. Use the remaining water to rinse out the flour sticking to the container and add it to the paste. Add the fat or white wax and cook for 15 to 20 minutes stirring constantly ; strain if lumps have formed. However, if care is taken, there should be no lumps. The starch thus made is known as full starch. Fashion varies in the degree of stiffness in outer garments. The strength of starch required for various kinds of articles depends upon the thickness of the fabric and personal taste.

Starch may be used in the following strengths on different articles :

Starch	*Cold water*	*Articles*
1	1	Gandhi caps
1	2	Thin fabrics requiring stiff starch
1	4	Table linen, *dupattas,* aprons and *salwars*
1	6	Afternoon tea cloths and napkins
1	8	Cotton blouses, *kameezes* and frocks

Blue

Ultra-marine blue is generally used by the housewife. It is added to the last rinsing water for white, blue, green, purple and black articles. It is used to improve whiteness or revive faded colour. The blue is tied in a piece of muslin and squeezed in cold water until the required depth of colour is obtained. The rinse should have a faint blue tinge when lifted in the hand. The blue is insoluble in water. The colouring matter is held in suspension and so the water must be stirred each time it is used ; otherwise the powder will settle on the clothes in uneven patches.

Bleaches

Fabrics are bleached by natural means or by the use of chemical substances. The oxidizing effect of sunlight and fresh air, in the presence of moisture, is made use of in bleaching linen during its manufacture. The same effect can be utilized when drying cotton or linen articles. Boiling is also a domestic method of bleaching white clothes. Some common bleaching substances with their properties and methods of use have been listed below.

Hydrogen Peroxide : It is used for bleaching wool, silk and rayon during manufacture. It has a strong oxidizing effect, working more rapidly in the presence of an alkali. It is also used for removing stains, specially on delicate fabrics, in the proportion of one part of hydrogen peroxide to six parts of water. All stains, except those requiring a grease solvent, can be removed by its careful application.

Javelle Water : This bleach is suitable only for white cotton and linen fabrics and is harmful to woollen, silken and synthetic fibres. It is also called sodium hypochlorite bleach. It can be easily prepared at home by the following method :

Washing soda	1 lb.
Chloride of lime	½ lb.
Boiling water	1 quart
Cold water	2 quarts

Dissolve washing soda in the boiling water.

Mix chloride of lime with the cold water. Allow it to stand; then strain off the clear liquid before stirring.

Mix together the dissolved washing soda and the filterate from the chloride of lime.

Allow the precipitate of calcium carbonate that is formed to settle.

Strain off the clear liquid and store it in a dark coloured bottle, as it is unstable in light.

This liquid, called *javelle* water, readily gives off nascent oxygen which has a powerful bleaching action. One should not allow the article to remain soaked in it for more than 20 minutes. To hasten the action, a few drops of vinegar may be added to the bath. Rinse out very thoroughly; never allow the bleach to dry on the fabric. A small amount of ammonia in the rinsing water will help in removing the smell of the bleach from the fabric.

Sodium Perborate : It is made from borax, caustic soda and hydrogen peroxide. It forms an alkaline solution which gives up oxygen up when applied to fabrics. It is used, along with other chemicals, in the manufacuture of various commercial preparations, particularly those which are advertised as 'oxygen' washers. It should be craefully used. Washing powders containing sodium perborate are most effective if the clothes are placed in cold water and brought slowly to the boil. Like Hydrogen peroxide, its bleaching action is due to oxidation and condequ?ntly it can produce tendering on cotton and linen.

Alkaline Agents

Washing Soda : Washing soda is sometines used to soften hard water. It also has a very strong emulsifying action when applied to greasy utensils and such greasy clothes as overalls.

Washing soda can be usded for removing stains on cotton and linen, but is most harmful to animal fibres such as wool. The indiscriminate use of hot water from a wash boiler, to which soda has been added, will harm delicate fabrics.

Caustic Soda : It is not used for domestic purposes, but there is a small amount of free caustic soda in coarse washing soaps which renders them unsuitable for washing delicate materials.

Borax : This salt is variously known as *sohaga, kuddiakar* and *tankankar.* Borax is a mild alkaline substance and acts as a water softener in the same way as wasing soda. It has no harmful effect on animal fibres, and can be used for washing and removing stains on wool or silk. As a grease solvent, borax is less effective than soda on cotton or linen articles. It is used as a stiffening agent for lace. It is also used as a mordant in dyeing and calico printing.

Ammonia : This too is used for softening water and for removing grease and dirt. It is used in suitably diluted amounts for washing blankets and white woollens and for sponging thick woollens. It is caustic and poisonous, and should be stored and used with care. It is a comparatively strong alkali

M13D of A/64—24

and may make silk and wool yellow. It may cause colour bleeding in fine fabrics.

Paraffin : It is a grease solvent and is used for removing the stains of heavy machine oil from overalls. If added to the wash boiler, it can remove dirt without the necessity of washing and rubbing the articles.

Carbon Tetrachloride : It is used for removing grease spots from clothing. It is apt to leave a ring round the mark and it is advisable to work inward from the outer edges of the mark. It is extremely volatile. The fumes are unpleasant and slightly anaesthetic in effect. It should be used in small quantities near an open window. It is not inflammable.

LAUNDERING

The majority of clothes in the weekly wash are cotton clothes. There is nothing so discouraging to the home-maker as dingy clothing and nothing so satisfactory as white clothes that look really white or coloured clothes that are fresh and clean.

A complete step by step schedule for washing cotton clothes is given below :

1. Mend rips and tears ; sew on buttons ; remove stains.
2. Sort clothes into whites, coloureds—fast and non-fast—and fabrics requiring special care.
3. Soften water with ammonia or a borax solution.
4. Use the correct water temperature for each fabric. Use hot water for white cottons or linens, and warm water for fast coloured cottons.
5. Before adding clothes, thoroughly dissolve a mild soap in the water. A strong soap will damage the cloth and fade even fast colours.
6. Add the clothes to the water ; do not overload the tub. To loosen the dirt, very soiled clothes may be soaked for 15 to 20 minutes before washing. A longer soaking tends to set the dirt in the fibres.
7. Dip the garments into water often and avoid excessive rubbing.
8. If clothes are heavily soiled, pour out the first soapy water and use a fresh solution again.
9. Rinse clothes at least twice in clear water to remove all soap and other chemicals. If allowed to remain in the clothes, soap will make them yellow and weak. The first rinse should be at the same temperature as that of the wash water and the second may be in cooler water. Rinsing should be continued till the water is clear.
10. Boil white cotton and linen clothes if necessary. This improves their colour, disinfects them and removes some obstinate stains. With the use of fluorescent washing preparations, boiling is not considered as essential as it used to be.
11. Wring cotton clothes thoroughly after each rinse.
12. Add a very small amount of blue to the last rinse for white cottons if they appear yellowish. Blue should not be used to hide dirt in clothes. If this is done, it will give the garments a grey appearance.

13. Use starch to restore the original finish. Heavy fabrics require less starch than light ones. Starching and blueing may be done as a single process.
14. Hang white clothes in the sun and coloured clothes in the shade. Garments should be hung in the way they are worn, for example, from the shoulders or the waist. Coloured garments should be turned to the wrong side. If white articles can be laid on clean grass or bushes, there will be an additional oxidizing effect from contact with the blades of grass or with the leaves.
15. Cotton fabrics should be well dampened for ironing. Sprinkle them with warm water, roll and keep them covered for some time before ironing.
16. Use a hot iron but be careful not to scorch the fabric.
17. Cotton may be ironed on either the right or wrong side. Avoid frequent starching or creasing in the same place. Press table-cloths on the wrong side and finish on the right side. Press only the lengthwise crease down the centre of the table-cloths with the iron ; the other folds should be made by hand. Double the sheets and iron them to save time. If folded smoothly when removed from the line, ironing the top hem may be sufficient. Iron all double portions of garments such as hems, seams, etc., on both the wrong and the right side to dry them thoroughly. First iron the small parts, for example, frills, lace edging and waist bands. Place the garment flat on the table with, if possible, only a single layer of the fabric beneath the iron. Guide the work with the left hand, disturbing the position of the garment only when that is necessary to prevent creasing. Special attention must be paid to gathers, tucks, pleats and collars. Creases that are made accidentally should be lightly damped with a damping rag and pressed out with a hot iron. A damping rag is also useful for removing any marks on the fabric.

The home-maker should remember the following hints for handling non-cotton garments :

Rayons

1. Some rayons are not washable. If in doubt, have them dry-cleaned. When laundering, the aim is to cleanse the fabric without breaking or melting the fibres and also to restore the original surface finish.
2. Remove non-washable trimmings.
3. Do not soak, boil or try to bleach rayon.
4. Use mild soap and warm water but never hot water. Make plenty of suds ; make sure that the soap is dissolved.
5. Squeeze suds through the garment ; do not rub or twist. Rayons lose about 50 per cent of their strength when wet and should be considered a delicate fabric.
6. Rinse twice ; use lukewarm water for each rinse.

7. Squeeze the water out gently ; do not wring rayons.
8. Roll the piece in a heavy towel, sheet or old sari to remove excess moisture. Leave it in the towel or sheet till it is ready for pressing.
9. Dry rayons away from sunshine or heat.
10. Avoid pulling or stretching rayons while ironing. Iron on the straightwise yarns.
11. Some rayons should be pressed while slightly damp ; spun rayons should be almost dry. Crisp acetate rayon (e.g., taffeta) presses better while quite damp.
12. Make certain that the rayon garments are pressed thoroughly dry before folding them away.

Silks

1. Prepare warm soapy water, using soap solution or soap flakes. Coloured silks are best washed in the *reeta* nut solution. *Reeta* nut not only cleanses but also prevents colour from running.

2. Knead and squeeze gently in the lather and pat extra soap solution through very soiled parts. Avoid rough handling, such as rubbing, wringing or twisting the piece.

3. Use warm water for the first rinse and cold water for the final rinse because this helps to stiffen the fibres. A little lime juice may be added to the final rinse. This helps to clear the colour and renew the sheen.

4. If necessary, stiffen silks with gum water. Dry silks in a shady place. Wrap them in a damp Turkish towel for ten to fifteen minutes before pressing.

5. Finish silks when they are evenly damp. Do not sprinkle water as it leaves water marks. Saris should be wrapped in damp towels and unrolled for ironing.

6. Iron white silks on the right side, if a gloss is desired. Dark colours should be ironed on the wrong side to prevent 'shine.' Tussore and eri silk should be ironed when completely dry.

The home-maker must remember the following suggestions for treating *crepe de Chine* and georgette :

1. As a rule, these silks should be dry-cleaned. If washing is necessary, follow the above method.

2. If the garment shrinks during washing, stretch it on a roller to its original size.

3. Iron on the wrong side when almost dry or quite dry. This will help to preserve the creped surface.

Woollens

When properly cared for, wool retains its fresh, fluffy appearance, holds warmth and gives longer wear. Once wool is badly soiled, it is hard to bring back its natural appearance. Perspiration weakens the fibre and dirt cuts it. Soiled spots are moth baits. For longer service, keep woollen garments clean, aired and mended. Avoid

the shock of sudden changes in temperature while laundering. Protect the garments from moths and carpet beetles.

Many woollen garments can be washed quite successfully if the right method is used. However, dry-cleaning is recommended for the heavier, fancier and dressier garments. Garments that have become dingy from many trips to the cleaners regain much of their original appearance through careful laundering.

The home-maker should bear in mind the following suggestions while washing woollen articles :

1. Make an outline of the garment on a piece of heavy brown paper, or take measurements of the garment before washing.
2. Wash gently. Never soak or boil wool. Wash by hand.
3. Wool gets shrunk or hardened by rubbing, twisting, using too strong a soap, using extremely hot water or suddenly changing the temperature of water.
4. If necessary, soften the water by adding a small amount of ammonia or borax solution.
5. Use plenty of lukewarm water, but never use hot water. The temperature of the water is a major factor in washing woollens. The wool may shrink and mat from only one too hot or too cold a dip.
6. Dissolve soap flakes in a very small amount of water ; then add cold water until the temperature is just right. The heavier the suds, the less handling is required in washing woollens.
7. Squeeze suds through the garment gently. Do not rub or twist. Wash quickly.
8. Rinse twice in water of the same temperature as the suds. Remove all soap thoroughly.
9. Roll in a heavy towel and press out any excess moisture ; unroll immediately.
10. Ease the garment back into the traced outline. Pin in place with rustproof pins or baste to the paper.
11. Dry knitted garments and skirts flat ; hang blankets over two parallel lines for drying.
12. Drying in cold wind or by a hot fire, shrinks and hardens woollen fabrics. A warm place is best.

Many articles are better left unironed. Lift, shake occasionally and pull into shape. Woollen dresses or *kurta* materials should be ironed while they are slightly damp, a steam iron proving most useful for this purpose. A damp pressing cloth may be used between the iron and the fabric in which case the iron should be moderately hot.

Nylons

Nylon is gaining popularity in India. Its smooth surface makes it resistant to dirt and easy to launder. Its great strength makes it less liable to injury than

other fibres although care has to be taken to avoid catching this fine fabric on sharp or jagged objects.

Nylon saris and light articles of clothing like blouses should be washed frequently. Nylon is resistant to staining and many common stains can be removed very easily if they are dealt with quickly. Nylon attracts dirt. When wet, nylon fabrics are almost as strong as they are when dry ; it is this which helps to make them so safe to wash. Take care not to boil nylons or use bleaches on them.

Use lukewarm water and make a lather with soap flakes or soap powder for washing nylon clothes. Soap powders containing fluorescent whitening compounds are useful for washing white nylon and preserving its brilliance. Gently knead and squeeze the garment in the water. Rubbing is not necessary since nylon is easily cleaned.

Careful rinsing in warm water is important ; white nylon should not be washed with coloured articles as it may pick up colour from the water or dirt from other fabrics.

Dry outdoors, avoiding strong sunlight.

Nylon fabrics need no finishing. Some nylon articles look better if lightly pressed with a cool iron. For some thicker types of the material, a slight degree of dampness is helpful. Water does not stain or spot nylon.

Mixed Fabrics

At present, there are many materials in the market which are made of mixed fibres such as silk and wool, cotton and wool, rayon and wool, etc. These fabrics are attractive and comparatively cheap, and combine the properties of both kinds of fibres. The one general rule is to treat them as if they were made entirely of the more delicate fibre. For example, the cotton and woollen mixture, cotswol, should be treated as woollen.

DRY-CLEANING METHODS

Certain fabrics and certain types of clothing, such as fancy brocaded *cholis* or saris, men's woollen suits and heavy coats, require dry-cleaning. Unless the family can afford this additional expense, it should avoid purchasing garments that cannot be laundered at home. Home dry-cleaning can be quite satisfactory, but it is more expensive than soap-and-water washing. Home dry-cleaning saves money in two ways. It keeps down the cost of dry-cleaning and at the same time saves many fabrics that would be ruined by home laundering.

Dry-cleaning is based on the fact that most of the dirt or soiling matter is held by grease. When this grease is dislodged, the dirt is removed along with it.

Dry-cleaning is the process of cleaning garments without the use of water. The clothes are cleaned with a dry-cleaning solution, such as white petrol or some other available cleaning fluid. As long as a pure cleaning solution is used, this cleaning process will not remove pleats, cause shrinkage or remove colour. Home dry-cleaning is practical for general clothing. On special garments, the local commercial cleaner will do a better job.

Dry-cleaning in the home may be done by the use of absorbents or grease solvents.

Common Absorbents

Absorbents are suitable for removing light grease spots from all kinds of material, for cleaning light-coloured fabrics that are evenly soiled, and for cleaning such articles as silver brocades, white shawls, white furs or dark-coloured gloves which cannot be cleaned through solvents alone. The common absorbents are French chalk, Fuller's earth, magnesium carbonate (powdered magnesia), bran, *moong* powder (green gram powder) and bread crumbs. Besides these, there are other commercial dry-cleaning powders sold in the market.

Method of Use: While using absorbents in dry-cleaning, the home-maker should remember the following rules :

1. Shake or brush off loose dirt from the garment.
2. Spread a thick layer of the absorbent powder over it and rub it in lightly with a circular motion.
3. Leave the garment for half an hour to allow the powder to absorb the grease. Evenly soiled fabrics can be wrapped up and left longer.
4. Shake off the powder and brush the whole garment in the direction of pile.

Bran, *moong* (green gram) powder and bread crumbs are the most easily available absorbents. They are useful for cleaning dark coloured felts, dark furs, teddy-bear coats, white overcoats and camel hair cloth. Heat the bran in an old pan, stirring to prevent it from burning. Rub it into the material; leave for 30 minutes; shake and brush out.

Absorbents leave no 'ring' on the fabrics. Hence they are suitable for removing spots. However, they are not so effective for cleaning articles heavily soiled with greasy dirt.

Solvents for Dry-cleaning

They are classified as inflammable and non-inflammable. Among the first group is aviation petrol. Two of the common non-inflammable solvents are carbon tetrachloride and benzene.

A dry-cleaning solvent will dissolve rubber, composition buttons, buckles and zip fasteners. It may spoil metal enamel and painted blouses or sari trimmings. If these things cannot be removed, the dry-cleaning solvent should not be used.

Dry-cleaning with Petrol

Petrol is very inflammable. It should be used outdoors at a distance from any building. Neither the petrol nor its vapour should come near a flame as it will catch fire at once.

For dry-cleaning small articles, the home-maker would do well to remember the following rules :

1. Prepare the garments by shaking and brushing them, and placing little piece of dry-- cleaning soap on them where necessary.

2. Have sufficient petrol in bowls, both to clean the garments by hard squeezing and to finally rinse them in clear petrol.
3. When the garments have been clearned, squeeze out as much petrol as possible; then wrap them in a dry towel or cloth, and beat them.
4. Hang them outside to dry.
5. Press the garments when they have become thoroughly dry.
6. Hang the garments in the open air for one day to remove the odour of petrol.
7. Strain used petrol through a muslin piece into an old spirit can. Do not throw away used petrol. Reclaimed petrol can be used as the first petrol for the next cleaning.
8. Petrol should be stored away carefully in a closed tin or bottle in an outhouse.

Cleaning Heavy Garments : It ks more economical to have heavy garments cleaned at the dry-cleaners'. If cleaned at home, they should not be dipped in dry-cleaning solutions as they absorb too much of the fluid and become difficult to handle. Do not allow a heavy garment to become too dirty. The garment cna be successfully spotted and cleanred at home for grease spots and then steam-pressed.

Home-makers should use the following method for dry-cleaning heavy garments.

1. Spread out the stained part of the garment on a table or skirt board, with a paid of cotton-woolr or several thicknesses of blotting paper benath it.
4. Take a clean pad preferably of the same material as that being treated; moisten it with petrol a apply it to the fabric gently around the stain.
3. Gently rub the pad inwards until the centre is reached. Repeat until the stain is removed.
4. Complete the process by shading off any ring which may have appeared; and dabbing the treated area with a piece of dry material. Take particular care in drying off the surrounding patrts; a ring or halo might othersise be formed.
5. Between applications of the solvent, take care to re-form the pad beneath the stain, so as to take away any grease already absorbed. This grease might otherwise be picked up later by the garment.

Cleaning Leather and Fur Articles : The paraffin method is used in cleaning leather and fur artiles. This prevents the natural oil in the leather from drying and keeps the articles soft and pliable. The methods is as follo2ss:

Completely dissolve two-thirds of an ounce (about 2 tablespoonfuls) of fintely hsaved paraffin in one quarrt of a dry-clearning fluid in a glass jar, bowl or enamel pan. It will take 30 to 45 minutes for the paraffin to sissolve. btir frequently.

Leather jackets, bags and belts can be cleaned by scrubbing the garment with a soft cloth which has been dipped in the paraffin solution. Continue to scrub until the entire garment is cleanred. Jackets, gloves or collars of fur can be easily cleaned

with this solution. Dip a brush into the solution, brushing back and forth over the fur. Be careful not to allow the solutionto touch any cloth part of the gaiment, othersise the paraffin will make a greasy spot. After the fur has been completely dried, brush with a stiff brush .

Very dirty white fur may be treated with a paste made by mixing French chalk or Fuller's earth and a dry-clearning solvent. When dry, brush or shake off the powder. Brush in the direction of the fur, but never against it. Dry in the open air.

REMOVAL OF SPOTS AND STAINS

It is very difficult to remove spots successfully. Skilful and experienced workers are employed to remove spots in dry-clearning establishments. These workers must have knowledge of textile fibres, dye-stuffs and chemicals used on different fabrics. The home-maker can study the general principles involved in the removal of stains and make a good job of it at home.

Spots should be removed immediately before clearning or pressing a garment. Pessing sometimes sets a stain. If strians are allowed to remain in a garment for a long time, they become permanet. It is then impossible to remove the spot without removing the colour from the garment. While removing stains, the following points must be borne in mind.

1. Find out what kind of a stain has to be removed.
2. Find out what kind of a material it is—whether it issilk, linen, cotton, rayon or a mixture of fibres. Each of these fibres presents various difficulties and the combination of fibres, colours and finishes makes stain removing still more difficult.
3. Find out what substance will remove the stain without injuringthefabric.
4. Try the stain remover on an unexposed part of the garment to see its effect on the cloth.
5. Remove the stain as soon as you find the correct stain remover.
6. Correct use of the stain remover is very important.
7. The stain may often attack the fibre so that removal becomes impossible.
8. Changes in the character of the stain due to drying, exposure to air, washing, soaping or ironing may make drastic measures necessary and often prevent removal of the stain.

Spot Removing Mixture

A spot removing mixture can be prepared with the following ingredients :

One cup dry-cleaning solution; one cup warm water and dry-clearning soap.

Turn the spot over a towel, dip a soft cloth or brush in the spot eremoving mixture and apply it to the wrong side of the spot, beating it gently with a damp cloth or brush until the stain is removed. Let it dry. Dip the garment in a clearning solution Remove, dry and press.

Causes and Removal of Rings

The formation of a ring is one of the greatest problems confronted while removing stains. Rings may be caused :

1. by the rest of the garment becoming soiled while the stained area is being cleaned;
2. by the dressing of the fabric being removed;
3. by the texture of the fabric being changed;
4. by the tightening of the fibre;
5. by the use of impure solvents; or
6. by the incorrect use of a solvent.

Rings may be avoided:

1. by using a towel or a blotter beneath the stain;
2. by using straight light strokes;
3. by beginning in the area round the stain and working towards the centre of the stain;
4. by using the solvent sparingly and working rapidly;
5. by drying quickly (blowing on the stain as the solvent is being applied will help to dry it);
6. by steaming or holding the fabric over steaming kettles; and
7. by steam pressing the garment with a damp cloth.

TABLE 44

METHODS OF REMOVING DIFFERENT TYPES OF SPOTS

Stain	*Remover*	*Method*
Blood	Clear cold water, ammonia	Apply water; tap the stain with a brush. Add a small amount of ammonia in the water for stubborn stains.
Coca Cola or other aerated waters	Water, glycerine, acetic acid	Apply warm glycerine. Remove the glycerine with a sponge dipped in clean water. If the stain remains, apply 20% solution of acetic acid. Rinse with cold water.
Coffee or fruit ..	Hot water	Spread the stained part over a bowl. Pour boiling water on it from a height sufficient to strike the stain with force.
Cream or milk ..	Soap, water	Wash first in cold water; and then in warm water and soap.
Curry or *kunkum*	Hot soapy water, hydrogen peroxide, sun, grass	Soak in hot soapy water and dry in the sun on the grass. Apply a few drops of hydrogen peroxide; leave for a few minutes; rinse thoroughly; dry in the sun.
Grass or leaves ..	Cleaning solution, banana oil if necessary	Dry-clean the garment and use a spot removing mixture. If the stain still remains, try a few drops of banana oil.
Grease spot ..	(*i*) Talcum powder or flour	(*i*) Apply powder to the spot immediately on both sides. Repeat if necessary.

TABLE 44—*contd.*

Stain	*Remover*	*Method*
	(*ii*) Soap jelly, water	(*ii*) Place a bowl under the stain. Cover the spot with soap jelly. Rub with the tip of your finger or a soft brush. Rinse with water. Repeat if necessary. Make sure the stain is removed before pressing.
Indelible ink ..	(*i*) Iodine and sodium thiosulphate	(*i*) Sponge spot with iodine, remove with sodium thiosulphate solution. Dissolve several crystals in half a cup of water.
	(*ii*) *javelle* water, ammonia solution	(*ii*) Soak cotton or linen in *javelle* water. Then soak in ammonia solution.
Iodine	Water, sodium hyposulphate, ammonia	Sponge with clear water. Tie a few crystals of sodium hyposulphate in a thin cloth; dip it in a weak ammonia solution and daub the stain with it. Rinse out in clear water.
Iron rust	Lemon juice, curds, soap and water.	(*i*) If iron rust is from fresh rusty water, quickly wash out. Apply lemon juice or curds with warm water and then wash with soap and water.
	(*ii*) Lemon juice, boiling water	(*ii*) Hold stain over a vessel of boiling water and squeeze lemon juice on stain. Rinse. Repeat until stain is removed.
	(*iii*) Cream of tartar	(*iii*) Boil the stained article in water containing 4 teaspoons of cream of tartar to each pint of water. Rinse thoroughly.
Lipstick	Soap, water, hydrogen peroxide or a chlorine bleach	Some of the stains can easily be removed if soap is rubbed on the spot before wetting. Wash with warm water and soap. A stubborn spot should be treated with hydrogen peroxide or a chlorine bleach.
Medicine ..	Ethyl alcohol or surgical spirit	Steep in ethyl alcohol or surgical spirit. Treat any resulting stain by the usual method.
Mildew	(*i*) Lemon juice and salt	(*i*) Apply to stain and let stand in sun.
	(*ii*) Hydrogen peroxide	(*ii*) Cotton and linen may be bleached but not silk and wool.
	(*iii*) Potassium permanganate and oxalic acid	(*iii*) With a medicine dropper, apply potassium permanganate. Remove with oxalic acid. Rinse thoroughly in three waters.
Nail polish ..	Amyl acetate (nail polish remover)	Nail polish will generally stiffen the fibres because of its cellulose base. Apply amyl acetate with a dropper. Dry-clean. Never use amyl acetate on rayon or silk.
Oil paints, varnishes and enamels	(*i*) Equal parts of benzol, acetone and alcohol	(*i*) Sponge with solution. If stain is stubborn, soak it in the solution. Do not use on an acetate rayon.

TABLE 44—*contd.*

Stain	*Remover*	*Method*
	(*ii*) Turpentine	(*ii*) Sponge the spots or wash the entire article in turpentine. Rinse in fresh turpentine.
Perspiration ..	Water, ammonia	Sponge area with clear water. Add a few drops of ammonia to water; repeat.
Printing ink ..	(*i*) Lard or fat or oil, soap and water	Wash fresh stains thoroughly. Work oil in fibres thoroughly and leave overnight. Wash with soap and water.
	(*ii*) Turpentine or kerosene	Soak overnight in turpentine or kerosene. Wash thoroughly.
Sugar	Lukewarm water, acetic acid	Apply water. A small amount of acetic acid applied to the stain with a medicine dropper hastens the stain's removal.
Tar	Oil or grease solvent, hot water, soap	Use oil or grease to soften the tar and then wash with hot water and soap. In the case of articles that cannot be washed, remove the tar with oil. Afterwards, remove the grease with a grease solvent, or have the article dry-cleaned.
Tea	Hot water	Wash in hot water or pour hot water over the stain.
Lead pencil stains	Oleic acid, Ammonia	These can be generally removed by normal washing. For stubborn stains, treat with oleic acid. Then dip in warm solution of ammonia.
Turmeric	(*i*) Hot soapy water, sun and grass	(*i*) Soak in hot water and dry in the sun.
	(*ii*) Hydrogen peroxide	(*ii*) Apply a few drops of hydrogen peroxide, leave for a few moments, rinse thoroughly and dry in the sun.

STORAGE OF WOOLLEN GARMENTS

Storage of garments, specially of woollen garments, is as important as their upkeep. If storage is neglected, the result may be a total loss. The greatest enemy of woollen garments is the moth. This little insect can destroy or ruin clothing worth thousands of rupees in a short time. The only way of preventing this heavy waste is to ensure proper storage of woollen garments when they are not in use. The home-maker will do well to remember the following hints when storing woollen garments.

1. Clean the garments with a suitable method.
2. Place the freshly cleaned, thoroughly dry and neatly folded garments in paper. (Newspaper or brown paper will do.) Moths dislike printer's ink. Sprinkle paradichlorobenzene crystals or moth-balls between the folds of the garments.

3. Seal all edges with gummed tape to prevent re-infestation of moths. Put cedar chips, sandal wood dust, dry eucalyptus or neem leaves between the bundles.
4. Pack the sealed bundles in a box or trunk or on a closet shelf.
5. As an extra precaution, keep paradichlorobenzene between the bundles. Use one pound to each trunk or large box. Seal the edges of the box with gummed tape. Paradichlorobenzene destroys the moth in all the stages of its development.

Kerosene pyrethrum sprays are sold in bazaars, and are effective in killing moths by direct contact. Various local materials, such as neem leaves, tobacco leaves and *khas-khas* roots can be used. Dry neem and tobacco leaves; and put them in-between the folds. Three to four pounds of either naphthalene or paradichlorobenzene sprinkled on the shelves and floor of a closet full of clothes will protect garments, provided the closet is sealed air-tight. Cedar linings in closets are not sufficient to protect clothes. The moth-proofing solutions which are available in the market cannot make a garment permanently immune to moths. Ordinary moth-balls are not dependable, since the odour drives only the adult moth away. The young moth continues to feed on the garment until it is old enough to fly away. Sun and air the clothes every month; the hot sun will kill the moths.

MENDING METHODS

The housewife must examine family garments frequently and take prompt action to mend them if they have become worn or defective. She must have, as her motto, the old saying : 'A stitch in time saves nine.' It is hardly necessary to stress that if mending is neglected, total loss invariably occurs.

In spite of painstaking mending, large patches and darns are sure to show and look unsightly. With proper care, they can be avoided. Buttons should be reattached before they fall off and get lost. Buttonholes on upper garments should be sewn with buttonhole twist as soon as they begin to fray. On undergarments a piece of tape should be tacked behind the buttonhole and then slit to the size of the hole. The buttonhole can then be stitched on to the tape. Children's clothes should be reinforced to make them stronger.

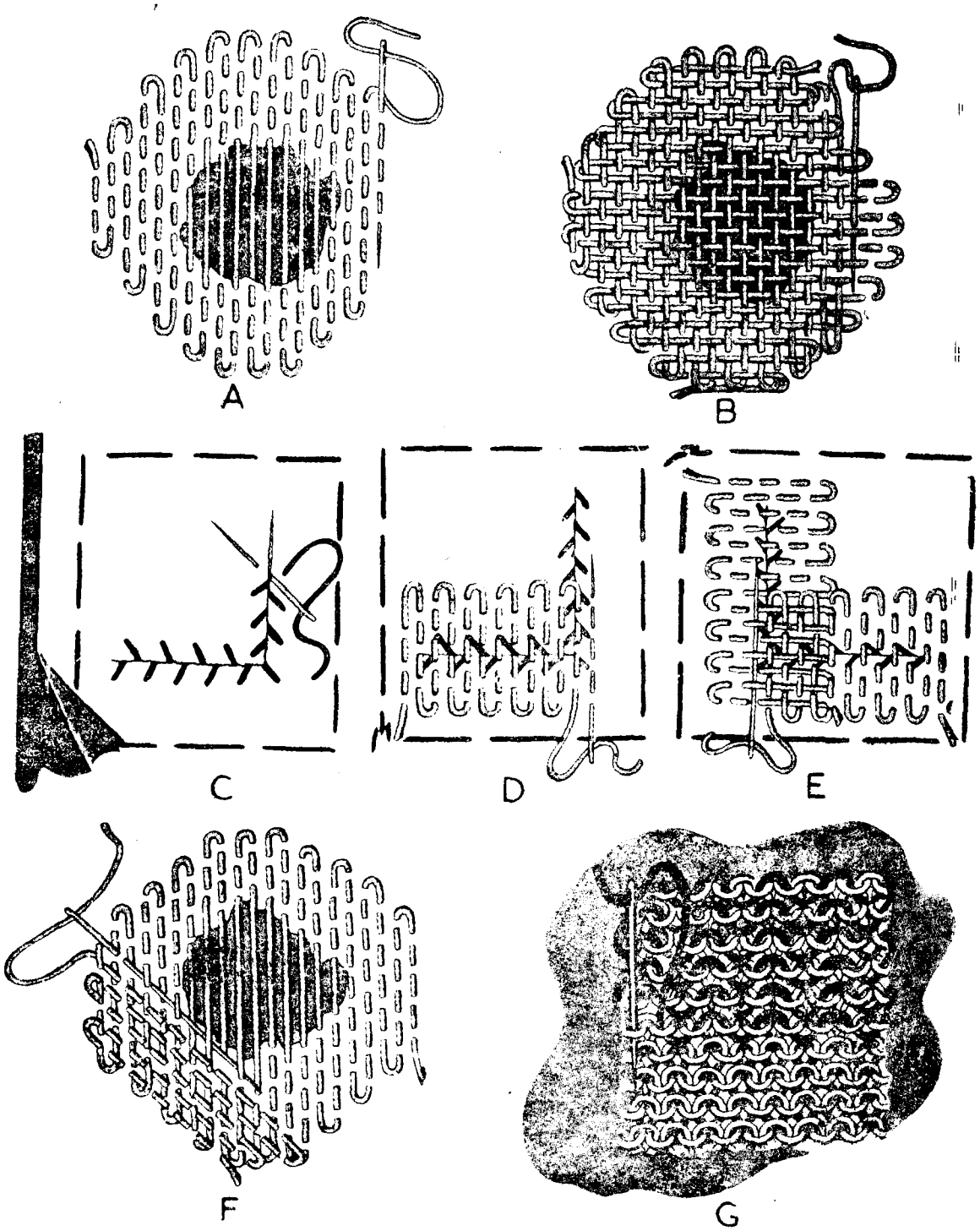


FIG. 46. DARNING HOLES AND TEARS

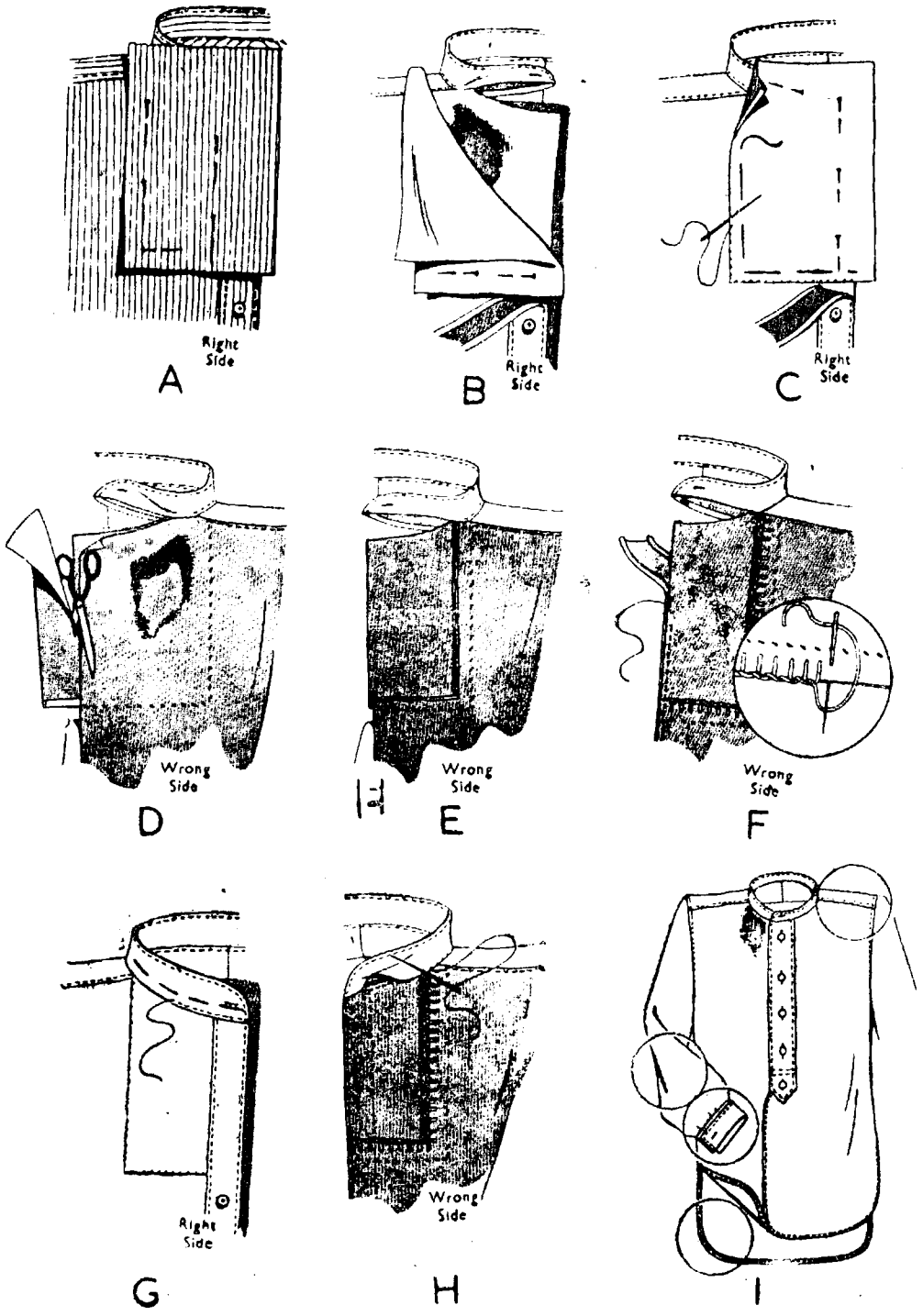


FIG. 47. PATCHING A SHIRT

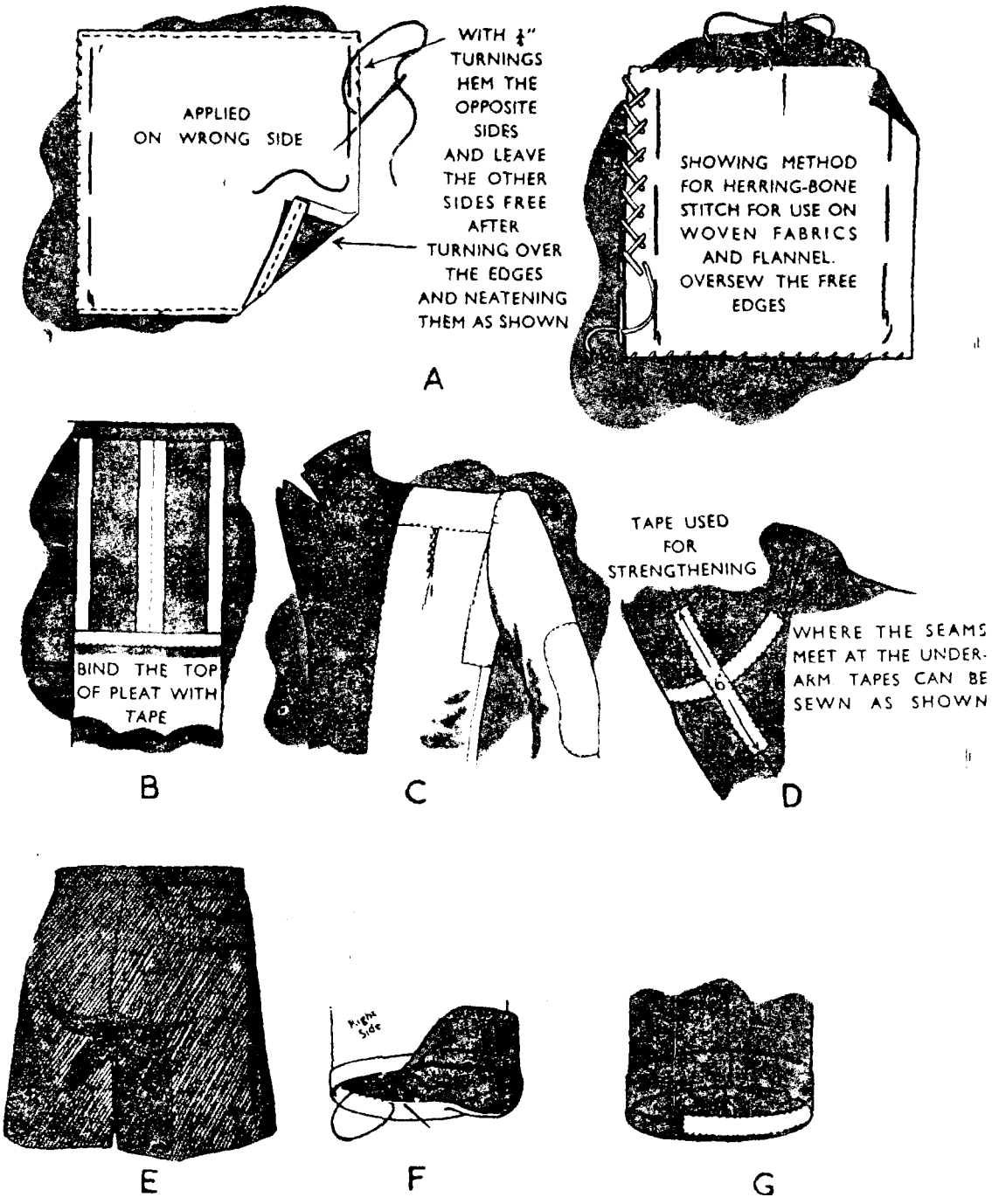


FIG. 48. REINFORCING FOR EXTRA WEAR

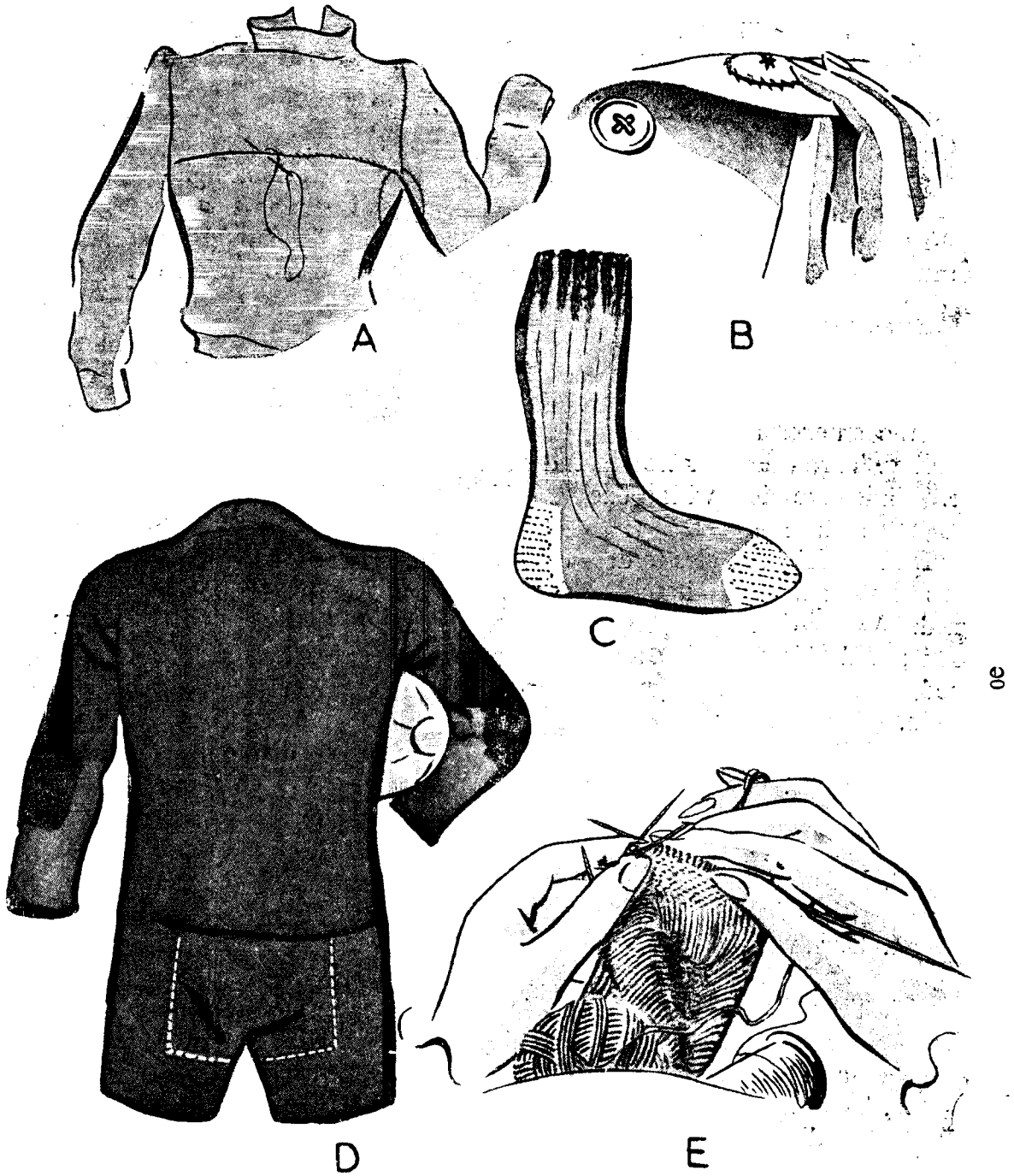


FIG. 49. REINFORCING CHILDREN'S CLOTHES

Darning Problems

Many a run in knitted fabrics starts with a hole. Efficient and timely action will stop further damage. The housewife should keep, in her mending basket, darning threads of all types, i.e., silk, mercerized or plain threads. She should also have mending wool, darning needles and a small pair of embroidery hoops to hold flat fabrics taut. The housewife should use one or more strands of darning thread, according to the weight of the stocking or the fabric to be darned. While matching thread with the piece, always choose a shade slightly darker than the fabric because when worked in the garment the thread will look lighter than it does in the spool.

Trim the frayed edges of a hole and begin darning far enough from the hole to take in all weak portions. No knot should be made in the thread when darning. Just draw the thread neatly through the fabric leaving a loop at each end to allow for shrinkage and elasticity. Darn the wrong side. Trim off the loose ends close to the fabric when the hole is completely darned. Put in the lengthwise threads first by stitching rows of running stitches, working over and under the edge of the hole. Leave the stitches at the end of the rows loose to prevent the finished work from puckering. Turn the work around and weave in the filling stitches in the plain weave style. Finish the piece with a back stitch.

Darning Holes and Tears

Do not wait for holes to develop. It is better to darn the garment as soon as it begins to wear thin. Imitate, as far as possible, the texture of the fabric being darned. When darning a big hole, tack a piece of net at the back and darn acrossit; and this will give an extra support for the stitches. Before a tear is darned, it should be tacked on to a piece of paper to hold the edges in position.

1. Weave the needle in and out in an irregular diamond shape, working well beyond the thin area surrounding the hole. (Fig. 46).
2. Turn the darn around and work in the opposite direction. Always leave little loops as you turn to allow for shrinking when washed.
3. Before darning a tear, tack the work on to a piece of paper and stitch the edges of the tear together by using the fish-bone stitch.
4. Darn well beyond the tear and right across the base, forming a rectangle.
5. Turn the work around and darn in the same way across the other part of tear. At the corner, a solid square is formed. Remove tacking thread and paper.
6. The first stage in darning knitted fabrics is the same as in an ordinary darn, but the direction of the second set of stitches is diagonal.
7. For reinforcing heavy woollens, such as knitted jumpers, etc., work on the wrong side, and weave in and out following the loops of the knitting.

REINFORCING AND PATCHING

Reinforcing Children's Clothes

(*a*) Strengthen the back and underarm of the bushshirt (Fig. 49).
(*b*) Reinforce the material behind the buttons with circular patches.
(*c*) Reinforce the heels and toes of the socks (Fig. 49) .
(*d*) Reinforce the seat and inside elbows; patch outside and behind the cuffs.
(*e*) Knit extra cotton thread into the heels and toes of handknitted socks.

Shirts are easy to mend, as the patches can be cut from other parts of the garment. They can be replaced by similar material cut from a discarded shirt or some other garment. When the cuffs start getting frayed, they should be carefully unpicked and reversed. As they are double, the worn out edge will then be inside the fold. If you are using new fabric for patching, it should be washed first.

Reinforcing for Extra Wear

By reinforcing is meant the strengthening of a new garment at places where you know the wear will be greatest. It is always done on the wrong side (Fig. 48) and it should not show on the right side if it is neatly sewn. Use hemming stitch on most fabrics, but herring-bone stitch should be used on woven fabrics and flannel, when the edges are left frayed. Tape or bias binding will be found useful for strengthening seams.

1. For reinforcing elbows, knees, etc., sew an extra piece of cloth inside. Keep it in position by hemming opposite sides. It should be slightly tighter than the section it protects.
2. Cut away the material from the back of box-pleat. This can be used for patching. Then suspend corners from waist band with tape.
3. Linings can easily be strengthened, as they can be partly removed while being sewn.
4. Tape should be used for strengthening patch pockets on the wrong side.
5. Inter-lining applied in this way on elbows, seats, etc., can easily be removed and replaced when they wear out.
6. Bind the wrist edge of the sleeve with a strip.
7. Face the inside of trousers' legs with a strip of cloth of the same cloth as the trousers. Place it near the edge at the back where the heel will rub.

General Remarks on Patching

1. All patching should be as invisible as possible.
2. Patching should be placed selvedge by selvedge.
3. In plain patching or flannel patching, the patch should be straight by a thread.
4. For print patches, the edges are folded to match the print, though it is better to fold by a straight thread.
5. A print patch is not necessarily placed by a straight thread, as the pattern of the print has to be matched.

6. The selvedge side must be well stretched for all patches.
7. The turnings at the corners must be folded at true right angles.
8. The patch should extend 1/2" beyond worn-out area.
9. The patch material should match the garment in quality, strength and colour.
10. The centre of the patch should be over the centre of the hole.
11. Sewing is always done on the right side of the patch, with the patch being held towards the worker, to ensure the patch lying flat.
12. Felling is done on the wrong side of a plain patch, because it is a less strong stitch than sewing and does not throw a strain on the already weakened garment.
13. Sewing, being stronger than felling, is done on the right side because the strain is worn by the patch and not the garment.
14. In a flannel patch, no turnings are made.
15. Herring-bone stitch is done throughout patching.

Patching A Shirt

(*a*) Cut the patch to extend well over the neck band, yoke and front hem.
(*b*) Unpick the neck-band and front hem, and pin the patch in position, taking care to match the pattern exactly.
(*c*) Tack the patch firmly, folding a 1/4" turning along straight edges and hem neatly.
(*d*) Turn to the wrong side and trim to the shape of the neck and front.
(*e*) Cut away the worn parts of the shirt leaving a 1/4" turning from the hemming stitches.
(*f*) Blanket-stitch the turnings and sew front hem back into position.
(*g*) Turn in back to the right side, and tack and stitch the top layer of the neck-band by machine.
(*h*) Hem down the lining of the neck-band, and this completes the patch.
(*i*) The parts indicated by circles can be used for patches. The sleeves can be cut short for summer wear.

CHAPTER 50

CHILDREN'S GARMENTS

The influence of attractive, suitable and comfortable clothing on the child's growth and development is not always fully recognized. Comfortable and well-fitting garments in interesting fabrics, colours and designs contribute to the child's feeling of well-being and self-confidence. Appropriate clothing will help the child in developing into a well-poised individual, ready to take part in group activity or to work alone without feeling self-conscious.

Observation of children's clothing shows that more often than not it has been modelled on that of adults. Such garments handicap the physical, mental and emotional development of the child. Children's garments should be simple, easy to wear and colourful with ample fullness for stooping, reaching and growth.

Children, specially girls, begin to take an interest in their clothes at an early age. They may make undue demands on the family income by incessantly asking for extra clothing. Some parents do not resist even the most unreasonable wishes of their children, and thus create selfish habits and unwise buying practices in them. Once the children have learnt to read and write, they should be encouraged to keep a record of the articles purchased for them. This will gradually impress upon them what these things cost to the family. It will also develop in them a habit of sharing the family income.

Children normally tend to demand that a cloth be purchased because of its good looks or because it may catch their fancy. Therefore, the older members of the family must patiently guide them in buying the most suitable clothes. A nine-year-old girl may cry for a satin dress, not realizing that two lovely as well as durable cotton ones could be purchased for the same amount, last much longer and look much better even after many washings. When the child is old enough to understand, his clothing needs should be frankly discussed. Children should be allowed to assist in shopping from an early age. Generally, even a small part in the selection and purchase of clothing develops a special interest in clothing among the children.

If the home-maker remembers the following simple directions, she can clothe her children well at a reasonable cost.

1. Consider the actual needs.
2. Make suitable garments for infants and small children.
3. Select the best cloth available for the purpose for which the garment is needed and for the price which is being paid.
4. Buy durable, washable and fast coloured cloth.
5. Shrink the cloth before making it into a garment.
6. Select only such cloth and designs for the children's garments that lend themselves to remodelling.

7. Keep an extra bit of cloth for patching and remodelling.

PROPER CHOICE

Good posture depends largely on good health and comfortable clothes. Badly fitting shoes, socks that are too short, heavy garments hanging from the waist or shoulder, garments that are too tight on the shoulders and chest, a tight belt worn to hold up the pants or the skirt, etc., handicap normal physical development. Such poorly fitting garments will create posture problems that might last a lifetime. In addition to the above general considerations, the following aspects must be taken into account when making children's garments.

HOT WEATHER GARMENTS

During summer, children should not be made to wear more clothing than is necessary to maintain their body temperature evenly and to protect their bodies from the direct rays of the sun. Healthy children lead an active outdoor life in the spring and the early part of summer, until the heat becomes intense. Loose-fitting garments which permit freedom of movement and unrestricted play prove most comfortable. During the warm weather, the body creates an extra amount of perspiration. Clothing should be such as to absorb the oil and sweat; and the garments worn next to the body must be washed daily. Summer clothing must be light, absorbent and porous. They should permit free circulation of air and should be easily washable. Light-weight khadi or knitted cotton is excellent for summer wear.

COLD WEATHER GARMENTS

Very often children are loaded with thick, heavy and cumbersome clothing in an attempt to keep them warm. However, several layers of light-weight clothing give more warmth and provide more freedom of movement. Knitted or napped (fuzzy on one side) fabrics of cotton, wool, rayon or a blend of any two of these make desirable material for cold weather garments.

Some children generate more body heat and perspire freely even in cool weather. Thus, damp clothing may expose them to cold easily, if it is not changed at once. For ease in laundering, comfort and good service, a medium or light-weight knitted cotton is an excellent choice. Woollen knit underwear may be too warm for some children or may irritate their skin. They also require considerable care in laundering and storage.

Parents and teachers should check on the clothing worn by children in winter till the children are able to decide for themselves what to wear in different kinds of weather.

Precautions

Diseases like small-pox, certain intestinal diseases, scabies and turberculosis may be carried through clothing. Therefore, new garments should be carefully laundered before they are worn. The garment may have been made by a person with some infectious disease.

Loose dye is often irritating to a sensitive skin. Laundering will remove excess dye. Strong soap and bleaches used on clothing often tend to irritate the skin of young children. Such strong laundering materials should never be used on infants' garments.

BABY'S CLOTHING

The baby's clothes should be made of soft, pliable and absorbent cloth. Extreme care should be taken to ensure that the garments worn next to the skin do not irritate the baby's skin. Cotton cloth is the best material for all infant clothing. Cloth bought for the baby's garments should be durable and easily washable. It should require very little ironing. It should be light in weight, but sufficiently heavy to keep the body temperature even. Both the material used and the method of constructing the baby's garments should allow for ample ventilation. The baby's clothes should be attractive but never elaborate. The design and decoration, if any, should be simple. Trimming should not be bulky or irritating to the skin. His clothes should be constructed with smooth and flat seams, and have simple fastenings. They should be designed to allow the growth and development of muscles. This can be done by the use of gathering or unstitched pleats at the shoulder seam and at other places, of wide seams and hems that can be let out as the child grows.

Above all, the baby's garments must be safe. Safety and health are the first requirements in child care. Draw-strings and ribbons should not be used in the necks of baby garments, as they may get pulled too tight around the baby's neck and cause strangling. Fur and fuzzy yarns are bad, for the hair and fuzz may pull out and get into the baby's throat, eyes or nose. Safety pins can become a hazard as they may get unfastened; they may then be picked up and swallowed by the baby. It is best to dress the baby without the use of safety pins or buttons whenever possible.

Essential Clothing

The baby outgrows its clothing in a very short time. Therefore, his garments should be few in number, comfortable, locally made and able to stand very frequent washing.

Bands or abdominal binders are the first items of clothing required by the baby. These are used to hold the dressing in place until the navel is healed. The binders can be made of some soft cloth, such as worn-out saris, sheeting or cotton flannel. Cut the band 4" to 6" wide and 18" to 24" long and leave it unhemmed. Fold and hold it in place by ties. The bands should be sterilized before use.

Diapers come next on the list of essentials for the baby. A greater number of these is required than any other garment. Diaper cloth should be soft, light-weight, pliable, absorbent and quick-drying. Cotton gauze, flannelette and even knitted fabrics are satisfactory. Diapers vary in size from 18" by 18" to 22" by 48", depending on the size of the baby and the method of putting them on.

Shirts are needed to protect the baby's body from sudden changes of temperature. This does not mean that a shirt should be worn at all times for it might prove too hot to be worn in summer. Three to four shirts will be sufficient. Knitted cotton makes

FIG. 50. ESSENTIAL CLOTHING FOR CHILDREN

desirable shirts. These may be single or double-breasted, sleeveless, with short sleeves or with long sleeves. Butterfly type sleeves can be worn for a longer period of the year and are more comfortable. Shirts made of woven cloth should be a bit bigger than those made of knitted cloth since the woven cloth does not stretch enough to allow free movement of the body. The shirts may be cut on the bias for greater comfort of movement.

Baby dresses often display the creative skill of the mother rather than her desire to keep the baby in comfort. The dresses should be short enough for the baby to kick and wriggle around. Soft cloth in white, pale pink, blue or yellow, with simple dainty decoration, suits every baby. Avoid the use of scratchy trimmings, specially around the neck and sleeves. Kimono or raglan sleeves should be preferred to set in sleeves.

The material used for making the baby's dresses should be soft and easy to launder. When possible the fabric should be so chosen that slips (banyans) will not be found necessary. Nainsook, muslin and voile are desirable fabrics, but fine cotton crepe or seersucker is easy to launder and will not wrinkle as much as other fabrics.

Dresses should hang free from the shoulder and should be amply loose. Tucks in the yoke and skirt look well and can also be opened out as the child grows. Avoid tiny bindings or broad bands around the bottom of the sleeves, as these usually irritate the baby.

The type of sweaters or wraps for infants will depend on the climate and age. Wraps for younger children, specially babies, should be easy to slip on and off, and should be made of soft, warm and light-weight fabric. Dressing and undressing must be made easy for children of all ages, otherwise they develop a dislike for clothes.

Footwear is not always essential for the baby. Generally babies keep so active

that their feet and legs are sufficiently warm; they are therefore generally happier without footwear or legwear. Stockings or booties, however, will give sufficient protection until the baby begins to crawl or toddle, as well as on cold days.

It is important to remember that the baby's foot is very tender and pliable. Badly fitting socks or booties may therefore start foot trouble or become the basic factor in poor posture. Socks should always be three-quarters of an inch longer than the baby's foot. This requires constant observation, since the baby grows very rapidly and also because socks often shrink.

CLOTHES FOR THE TODDLER

Once the baby starts getting around by himself, clothes must be designed for protection as well as comfort. Since the child spends the greater part of the day crawling or toddling around on the floor, his clothes must protect him from dust and dirt.

Functional Designs

Clothes for the toddler vary considerably from the infant's garments. The child has become more active and requires garments permitting a greater freedom of movement. At this stage, his clothing receives a much greater degree of wear and requires more frequent laundering and constant upkeep. When planning clothes for the toddler you should consider the following factors:

1. Can the child play freely in his clothes ? The child's clothes should not restrict his movements. They should be loose-fitting with low-cut necklines. Leg openings should be loose and cut higher in the front so that they will not trip the child. The neck-to-crotch length should be long enough to allow for crawling, reaching and stretching. The shoulder should be cut to fit, but with enough fullness across the shoulder blades. The armholes and sleeves should not bind the arm or wrist, but be loose.
2. Will the clothes allow for growth ? Knitted or bias cut garments, gathers and loose pleats allow extra room for body movements and growth.
3. Are they light-weight but warm ? The child becomes clumsy, awkward and irritated by heavy and bulky garments.
4. Are they made of suitable fabrics ? The fabrics should be smooth and soft; they should shed dirt easily. The garments should be simple to wash and iron, or better still, should be such that they can be worn without ironing. Seersucker and knitted garments are most satisfactory.
5. Do they have convenient openings ? Children of this age play hard and make clothes dirty thus necessitating frequent changes. If the openings are simple, less time and effort are involved in changing clothes.
6. Is the tailoring smooth ? The seams should be strong, narrow and flat for durability and comfort.

CONSTRUCTION OF CHILDREN'S GARMENTS

The method of making some of the more important items of clothing for children are given below:

Kurta

One of the most useful garments for babies under two years is the *kurta.* It is comfortable and easy to make. It allows freedom of movement to the child.

Material required : 1 yd. of *mulmul,* muslin or voile 36" wide

Measurements : Length of cloth: 34" (back and front length) Width of cloth : 18" ($\frac{1}{2}$ width of *kurta*)

Method : Fold the width in half first. Fold length in half next.

Mark A, B, C, D (As shown in Fig. 43).

Mark AC on the single fold.

Mark AB on the double fold.

Mark F $2\frac{1}{2}$" from C.

Mark E for the armhole 6" from C.

Cut a slit for the neck from A to F.

Construction or Sewing : Open the *kurta* as shown in Fig. 51. Stitch the sides with run and fell seam, fold a hem of 1" at the bottom and armholes with narrow neater neckslit hems. Finish neck and sleeve with crochet. Make a cord of the same thread and pass it through the crochet neck for tying. Fine lace may be used instead of crochet for the sleeve.

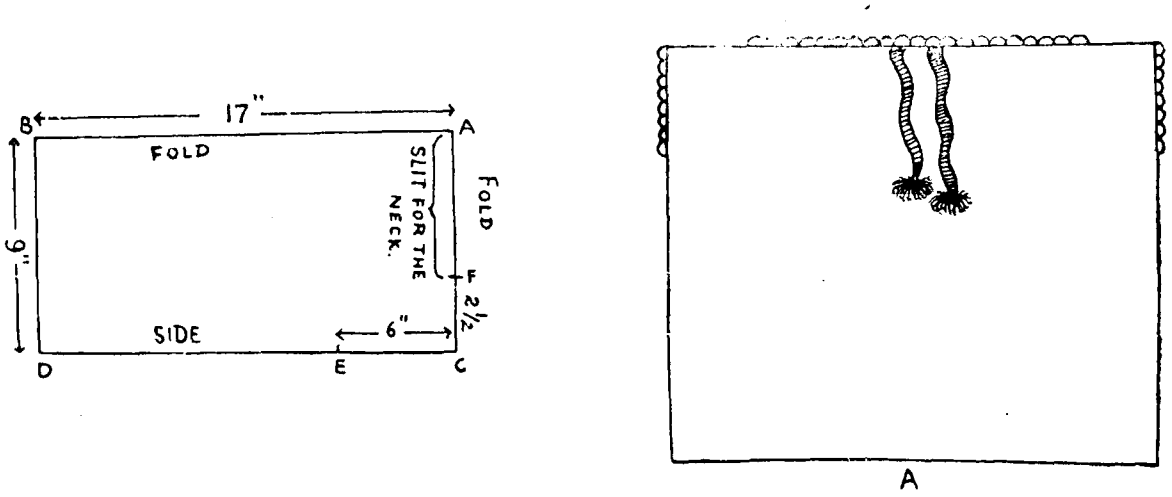


FIG. 51. CONSTRUCTION DETAILS OF A TODDLER'S *Kurta*

Pyjama

The following measurements and method are used for a pyjama for a child of 4 to 5 years :

Measurements :

Length=18″+2″ for waist band and bottom hem
Width=18″

Construction Lines :

Fold back 1″ hem for waist band
Fold back 1″ for bottom hem
Divide length into five equal parts and draw lines.
Mark ABCD as in Fig. 52
Two blocks down from B, mark E along BC

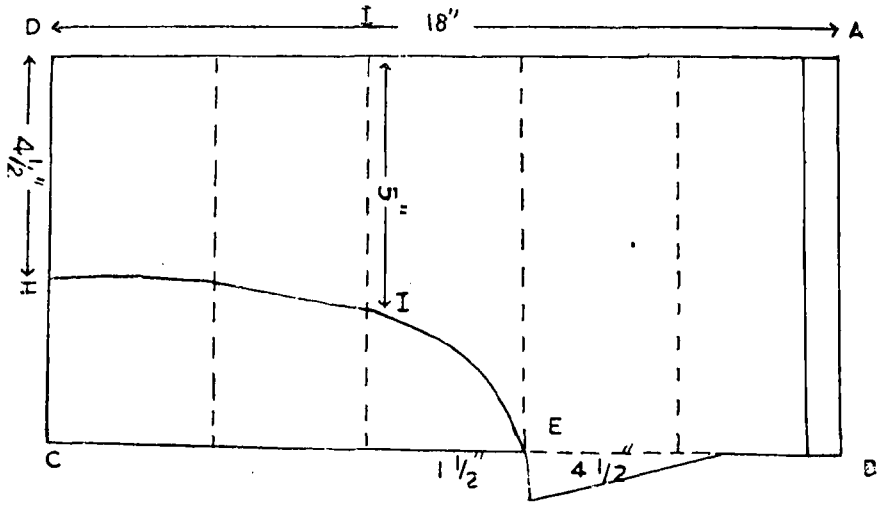


FIG. 52. MEASUREMENT DETAILS OF A PYJAMA

Width at Poncha (bottom hem) :

DH=4½″=¼ length of pyjama

Width at Ghutna (Knee) :

II′=5″=width of *poncha*+½″

Join EH through 1′ with a curve as in Fig. 52

Miyani :

Length of *miyani*=4½″=¼ length of pyjama
Width of *miyani*=1½″=1/12 length of pyjama
Join *miyani* to pyjama diagonal-wise at E (Fig. 52)

Jangia

Jangia is suitable for children of 6 months and above. It has no legs. Since the baby's limbs are round and chubby, large holes are provided for the legs. The shaping lifts *jangia* so that the fold between legs does not hang below the clothes. It is easy to make.

Material required : Soft cotton material 2/3 yd. of 36″ width
Length : 11″
Width : 16″ ($\frac{1}{2}$ width)

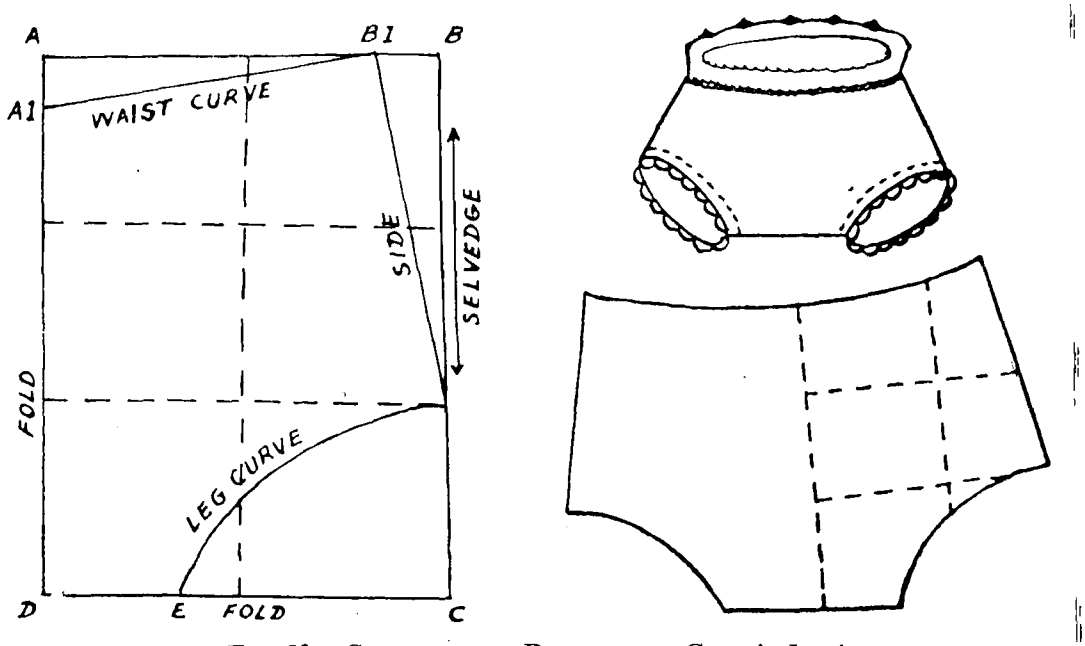


FIG. 53. CONSTRUCTION DETAILS OF A CHILD'S *Jangia*

Cutting : Rectangle with curves.
Method

1. Fold a piece of paper 22″×16″ lengthwise in $\frac{1}{2}$ first, breadthwise next.
2. Keep the double fold to your left (as shown in Fig. 53) and mark A, B, C, D.
3. Divide AB into two, draw a line.
4. Divide AD into three; draw lines, thus marking out 6 blocks.
5. Mark A_1 1″ below A. Mark B_1 1″ from B.
6. Mark E 1″ from the second block on the line DC. Mark C_1 one block above C. Draw a curve joining C_1 and E.
7. Join A_1 and B_1 with a curved line—Join B_1 and C_1 for the side.
8. Cut from E_1 to C_1; C_1 to B_1; B_1 to A_1.

Open the *jangia* as shown in Fig. 53. Sew the sides with run and fell seams. Fold a hem $\frac{1}{4}$″ for the leg. Turn down a hem round the waist $\frac{3}{4}$″ wide and pass elastic 12″ long. The eyelet holes which are to be worked at waist should be large enough for the elastic or tape to pass through them. Facing the waist with tape is an easy method to finish.

Baby's Bonnet

Woollen or Silk Bonnet : Suitable material : (Soft woollen material, thick wools or thick silks).

Requirements : $\frac{1}{4}$ yard of 36″ width.

Method

(1) Back : 6″×6″

Fold into halves and fourths as shown in Fig. 54. Mark curves as shown.

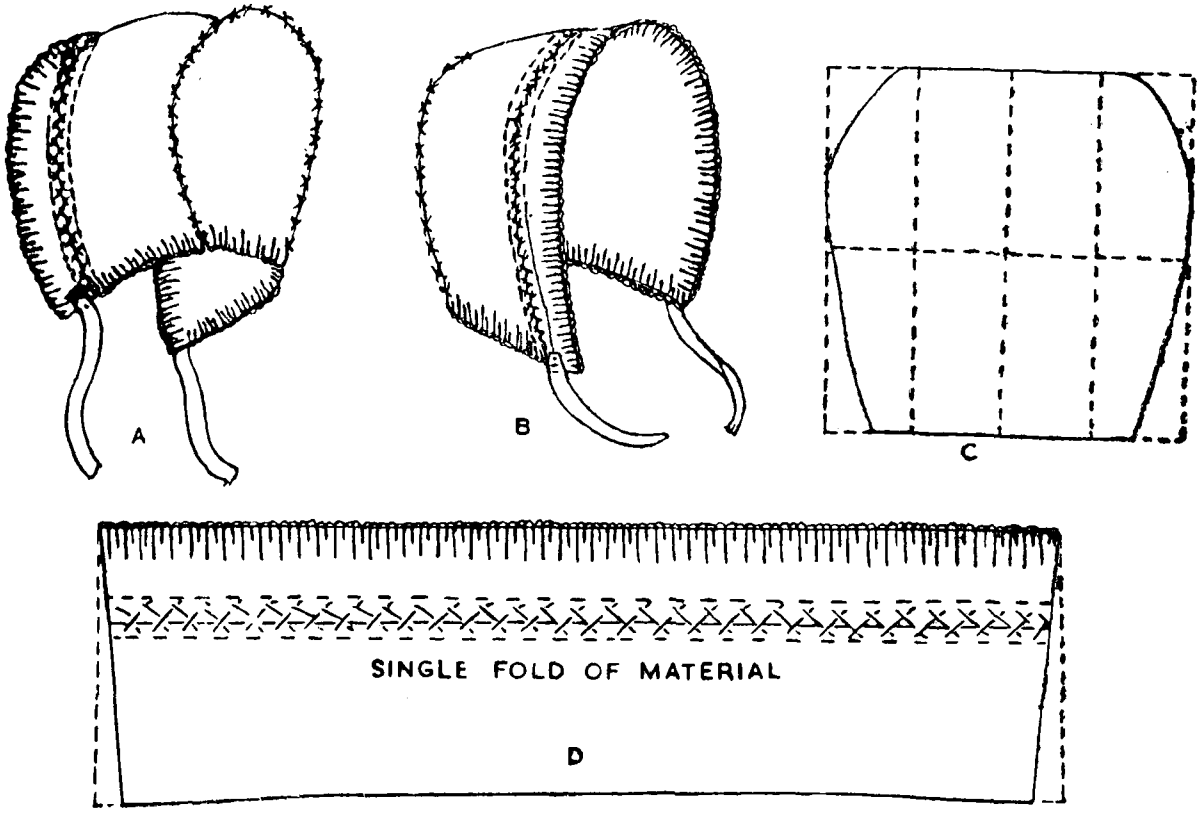


FIG. 54. CONSTRUCTION DETAILS OF BABY'S BONNET

2. Side : 5″ by 18″ Work herring-bone, fancy loop stitch on this as a decoration.
3. Join, overcasting first in one direction, and then in the other.
4. Attach tapes or ribbon for fastening.

Flannel Bonnet : *Material required* : Flannel or thick silks; 1/4 yard of 36″ width.

Centre Piece

1. Take the centre piece 9½″ by 4½″.
2. Fold the length into fourths, draw lines. Fold width into half as shown in Fig. 55 and draw line.
3. Draw curves as shown in Fig. 55.

Side Pieces (two)

4. Take paper 5½″ by 5½″.
5. Fold width in ½ first. Fold length in ½. Next mark lines. Draw the diagonal as shown above.
6. Shape as shown in Fig. 55.

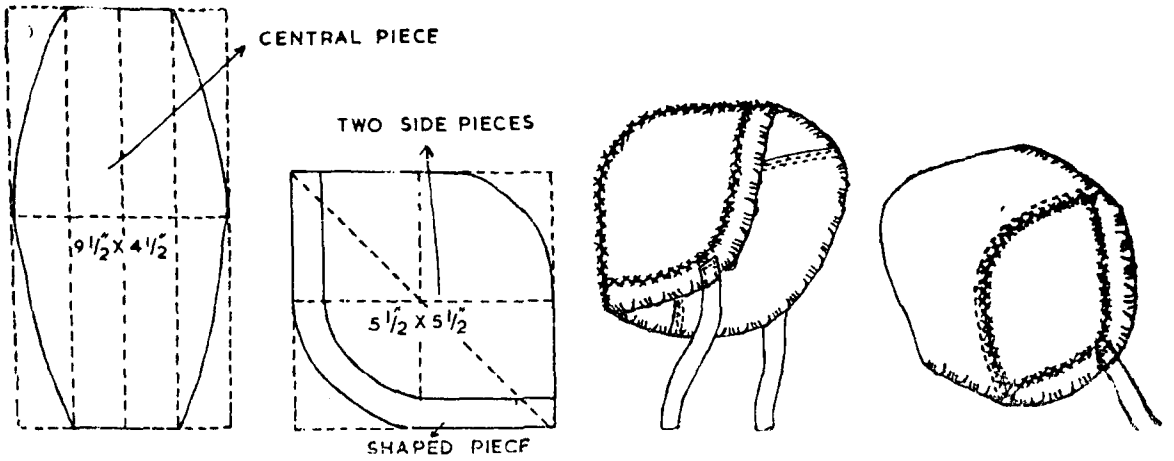


FIG. 55. SKETCH FOR PREPARING A FLANNEL BONNET

Processes

Fix the shaped pieces by groups of straight overcasting at the edge by using the herring-bone stitch down the other side. Run and fell herring-bone curved seam as shown in Fig. 55.

SOME BASIC PATTERNS

Some basic patterns for garments commonly needed by children are given below. For a perfect fit individual adjustments are necessary.

Children's Knickers

The following measurements are needed for a 2 to 5-year-old child's knickers (half-pants).

Measurements :

Length=Side waist to knee=12".

Width=$1\frac{1}{3}$ length=16".

Size of paper or cloth :

Length=12".

Width=8".

Construction Lines:

Divide length and width into four equal parts.

Leg curve

One division each way. Join E to F with a curve.

Back Centre Forkline

From B take half block in along BA and mark it G. Join G to E with a straight line.

Back Waistline

From A take half block down, along AD and mark it H. Join HG with a slightly upward curve.

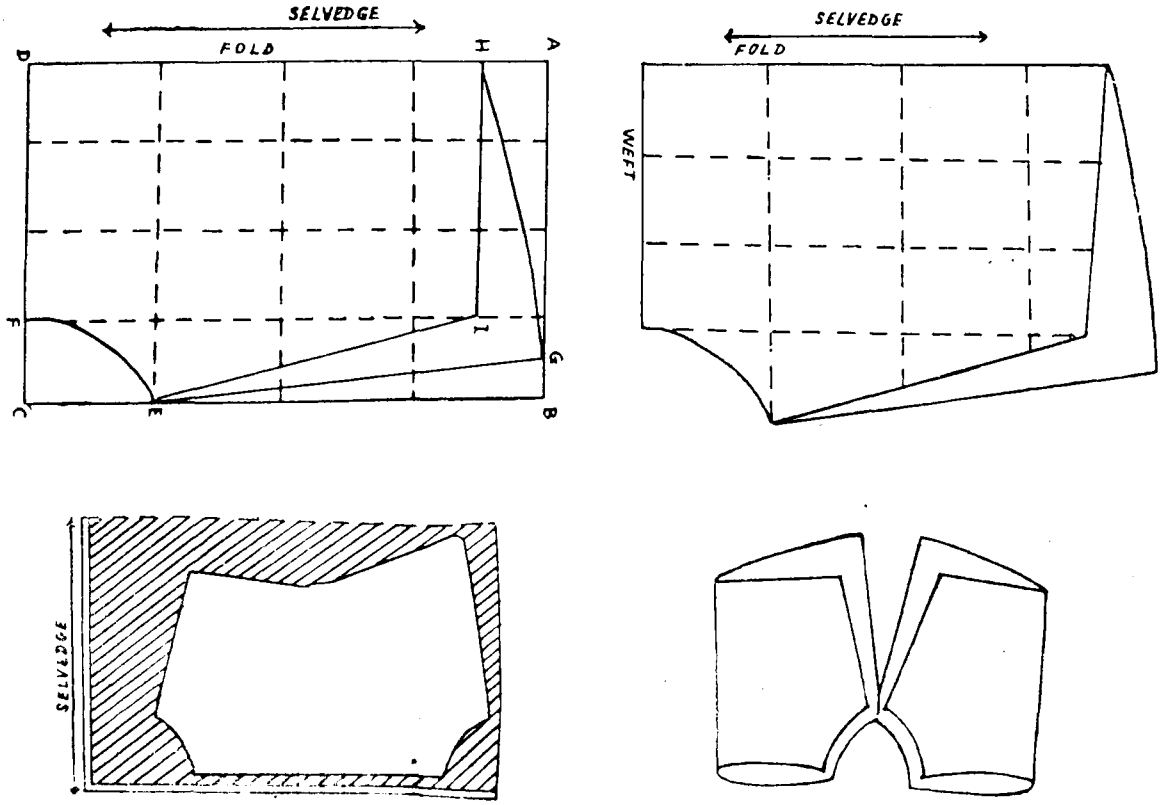


FIG. 56. CONSTRUCTION DETAILS OF A CHILD'S KNICKERS

Front Forkline

From B take one block in, along BA and half block down—I. Join I to E with a straight line.

Front Waistline

Join H to I with a straight line.

Bands' Measurements

Front band—9″ to 1½″

Back band—10″ to 1¼″

Wrap opening

Make two wrap openings on both sides, each 2 in. by ½ in.

While cutting out, remember the following things: Keep the paper folded, with the fold on left. Cut out the outer pattern lines on the double paper. Lift the top paper; and cut front, waist and centre front line to the fork.

For the lay of the pattern on the material, remember the following things:

Fold the material along the weft with the wrong or right sides facing. Place the pattern with the knee to the cut edges and the back towards the selvedge.

Child's Romper Pattern

The following measurements are necessary for this garment:

1. A—B=length from neck to knee

A—C =length from neck to chest
C—D =quarter of chest measure
D—E =length of sleeves
A—F =C—E+1″; give a slant of 1″.

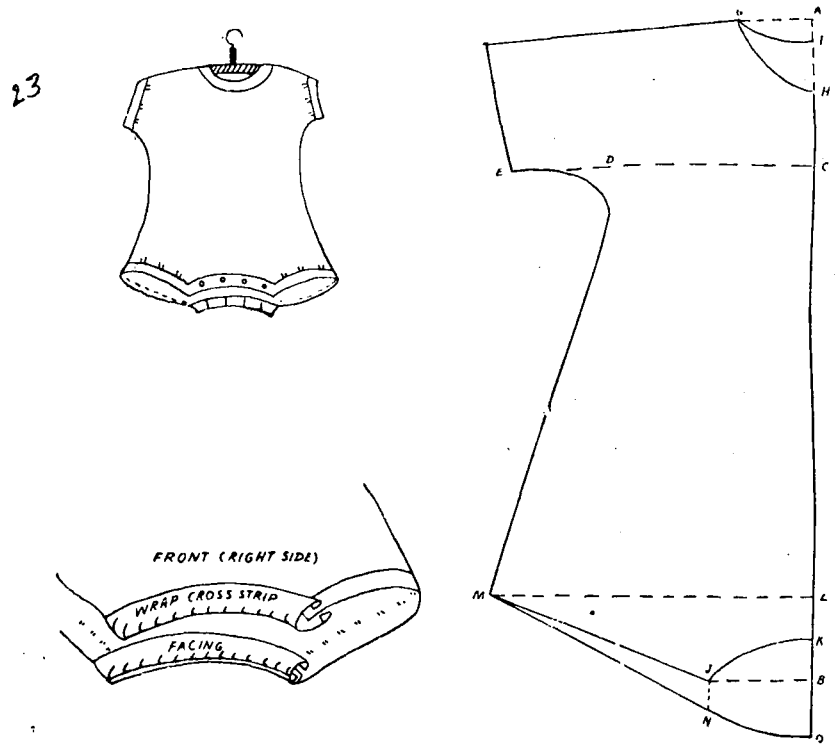


FIG. 57. CONSTRUCTION DETAILS OF A CHILD'S ROMPER

A—G =2″
A—H =2″
A—I =3/4″
Connect I—G for back of neck
Connect H—G for front neck
Connect G—F for top of sleeves
Connect F—E for edge of sleeves
B—J =3″
B—K =1″
B—L =2″
L—M =C—E+1″
Connect J—K
Connect M—J
Connect M—E with a curved line
J—N =1″
Connect M—N for back leg

Hints : Draw the reverse curve from N—O as from J—K. This basic pattern gives half of the front and half of the back pattern. The longer pattern is the back

which turns up over the front and fastens with buttons. Neck or shoulder opening must be made. This pattern can be varied by adding pockets, collar or elastic around the legs.

Child's Bodice Block

To make a bodice for a child of 1 to 2 years, proceed as follows:

Standard Measurements

Length =10"
Round bust =24"
Cross back =9"

Size of paper

Length =10" ; width=12"

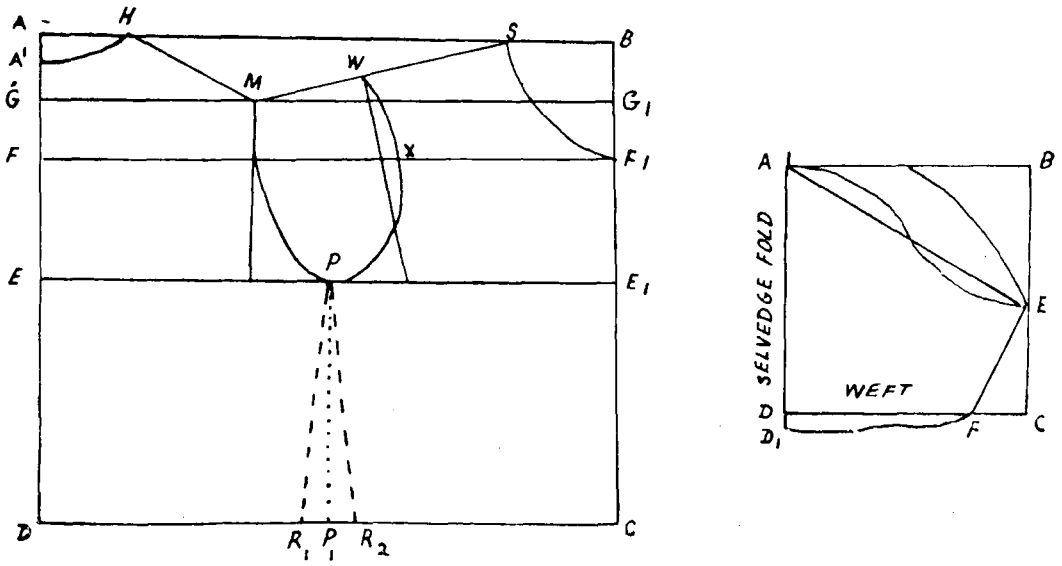


FIG. 58. MEASUREMENT DETAILS OF A CHILD'S BODICE BLOCK

Construction Lines

Divide length into half by $EE_1=\frac{1}{2}AD$ to get the bustline. Divide EE_1, into half by PP_1 to get back and front. Divide AE in half by FF_1 to get cross back-line. Half AF gives GG_1 shoulder line, AB is the neckline, CD waistline.

Pattern Lines

Back : From G take GM=1 cross back. From M drop a perpendicular to the bustline.

For *Back Neck* : Width=Take $\frac{1}{4}$ cross back$-\frac{1}{2}$" or $\frac{1}{2}$ GM$-\frac{1}{2}$"=AH

Depth : Take A^1 $\frac{1}{2}$" below A along AD. Join H to A^1 with a curve.

Shoulder and Armhole : Join H to M for shoulder. Join M to P with a curve for the armhole.

Front

Front Neck : Width=$\frac{1}{4}$ cross back or $\frac{1}{2}$ GM=BS. Join S to F_1 with a curve for front neck.

Shoulder : Join SM. Measure SW=HM

Armhole : From W drop a perpendicular to bustline EE_1. Take $\frac{1}{4}$" from the

perpendicular along FF_1 at X (cross back line). Join W to P with a curve for front armhole. The curve should pass through X.

Side Seams : Take R_1 and R_2 $\frac{1}{2}$" on either side of P_1. Join R_1P and also R_2P.

Child's Sleeve

The following measurements and methods are used for a child's sleeve.

Standard Measurements

Length =4" to 5" (as desired)
Width =1/2 bust−2"=10"
Round arm =8" to 9"

Size of Paper

Length =4" to 5"
Width =10"

Folding of Paper

Fold paper breadthwise and mark it A, B, C, D. AD and BC=length; AB and DC=width.

Construction Lines

From B take BE equal to quarter length of the back plus $\frac{1}{2}$"=2$\frac{3}{4}$". Join AE with a straight line.

Back Armhole Curve : Take half of AB and join with a curve as shown in Fig. 58.

Front Armhole Curve : Divide AE into half and quarters. The curve goes from A, $\frac{1}{4}$" in and then passes through the centre and then $\frac{1}{4}$" out and ends at E.

Round Arm Measurement : Along DC take half of round arm measurement DF. Join EF with a straight line.

To prevent the front becoming longer than the back, increase DD' by $\frac{1}{2}$" to $\frac{3}{4}$". Join FD^1 with a curve.

SELF-HELP GARMENTS

One of the best ways of aiding the development of a child's personality is to train him to dress himself. The child can learn to do certain tasks only gradually. For instance, he learns to put on his shoes long before he can lace, tie or buckle them. A child likes to put on garments at an early age, specially if the garments are so designed that he can get into them easily. If the dressing process is complicated by such things as small buttons, snaps, ties or fastenings at the back, the child becomes discouraged. The garments can be planned so that the child enjoys dressing himself. The child will learn to dress himself earlier and with far less trouble, if you follow the suggestions given below:

1. The garments must be simple and easy to manage.
2. Use the same pattern, with the opening in the same place, until the child acquires skill in dressing.
3. One-piece garments are easier to put on than two-piece ones.

4. Have as few fasteners as possible.
5. Use as few buttons as possible, and these should be large.
6. Garments should have armholes and sleeves of a good size, for easy dressing as well as for comfortable wear.
7. Keep the trimmings on clothes as simple as possible. Fussy trimmings tend to confuse the child while he is dressing and come in his way while he is playing.

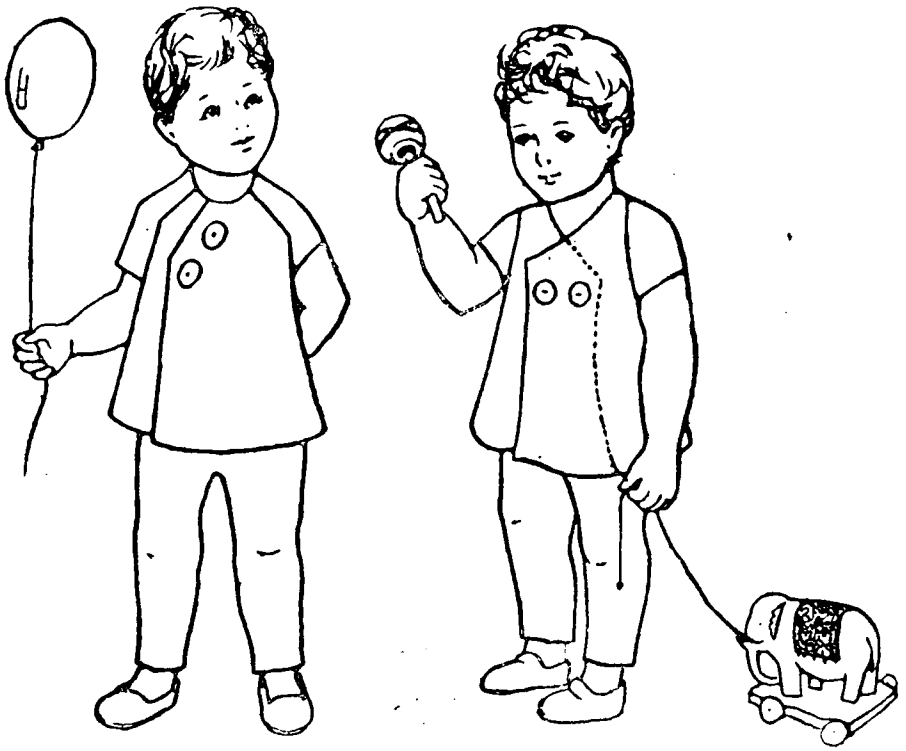


FIG. 59. DESIGN FOR SELF-HELP GARMENTS

8. Separate belts prove a nuisance to the child who is just learning to dress. Bows and belts at the back of garments cannot be reached by the child.
9. Children's clothes should be stored in a particular place, low enough for the child to reach. It has been noticed that children begin to learn quite early how to care for their clothing.

GOOD DRESSING HABITS

The mother must remember the following things if she wants her child to have good dressing habits:

1. Keep the child's clothing simple.
2. Have as few garments as possible; and these should provide comfort, warmth and beauty. Replace these as the child outgrows them.

3. Avoid elaborate styles, such as ruffles.
4. Use as many front openings on the garments, as possible. Use large buttons and button-holes, which the child can handle more easily; keep these to the minimum.
5. See that the neck opening of dresses and sweaters are large enough to slip over the child's head easily. The front of such garments should be marked, say, with embroidery so that the child can tell the front from the back.
6. Give as few changes of clothing per day as possible. A small child dislikes frequent dressing and undressing.
7. Begin to set a regular schedule for dressing and undressing early in the child's life.
8. Train the child early to put on and take off such garments as sweaters, head coverings and rain garments, so that he will feel responsible when he goes outdoors.
9. Plan a storage place for the clothing, which can be reached by the child. Train him to keep all items of clothing in their proper place.
10. Train the child to select and put on the clothing appropriate for the weather and to remove these extra garments when indoors.
11. Too many articles of clothing confuse a child. The colour of all garments, such as shoes, socks, dresses, shirts, etc., should harmonize and look well together.
12. Do not use such delicate materials as velvet, satin, taffeta or chiffon for children's clothing. Cloth that is durable and easy to launder is more comfortable for the child and cheaper for the family.

FOOTWEAR

Many doctors say that ordinarily a baby should not wear shoes until he learns to walk. The feet of almost all babies are perfect at birth. The tiny bones of the baby's foot are mere cartilages. Therefore, the baby's foot is tender and yields easily to the slightest pressure. Because of this, shoes which are too short, too narrow or too wide, or which press or restrict the foot at any point can cause a deformity in the foot. It can be readily understood that the first shoes worn by a child are the most important ones ever to be worn.

Fitting the shoe properly is the responsibility of the mother. The shoe-maker cannot be depended upon for this. Never buy the baby's shoes by guess or by age. They must first be tried on him. Take him to the shop for trying them on.

Feet can be kept healthy by fitting shoes properly and observing a few simple rules.

First, the mother must ensure that there is enough toe room for the baby's foot. A child's shoe should be $\frac{3}{4}$" to 1" longer than the foot. This extra length is to extend from the end of the longest toe to the end of the inside of the shoe. This does not mean that the rest of the shoe should be big. Shoes that are too large will

slip around, causing endless irritations and may make the child clumsy. They may even wrinkle across the top and press down on the foot and lead to accidents. Cramps in the child's foot or a dark reddish or pinkish colour on the skin is a sure indication that the shoe is too tight.

Secondly, the shoes should have close fitting heels which hug the heel well to eliminate slipping. Always check the shoes while the child is standing. The elastic tends to be longer and thicker when the bodyweight is placed upon it. Do not buy too many pairs for a growing child. They will become tight and cause trouble to the child or they will have to be discarded very quickly compared to the money spent on them.

SECTION VII

CHILD CARE

CHAPTER 51

THE CHILD IN THE FAMILY

If a person understands children, he is more successful in helping them meet their needs and in promoting their wholesome growth and development. Moreover, he will derive more satisfaction while working with children. By taking a greater care of to-day's children, we will be ensuring better parents for tomorrow's children. Better children and parents will make for happier families and, ultimately, for a happier society. Unfortunately, it is generally believed that not only does a person have a natural capacity for producing children, but that he also possesses an inherent knowledge about bringing them up. This is not so. Ignorance has caused much unhappiness and distress by depriving children of the kind of care and attention that they deserve.

It is not just the parents but all persons in the home who influence children and play a part in their development. The environment which surrounds the child while he is growing up, the culture in which the adults are brought up and the values that society has set for us are the factors that determine what little Leela, Ramesh, Uma or Ajay will be when they grow up.

Parents make a major contribution to the moulding of the child's character and personality, although other factors like the school or the community are also quite important. It is through education that a child develops his character and personality. True education is that which aims at the all-round development of the child. It promotes sound physical growth and health, and develops the mind by teaching it to think, reason, concentrate and create. It teaches the individual the art of group living, creates in him an emotional balance, gives him the ability to express his thoughts and emotions in constructive and socially acceptable ways, and builds in him a code based on sound moral and ethical values which help him become a mature and useful member of the society.

This task is too great to be carried out by one agency alone and, therefore, it becomes the joint responsibility of the home, the school and the community. However, since the parents have the longest and closest association with the child, it is they who lay the foundations of such development.

THE ROLE OF PARENTS

A child's growth and development depends both on his HEREDITY—what he is born with—and his ENVIRONMENT—what the parents provide for him during the formative years. The child's potentialities are set by heredity. To what extent he will use these capacities depends upon his environment. For example, a potential genius may become an idiot because of a birth injury. A child with a superior endowment is more adaptable than one with an inferior endowment.

He can make use of what his environment offers more effectively than a child with hereditary limitations. Of two children, both exposed to a musical environment, one may become a talented musician and the other remain unaffected by music.

The atmosphere provided by the home has a lasting influence on the child. The child's parents are his background. They protect him and satisfy his essential needs. They are also his earliest guides, educators and companions. They set the atmosphere for his moral and ethical standards, his physical well-being, his aesthetic sense, his concept of family life and his philosophy in general. A child's experiences in the family generally become a permanent part of his life and thinking. It is with these feelings and attitudes that the child goes forth into the world and which determine his response to the countless difficult situations that he will have to face in his daily life outside the family. Every child is born with the power to develop into an emotionally and physically mature adult, but how effectively he will do this is determined largely by what happens to him while he is growing up.

The development of a child can be likened to the growth of a plant. How the plant grows depends upon the soil, the climate, the amount of sun and water it receives, and the care and attention it receives from the gardener. In the same way, the growth and development of a child depends on a variety of factors.

THE CHILD'S FIRST LESSONS

Childhood is an extremely impressionable age. All the little things that the child learns in his mother's lap are carried over with him into adulthood. What a child grows up into depends to a great extent on the kind of living his family believes in. The spoilt girl will be a spoilt wife later. The boy, who is considered the king of the household and who bullies everyone in the house, will later become the domineering ruler of his own home. Unless the parents respect each other and recognize the dignity and worth of each member of the family, the child will not learn to appreciate these qualities.

The child's first lessons in democracy, dignity of labour, cooperation and freedom are learnt at home. Suppose the mother promises Anila a chocolate if she does her sums correctly and then conveniently forgets all about it, the child cannot be expected to learn to keep her promises. Respect for authority, provided the authority is not excessive in its demands and is not autocratic, is learnt at home. Respect for other people's rights, feelings and property is also something that the child learns from the grown-ups with whom he lives. It is they who teach him what is 'right' and what is 'wrong.' Parents help their children in developing a sense of responsibility, in learning to be considerate towards others, and in acquiring a feeling that they are responsible citizens who have an important part to play in the society. The importance of abiding by social laws is stressed by the parents. A father who charges heavy blackmarket prices for the gram that he sells or adds dust to the powdered sugar does nothing to develop honesty and integrity in his child.

Some parents have no patience with the curiosity of children. This is wrong. They should accept and, in fact, welcome their children's curiosity and answer their questions simply and correctly. They will thus create and stimulate interest, and promote the children's learning powers. 'Papa is tired after his hard work and you must not disturb him by asking him silly questions,' is sure to kill the child's desire to acquire knowledge.

If the child gets love, understanding and sympathy from his parents, he will learn to give these to others in his later life. But if the child's home life is full of petty quarrels, jealousies, anxieties or nagging, he will grow up feeling insecure and incapable of facing life.

In many of our homes, the birth of a male child is looked forward to. The son is idolized, petted and pampered. He is given a preferential treatment in all matters whether it be getting a toy, clothes or eduction. Often he grows up into an immature adult always depending upon his mother and quite incapable of adjustment to life. On the other hand, the birth of a girl is considered as something to be unhappy about. She is ill-treated and ignored. She is taunted and has to work like a slave for her very upkeep. She is merely tolerated in her father's home till she is married off. Thus she grows up with a feeling of inferiority and inadequacy. Parents should insist on the equality of the sexes and help children realize that both brothers and sisters have important functions to perform and hence have a valuable contribution to make to the home and the society.

If free wholesome contacts with members of the opposite sex are established from early childhood, there is a greater chance that girls and boys will adjust to each other and conduct themselves in a normal manner during later years. If a boy is taught to look at women as holy and sacred beings, to respect them and to treat them as his sisters or mothers, he is going to be extremely confused between the normal and natural desires and the lessons that he was taught. In the same way, if a girl is being constantly warned against the wickedness of men and of the necessity of protecting herself from them, she will have great trouble in establishing a healthy relationship with a man. In most homes the two sexes are strictly segregated. This creates an unhealthy atmosphere for the children.

Unless there is a genuine respect for and appreciation of the dignity of the functions of men as well as women in the home, the child will not get a correct concept of the role and functions of man and woman in the home or society.

THE CHILD IN THE FAMILY

Most children born today are brought up in large joint families. We tend to exaggerate some of the difficulties and problems that arise in bringing up children in such families and forget the advantages. For example, these children are lucky to be in a household where there are so many people to look after their welfare. Young inexperienced mothers often have no idea of how to look after their first-born children. In such a situation a grandmother is a boon.

Sometimes, mothers complain that their children are being spoilt by grand-

mothers. It is important to remember that a little spoiling is not a serious matter. They can outgrow it. The tender lullabies, the rocking in their arms, the stories and the sweets that are given by grandmothers are important and necessary things in a young child's life. The mother should remember that her mother and mother-in-law also love the child and in their eagerness to be helpful and to see that the baby gets the right care, they quite inadvertantly create conflicts in the house which are not good for the child. Usually the grandmother feels that because of her longer experience and intense interest, love and devotion, she has the right to criticize and advise others. The mother needs the advice and guidance of her elders, as it is based on intelligent and unselfish interest in the child's welfare. The grandmother should not interfere with her daughter's or daughter-in-laws' duty of bringing up her child in the way in which she wants to bring it up. She should not scold, nag or sulk. Instead of creating trouble between the husband and the wife, she should be at hand to provide help when it is needed. Creating conflicts in the child's mind by making it do just the opposite of what his mother wants him to do and always protecting and shielding the child will create a very unhealthy environment for the child.

One usually thinks of the mother in relation to the rearing of children. It is however important to remember that the father is as important as the mother in raising children, although he does not usually spend as much time with them as the mother does. Unfortunately in our country, the father steps in only when there is a need for disciplinary action. It is common to hear a mother shouting. 'Wait till your father comes home. I will tell him all about your pranks and he will give you a good spanking.' The children are taught to walk on tip-toe when the father is having his afternoon nap. They are sent away to play outside before he returns home from work so that he may not be disturbed. Thus he spends very little time with his children. He rules the family autocratically, laying down the law and taking all the major decisions. Children, however, need the company of their father. It is necessary that the children and their father share a close companionship. The father should take a little time off everyday to have fun with the children, tell them stories, play with them and take them out.

Many children are unhappy not so much because they live in poor homes or have little to eat or because they have only a few torn clothes and broken toys, but because of unhappy family life. Quarrels between the father and mother, jealousy between the mother and the aunt, unpleasantness between the mother-in-law and the daughter-in-law or constant nagging on the part of the mother tell upon the young mind and check its healthy mental growth.

CHILDHOOD NEEDS

The child not only has the physical needs of food, clothing and shelter, but also many 'inner' (psychological) needs like the need for love and affection or the need for security and 'belonging'. The child should be made to feel adequate and allowed to satisfy the desire to 'create.' He needs praise and encouragement and a feeling

that he is wanted for what he is. He needs opportunities for doing things for himself, for taking his own decisions and for becoming increasingly independent. He has an insatiable curiosity about the world around him. He wants to be allowed to grow at his own rate of growth and follow his own pace of development. Above all, he longs to know that he means a lot to his parents and that they will accept him and love him in spite of all his defects.

Many parents are unfortunately unaware of the difference between a healthy love and a love that smothers the child. The average parent naturally wants to do his best for his child. This is only possible if both the parents provide the child with genuine love, tolerance, sympathy and understanding. They will be truly good parents if they help the child in gaining independence and self-reliance, encourage the formation of healthy attitudes in him and help him to face the hard realities of life, so that he will be well prepared to face what life has to offer him later on. Parents should encourage the child to tackle difficult situations on his own and allow him the freedom to think for himself and make his own decisions. It is the parents' responsibility to help the child develop his individuality and at the same time, learn to live happily and harmoniously with those around him.

CHAPTER 52

PRINCIPLES OF GROWTH AND DEVELOPMENT

Intelligent handling of children requires a knowledge of the way children grow and of the way such growth can be influenced favourably.

One does not necessarily make a good parent merely by learning the general principles of child development. There must be an understanding of each child as an individual : How has Arun become what he is ? How does he compare with Suresh or Leela ? What direction has his growth taken ?

DIFFERENT ASPECTS OF GROWTH

Children grow not only physically *i.e.*, in size, they also grow socially, emotionally and mentally. The different aspects of the child's growth and development are very closely interrelated. It is quite impossible to understand how the child thinks and feels without understanding at the same time how his body works. For example, the reason why a ten-year-old child is doing very badly at school may be any one of the following : He may be very weak physically because of constant attacks of malaria; he may need glasses; he may not have enough to eat because he has no time for lunch; or he may be very jealous of his brother with whom his parents always compare him unfavourably.

INDIVIDUAL DIFFERENCES

No child is absolutely like another. Each grows in his own way. Some children are tall, some are short; some thin and some fat. Some are intelligent and others dull. Some are friendly and others rude or timid. Just because Mrs. Shah's Uma is cheerful and friendly, it does not mean that Mrs. Mehta's Usha, who is just as old as Uma, must be so, too. Parents should know that they must not expect all children to be alike, have the same rate of growth, or be able to do the same things at exactly the same time. A tall and thin child does not put on weight at the same rate as a short and plump one. Some anxious parents bring upon themselves and their children a lot of trouble in trying to bring their children up to the standard weight. Mrs. Patel would be wrong in worrying because her little Asha did not begin walking at 12 months although Asha's elder brother Atul did. Asha is by no means an abnormal or retarded child. Her rate of growth is different. That is all.

Forcing the child's pace of growth may have very harmful effects. Putting pressure on the child and expecting him to come up to the parent's standards and expectations may also lead to a lot of unhappiness. The mother should not taunt her younger daughter because her needle-work is not as good as the older one's.

It is important for all those who are dealing with children to know something

of the various stages in a child's growth and of growth patterns; otherwise, they may expect too much or too little from a child. The proud parents of a three-year-old child who is made to recite Sanskrit *shlokas* might fail to see the signs of nervousness and tension that the child will show if he is being pushed beyond what he is naturally capable of doing. Parents must understand the child's growth needs, so that they may provide the physical and mental activities essential to his development, and provide it under conditions where there is no nagging or forcing. We do not have to *make* children grow. They grow because of an inner force.

PATTERN OF GROWTH

There is an orderly sequence in the child's growth pattern. The child cannot run till he has learnt to sit, stand and walk. Growth is a continuous process and each stage overlaps and influences the succeeding stage.

Growth takes place in spurts. There are periods when it is very fast and others when it is very slow. From the first to about the sixth year, growth is very swift; between the sixth and twelfth years it slows down. Before puberty, *i.e.*, around the twelfth or the thirteenth year, certain phases of growth again become very fast. Growth slows down again once adulthood is reached. There are seasonal fluctuations in the rate of growth also. In winter, children put on more weight than in summer.

There is a difference in the way boys and girls grow. Boys are heavier in weight than girls throughout the growth period, except between the twelfth and the fifteenth years. This is due to the fact that girls mature earlier than boys and pass through the pubescent spurt earlier. Within each sex again, there is a great deal of difference in the age at which maturity is reached; one girl may mature at 13, another at 16.

DEVELOPMENT RATE

Growth takes place in various parts of the body at different rates. The nervous system of a child develops very rapidly in the early years, while the genital system develops most rapidly during puberty. Thus we find that children differ widely both in their rate of growth as well as in their pattern of growth. There is no such thing as 'standard growth.' Each child's progress is measured along his own pathway of progress.

It is important for parents to know that the rate and pattern of growth are affected by both inside and outside forces. It is, of course, true that there is a 'spark' inside the body that makes the body grow and that each child has a definite pattern. But, both the rate and pattern change if the child's environment does not fulfil his basic needs. Love and understanding, food, rest, exercise and the opportunity to learn are significant factors affecting the child's pattern of growth. Just as a child who has been given food deficient in calcium develops rickets and becomes deformed, a child who has not received the love he needs grows up into an unhappy individual.

STAGES OF GROWTH

Children do not follow any hard and fast rule in growing. Each child has his own pace of growth. However, the unfolding of the child's bodily processes always follows the same general order. For example, while all children may not necessarily start walking at 12 months, they all do walk before they can run or jump. The various stages in the growth and development of children are described below.

Below one Month : Lifts chin; tries to grasp things held in front of its face.

One Month : Lifts its head unsteadily when in position; makes crawling movements when placed on its stomach.

Two Months : Holds its head erect for a moment when held against a person's shoulder; makes upward arm thrusts when on its back; smiles a little; makes sounds when awake in the cradle.

Three Months : Holds its head erect and steady for a short time when held to the shoulder; turns its head in the direction of a voice; pushes itself up or raises its chest while lying on its stomach.

Four Months : Recognizes people and liked objects and smiles at them; holds its head steadily; lifts its head and shoulder when lying on back; does not keep its fists clenched; notices large objects and bright colours.

Five Months : Rolls over from back to stomach; sits up with a slight prop.

Six Months : Laughs frequently; begins to put things in its mouth; expresses recognition of familiar persons; sits momentarily without support if placed in a favourable leaning position; uses its hands to reach, grasp, crumple, bang and splash.

Eight Months : Sits without support; raises itself to a sitting position; begins to use its fingers for grasping and holding objects; coos, gurgles and makes sounds which are almost recognizable.

Ten Months : Begins to creep forward on its stomach and to crawl; pulls itself to a standing position using a chair or table for support; uses its fingers and thumb for grasping; says 'BA' 'MA' 'PA'; plays peek-a-boo.

One Year : Walks with a little help; can say and wave 'Ta Ta'; holds cup unsteadily to drink from; begins to cooperate while dressing; listens with interest when talked to; imitates the sounds of new words, plays with medium-sized objects.

One and a Half Years : Stands and walks alone—though unsteadily; points to ear, nose, eyes, hair, etc.; manages with great difficulty to climb up the stairs or into a chair; runs unsteadily—falling often; cares only for himself but notices others and at times cries if they leave; begins imitating adults; puts objects in and out of things, is shy before strangers and sometimes afraid of them; is often afraid of loud or sudden noises; has a vocabulary of about 10 to 15 words, likes to look at large and recognizable pictures; begins to take an interest in and explore things around him.

Two Years : Walks fairly steadily; runs, piles four or five blocks one on top of another; names a few familiar objects—cow, key, bangles, bed, etc.; scribbles with a chalk or pencil and daubs with paint; helps in dressing and undressing; likes other children but does not play with them much; prefers solitary play; has a

vocabulary of about 300 words; is able to tell something to others but not in complete sentences, *e.g.*, 'Uma go field. See bull'; begins to recognize simple shapes and colours; shows some imagination in play but loves to imitate; looks at picture-books and listens to very small stories; can use its fingers effectively for eating; takes risks—jumps and climbs and balances; is sometimes afraid of darkness, strangers, doctors, animals, etc.; likes and takes interest in other children but plays alone side by side with other children; likes vigorous activities but is not steady enough and soon gets tired; has tantrums or fits of rage and screaming; is fond of saying 'No'; shows sympathy and affection by hugging, kissing, etc.; loves to help adults; does not share; sometimes bites, scratches, pulls people's hair or cries loudly.

Three Years : Goes up and down stairs; tries standing on one foot; can put on knicker with a little help; eats fairly neatly; opens and closes the door; loves to 'draw'—is able to draw lines, circles etc.; talks freely with other children and uses sentences that are quite complex and long—there is a wider variety in speech; can hammer nails and cut gashes and lines with a pair of scissors; curiosity increases, likes to touch and manipulate things, 'what' and 'why' questions increase; makes up nonsense rhymes; knows primary colours and has some idea of different tastes, shapes and textures; plays with other children, groups shift, no fixed friends, groups are small, and still enjoys playing alone; still does not like to give up turn or share things, but when reasoned with, is willing to share and makes compromises : 'O. K. you take one turn (on the swing) and then I will,' or 'you hold that end and I will hold this one'; is negative and resistant : 'No ! I do not want to come for lunch'; is afraid of darkness, animals, police, doctors, witches and '*sadhus*.'

Four Years : Hops, jumps and skips; washes and dries hands; can cut a design on paper with a pair of scissors; has a scheme in his drawing; can tell a simple story, narrate an incident or describe a picture; begins to have a concept of time and distance : 'Many days ago I was in a train' or 'My house is very far from the school'; can reason : 'I am late because I woke up late'; asks a great number of questions and is very curious : 'Didi, why is it raining ?' or 'How did Satish fall down?' asks for the causes and reasons for actions and things; knows the major colours; plays in a group and cooperates; has one or two good friends with whom he likes to do everything; actively fights for his own rights; defends other children; complains verbally, 'Didi, Naresh is beating Uma and she is crying'; sympathizes with and looks after younger children : 'Don't cry, you can go home when your mother comes'; teases other children and adults; demonstrates affection and at times ignores adults; in school, always boasts about father, mother, home, toys, etc.; fears become more complex while the fear of inanimate things like darkness, ghosts, etc., increases; sometimes has imaginary companions with whom conversations are carried on; learns to bargain : 'If I give you my hanky will you give me your red train ?'; becomes aware of being a part of the group : 'Let us boys climb the tree'; attention span widens; takes interest in a greater variety of activities; asks for help and suggestions for play; is able to learn and retain new ideas.

Five Years : Runs fast; jumps, climbs considerable heights, hops, skips and plays with a ball; plays simple organized games; draws recognizable shapes or objects; likes to write alphabets and numbers; can speak very clearly and properly; can be very logical. (For example, Naresh was told when his great uncle died that people die when they are old. A few days later, he went up to his grandmother and asked : 'Will you too die soon because you are old ?'); is very observant and sees the relation between cause and effect : 'If I drink milk I will become as strong as Father'; plays in large groups and has one or two fast friends; is cooperative in play, likes to play more with own sex, quarrels and makes up : 'Go ! I will never speak to you,' he cries to his friend, although the next instant, the two are friends; can look after himself; makes up stories; has an increasing knowledge about the world around him; begins to carry his own load in life; runs errands for adults and is quite responsible; loves to use his hands and make things; loves to cut and paste things; likes clay work, carpentry, etc; attention span and concentration increase; can count up to 10; can solve simple everyday problems by himself; likes to do chores in the home like shelling peas or watering the garden; dresses and undresses himself; begins to learn simple rules and regulations : 'We should wipe up the mess when we spill water' or 'We do not cross the road unless we look at both sides'; conforms to social demands : 'Mummy, is this the right way to do it ?'; can look after a younger child; begins to form favourable or unfavourable ideas of honesty; learns to do or not to do a particular thing even though there is nobody to watch; his ability to remember past events improves; has a good judgement of weight, time, size, distance and shapes; his sense of hearing, taste, smell, temperature and touch have developed almost fully; thinks of himself as 'big' : 'Oh, I am big so I don't cry but Uma is small so she cries'; feels ashamed of crying; often uses 'abusive' language when angry; expresses aggression verbally and sometimes on objects (*e.g.*, breaks dolls); shows curiosity about sex : 'How was that calf born?' or 'Why can't Uma also urinate while standing up ?'

After Five Years : Continues to grow in size and change in appearance; develops more complex skills and abilities to do things; routine habits of sleep, rest, eating, exercising and keeping clean are further established; learns to play complex games which involve competition; goes through a stage when children move about in a 'gang,' has friends of his own sex and when 16 to 17 years of age begins to take an interest in members of the opposite sex; develops a conscience and an adult code of conduct; develops skills and abilities in work and play; develops hobbies and special interests; learns a variety of subjects in school; becomes more and more independent and self-reliant; solves his own problems and makes his own decisions; is able to control his emotions and gradually gets weaned from dependence on adults; learns to discipline himself; his vocabulary increases and his language becomes full and expressive; has a widening range of creative outlets; has greater tolerance, understanding, consideration and sympathy for others; builds for himself a well-balanced ethical and moral code of behaviour which is accepted by the society in

which he lives; gains an insight into himself and others and into problems of the world around him; finally acquires a philosophy of life.

Much of this learning, of course, depends on the efforts made by the parents to encourage and foster such learning. A child who is left alone most of the time and whose parents are not there to 'talk' to him when he is ready to use words is slow in talking. How quickly and how well the child learns depends much on the parents' attitude and on the opportunities they provide to the child.

LEARNING THAT TAKES PLACE WITH GROWTH

It is by his behaviour that the child shows how he is developing. In his gradual progress from babyhood to adulthood, he not only grows taller and heavier but his activities and abilities also change. As mentioned earlier, the changes in behaviour are partly due to an inner urge to develop and partly because of the complex and varying influences of the world around him.

When the child is able to move about by himself and is able to talk, he has become sociable enough to want to play with other children. He soon learns to make friends, get along with people and share each other's belongings. Out of the pleasant or unpleasant experiences that he has while trying to play with others comes the realization that other children also have feelings, wants, desires and rights like his own. He learns that instead of crying when he wants the ball or grabbing it from others, he can ask for it or wait for his turn to play with it or play with it together. He learns to respect other people's property as well as their rights and feelings.

The child soon learns to express his emotions in more 'grown up' ways with the help and wise guidance of the adults around them. He discovers that crying loudly, beating other children, tearing, banging or smashing things in anger, etc., are not accepted. Thus he learns to use more effective and grown-up ways. He learns to use more words, to reason, think and make his own decisions.

All children grow from dependence to independence. Their efforts for this begin in the early childhood years when they learn to eat by themselves, bathe and dress themselves, play alone, go on small errands, etc. In course of time, they progress towards a more and more adult type of independence. They begin to think and decide for themselves.

As the child collects experiences of people and things around him, he begins to learn the rules, regulations and customs of the world. Just as he learns that snatching a toy, hitting another child, stealing mangoes from a neighbour's farm or cheating at games are wrong, he also learns from experience the adult code of moral behaviour.

From an egocentric being who is interested in the satisfaction of his wants and needs alone, the child develops into a balanced individual who can form healthy relationships with people of both sexes.

As the child grows, he also learns to accept authority in a reasonable way without being oversubmissive.

In the early years, the child's ideas of the real world and the world of make-believe are very hazy. The child often has imaginary friends with whom he talks. Usually, in this imaginary world that he creates for himself, he is the hero. He kills lions and tigers, and wins battles. But the child outgrows this imaginary world as he grows older and develops skills and abilities and makes real friends. Parents should not accuse their child of telling lies when he reports that he killed a tiger on his way from school. They would be helping the child to see the difference between real life and the make-believe if they praised him for the 'story' he has told them.

The kind of behaviour learnt earlier in the family is repeated later in reference to others with whom the child associates. Adults who recognize how children develop or learn, and who provide intelligent and loving guidance along the path of growth are laying the foundations of a well-adjusted life for their children.

CHAPTER 53

PROBLEM BEHAVIOUR

Many mothers get puzzled as well as upset when their children show signs of 'undesirable' behaviour.

It is important to remember that many of the so-called behaviour problems are merely aspects of normal growth. Crying is normal at the early stages of development. Anger at physical restriction or at prevention from getting what is desired is normal in early childhood. So are the unreasonable fears displayed during these years. In the process of development from childish ways of exhibiting emotion to adult and mature ways, there are many stages at which behaviour is very explosive, resistant or fearful. Parents should learn to make out when such behaviour is just a phase of growth and when it is a result of some defect in the environment.

Thumb-sucking, masturbation, bed-wetting, tantrums, jealousy, fear, stuttering, lying, stealing and using bad language, etc., are some examples of problem behaviour. Whenever a child exhibits any of these so-called problems, it is important to go into the underlying causes before any step is taken to cure him of the habit.

UNDERLYING CAUSES

Most of these 'problems' are intensified because the parents feel ashamed of their child's bad habit, thinking that it reflects on their method of bringing him up or that he has inherited a habit from them. Often the mother makes her child's problems a topic for conversation; loud and detailed discussions are then held with a neighbour, in the child's presence, on the subject. This might hurt the child's dignity; it might, on the other hand, give him a feeling of importance and the child might increasingly resort to such behaviour as a means of attracting attention.

Such behaviour will definitely not be corrected by nagging, scolding, putting fear in the child's mind, threatening or punishing.

Such a child needs special attention, careful handling, love and understanding. It may be necessary to build up a feeling of adequacy and confidence in him. He should be kept occupied with activities in which he is interested and in which he can take pride. He may need ample outlets for his unhappy feelings. For example, little Anand aged seven became very destructive because of his jealousy of his three-year-old brother. His parents accepted his jealousy and hostility as nothing very unnatural, helped him by giving him more love and attention, and encouraged his interest in carpentry and clay work. Anand made little toys for himself and his little brother. This was praised and appreciated. He felt happy and proud, and his relationship with his little brother improved considerably.

When his parents are anxious, worried or tense, or when they quarrel between themselves, the child feels insecure and unhappy. Sensing the parental anxiety over his behaviour also causes distress and tension in him. Rejecting the child and telling him that 'Mother and Father do not like little children who put dirty fingers in their mouths,' also gives him a jolt and makes him unsure of his parents' love. Insecurity is one of the main underlying causes of these behaviour difficulties.

THUMB-SUCKING

Apart from a little injury to parental pride, there is nothing wrong with the child's sucking his thumb or fingers between the ages of one and five. Thumb or finger suckers are usually children who have had insufficient sucking. Scolding may only make the child do it oftener and also make him feel guilty. Bandaging the child's thumb, putting adhesive tape on it, applying quinine to it, etc., may prove harmful to the child. In general, the best way to help the child give up the habit is to disregard it as much as possible; making him happy, at the same time, by removing emotional strains, avoiding talk about the habit, abstaining from ridiculing him, refraining from using punishment, and providing plenty of other enjoyable activities and toys that require the use of both hands and plenty of active play.

MASTURBATION

Practically all children play with their sex organs. It starts usually in infancy when the baby explores his body and finds that the manipulation of certain parts produces a pleasurable sensation. When the parents discover that the child is masturbating, they should not show alarm or disapproval. They should not frighten him by saying that it will cause some injury or that he will fall ill if he continues the habit. If the child is made to feel guilty, he may indulge in this habit secretly and at the same time worry a great deal to the detriment of his mental health. Substitution of other activities, absorption in creative activities, plenty of active play and provision of playmates help the child in getting rid of this habit.

If the child is happy and reasonably well adjusted in his family, if the atmosphere at home is free from strains and anxiety, and if he feels secure and satisfied, the chances of his indulging in such behaviour will be lessened.

Masturbation and sex play between boys and girls is often due to an unsatisfied sexual curiosity. Therefore, children should be given information about sex in a simple and direct manner. Sex education does not involve the mere imparting of knowledge about the physiological functions and processes of the human body. It involves the formation of a healthy and wholesome attitude towards sex. Telling a child how a baby is born or how a boy is different from a girl is not enough. The important thing is to develop in the child an attitude which will help him in forming wholesome relationships later on in life. If a child is loved and treated with warmth and sympathy, and if he has parents who love each other and who are tender and considerate towards each other, he will know the real meaning of love, and the foundations will be laid for a happy and stable love life later on. Many look upon

sex as something dirty and nasty, as something to be ashamed of, to be hidden and talked of only in whispers. It is, however, important to help children see that all body functions are human and normal 'everyday' things.

Sound sex education will lead eventually to a happy, satisfying and productive union of two adults. This will not be possible unless children are made aware of the respective roles of man and woman. Both sexes must start early in childhood to lay the foundations for their feelings towards each other.

Children are naturally curious and just as they want to know why and how a clock or a train works, they want to know about themselves : how they were born or why boys and girls are built differently. When children ask questions, it is imperative to answer them simply, directly, truthfully and unemotionally. It is not necessary to give too much information, as this is only likely to confuse the child. Correct terminology should always be used. Children should be told only as much as they want to know and can easily understand. They should never be scolded or nagged for asking questions. When answering them, parents should not feel shy, awkward or hesitant. Children will not seek information from outside sources and obtain false knowledge, if they are always encouraged to confide in the parents.

BED-WETTING

Most children usually achieve fairly complete bladder control some time between the ages of two and three years. In many homes, however, little attention is paid to the child's toilet training. If the child continues to wet the bed at night, he is either scolded or ridiculed or treated as if he has a disease. Skilful training is necessary to enable the child to acquire proper bladder control.

The usual corrective methods are :

(*i*) Limiting his intake of liquids several hours before bedtime;

(*ii*) Picking him up several times in the night to take him to the bathroom;

(*iii*) Extracting promises from the child not to wet his bed;

(*iv*) Tempting and rewarding him with desired objects if he remains dry.

Focussing the attention of the family upon the child's failure to stay dry is bound to make him feel ashamed and guilty. It just increases the tension in him and is likely to prolong the difficulty rather than cure it.

Calmness, patience and praise generally work well. Ignoring his failures and praising him for dryness help greatly. The child's self-confidence has to be built up. A relaxed attitude expressing confidence in the child is likely to help him more than shaming him can. Instead of making him feel inferior and odd, one should make him feel that he is accepted in spite of bed-wetting.

TANTRUMS

Anger and resistance are the natural responses to being thwarted. Children often show these by throwing a tantrum. A child of one to three years has a greater

tendency to show such anger because he is unable to express his irritation or frustration in words. At this time, moreover, the child tries to establish his independence; he becomes negative and resistant to authority and often expresses this through a tantrum. If Mother wants Uma to have lunch when she is in the middle of building a sand castle, or if Suresh has to give up playing with his tricycle to have a bath, they often show their resistance by rolling on the floor, throwing about their hands and legs wildly, banging their heads against the wall or the floor, crying loudly, etc. Such behaviour often embarrasses parents. They get impatient and are likely to mishandle the situation.

A tantrum, provided it is rare, does not mean anything. Life is bound to have some frustrations. Sometimes it is due to the fact that the child is unwell, hungry, sleepy, overfatigued or overstimulated. More often than not, the tantrum occurs because the mother has not learnt how to handle the child tactfully.

The following should be avoided by parents :

1. Too many Do's and Don'ts.
2. Telling the child to do things; not giving him enough time to get ready for activities; arbitrarily shifting the child to another activity.
3. Imposing too many restrictions.
4. Not allowing the child to assume any responsibility or independence; doing things all the time for the child, hovering about him and constantly fussing over him and giving him too many suggestions.
5. Being too rigid and making an issue of matters that are not really important.

When the parents see a temper storm coming, they should try and prevent it by diverting the child to another activity or ignoring him.

If the storm does break out, the parents should try to be patient and tactful. They should try to take it as casually as possible. Parents should not give in and let the child have his way, otherwise he will get into a tantrum each time he wants his unreasonable wishes granted. Parents ought to be friendly but firm on these occasions. The child should be made to know that others have rights too. Arguing is of no help; nor does it do any good to get angry or irritated. Children are grateful and appreciate it if their parents provide a graceful way out of their difficulties.

JEALOUSY

When a new child is expected in the home, it is important for the young child to know about it early enough so that he can get used to the idea gradually. It is also important to make certain that his life does not change too much due to the arrival of the newcomer. Getting the child to help in the preparation for the baby's arrival and in caring for the baby is a good way to reduce jealousy. Giving the older child a little special attention and giving him a present when the new baby receives one is also helpful.

It is not desirable to ignore and suppress these feelings of jealousy. Parents must accept the child's feelings and help him get rid of such feelings through a number of activities like playing with dolls, painting, etc.

Parents should refrain from making unfavourable comparisons : 'Mahesh, why can't you try and learn your lessons as well as your brother Naresh ? He always stands first in his class while you are always at the bottom of yours.' Comments like these make the child feel jealous of the cleverer one. Often the child stops trying for success and more severe problems may then arise.

Parents should, as far as possible, keep out of children's fights and never interfere or show preferences. It is not fair on the part of parents to expect the older child to always give in to the wishes of the younger one. Nor should they expect the older child always to show love and affection for the younger one. Instead of making the child feel guilty, parents should help him understand that it is all right for him to hate his brother or sister at times. All help should be given, however, to help the child to get the better of his 'bad' feelings.

FEARS

Fears are very common among children at some stage or another. These are many and varied, such as the fear of animals, doctors, *sadhus*, policemen, storms, ghosts, witches, darkness, thunder, death, etc. Much can be done to prevent children from acquiring fears. Explaining things to them and adding to their knowledge is helpful. For example, the fear of a doctor can be prevented if the child is made to understand what he will be undergoing during an examination: if an injection is to be given, he should know what to expect. Although it certainly is good to help the child learn to be careful and cautious, the parents should refrain from giving him too many warnings, such as : 'If you play in the grass, a snake will bite you' or 'If you jump from such a great height, you will break your head.'

Refraining from showing your own fears in the child's presence is important. A mother who hides her face in the sari when it thunders is not setting a good example for the children.

Fear should never be used as a means of discipline. For example, three-year-old Tushar was terrified of dogs because whenever he was naughty, his mother used to say 'Stop it or I will call the dog and make it bite you.'

Some of the commonly used methods of overcoming fear are not only ineffective but harmful. Ignoring his fears and hoping that he will get over them; asking him not to be afraid and ridiculing him; making him feel a coward; suddenly introducing the child to the feared object without any warning; or physically dragging the child to the feared object may prove harmful to the child. If a child is afraid of cats, it will not prove helpful to push a cat suddenly into his lap and make him stroke it.

The child should be shown approval and his confidence should be built up. He should as far as possible be kept away from known fear-producing situations.

The following methods may be found effective in ridding a child of his fears :

1. Building up the child's self-confidence by teaching him something that will actively combat the fear, *e.g.*, teaching a 14-year-old boy wrestling, so that he can handle his bullying friends.

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2. Having a casual attitude and explaining in simple language that his fears are baseless and trying to gradually 'ease' the child out of his fear.
3. Giving considerate recognition to the child's fears and giving him a chance to talk about them.
4. Being fearless and helping the child face the fear-producing object or situation in the parent's presence.
5. Reassuring and encouraging him, and having a happy atmosphere in the family.
6. Presenting the feared object or situation in association with a loved and familiar object.
7. Giving the child an opportunity to become familiar with the things feared. Little Manu aged four was, for example, terrified of dogs ever since he was bitten by one when he was two years old. His mother told him pleasant stories about dogs. She bought him toy dogs. They discussed how a dog should be cared for and finally she bought a little puppy for him. In the beginning he was terrified but, gradually, with greater familiarity and having an increasing responsibility in caring for the puppy, he got over his fear.

STUTTERING AND LEFT HANDEDNESS

Parents should never call the child's attention to stuttering in early childhood. If the child stutters, they should never insist on his trying to talk properly. Above all, they should not tease, imitate or mock him. Since the average stutterer is a restless and tense child, parents should see that he gets plenty of rest and a good healthy diet. They should see that as far as possible he lives in a relaxed atmosphere. The child who stutters should have plenty of opportunities for enjoying rhythmic activities like singing and dancing. Reciting little rhymes, singing little songs with him, giving him a chance to hop, skip or march to music, etc., help the child in relaxing both bodily and mentally. Again, the parents should give the child plenty of love and attention, lots of opportunities for play, and see that he has plenty of fun with other children. They should engage him in such creative work as painting, clay work or block-building to lessen his tension.

Sometimes, children show a preference for the left hand and this usually upsets parents. They insist on the child's using the right hand and scold or punish him to change his 'habit.' Such children should be allowed to use the left hand because, otherwise, they often develop more serious troubles.

LYING

It is a mistake to apply adult standards about telling the truth to a little child. He has no idea that he is doing something wrong. Actually what adults consider lying may mean something quite different to a child.

Take the case of Maya, aged four, who came home from school one after-

noon and told her mother that they had all been taken to the zoo in the school bus to see the animals in the cages, that she had actually fed the big lion and had not been afraid when he had roared. In reality, Maya is a timid little child who is afraid of new experiences but in her imagination she is brave. Instead of getting upset at the child's lying or questioning the truth of her story or ridiculing or scolding her or giving her a lecture on telling the truth, the mother should say : 'Oh, what a nice make-believe story ! Let us hear it again and we will write it down for Papa.' The child can further be encouraged to draw pictures for the story, thus creating a product of her own imagination in which she can take great pride. Scolding the child would only cause confusion, it would not help her in understanding the distinction between what really happened and what she is imagining. On the other hand, accepting the story would also produce confusion. The child would rely more and more on fantasy to compensate for her timidity.

Very often lies are a compensation for some deficiency in the child's life. Take the case of five-year-old Subhash who describes in great detail to his teacher how his father has sent him a big box of toys from Delhi or how in the following month, he is going to meet his father who will be flying home in a big aeroplane. Little Subhash is confused and unhappy about his father's absence and he brags about all the imaginary toys that he would like to possess but does not. Hence he makes up these stories to reassure himself.

Many children lie because they are trying to escape the results of their misdeeds. Often it is because of very strict and unreasonably harsh disciplinary measures that children lie about what they have or have not done. The child who is sure that his parents will listen sympathetically and will not be too strict, rigid or harsh is not likely to lie. Threats do little good. The greater the fear, the more is the child likely to tell lies. Parents should not try to be too dogmatic as to when a child is or is not lying, unless they have real proof.

Since lying is usually an attempt on the part of the child to protect himself, it is up to the parents to make it less necessary for the child to resort to lies.

STEALING

Little children take things that do not belong to them because they do not see the difference between what belongs to them and what does not. At this stage, a child should not be made to feel wicked. Mother can remind her erring child that the toy belongs to Ravi and that he has one like that at home, or that he can have one like it at Diwali.

In later childhood, when children take things that belong to others, they know that they are doing wrong. Parents get very upset about such behaviour. It is, however, important to remember that the child who steals is feeling unhappy and lonely or is desperately trying to work out an inner conflict. Knowing that grown-ups consider this a very serious matter, children perhaps do it as a sure way of expressing their resistance and their inner misery. When a child wants more

friendship and popularity, he may steal money from the father's pocket and buy peanuts, gram or 'ice-golas' for his friends.

The child who is not trained early to recognize the value of money or the difference between what is his and what is not his, is bound to have trouble later on. Giving the child an allowance and helping him to plan how to spend it or save it is essential.

The child who steals needs affection and approval at home and should be helped to make friends. He should not be treated as a criminal but must be given responsibility and a great deal of understanding.

BAD LANGUAGE

Once they are over three years old, children go through a phase of using bad language. In many homes from the smallest children upwards, all use 'naughty' words. Such words become a part of the vocabulary of the older children in some homes. This is often due to the fact that many people around them use these words.

Often, in the beginning, children who are great imitators begin using bad language which is new to them merely because they like to use new words. When they find that the grown-ups get shocked and annoyed, then they deliberately use them to cause annoyance and get attention. Sometimes children swear to show how worldly-wise they are. Small children use them with a flourish and think they are being very smart.

Parents should not get alarmed or act thoughtlessly. It might worry the child or make him feel guilty; on the other hand, he may even be delighted to see their reaction and use such language again and again. If he is prevented from using such words at home through threats, scoldings and beatings, he will use them when he is with his friends at school. Parents should try to ignore these words, provided they are not awful and tactfully change the subject. If very offensive words are used, the parents should tell the child in a matter of fact way that people do not usually like to hear those words and that they do not enjoy hearing them either. If the child is small, substituting meaningless words for oaths helps; making little rhymes is also useful.

Aggressiveness and destructiveness are other examples of problem behaviour that troubles parents. Children who are over timid and shy, overpossessive and incapable of sharing things, obstinate, negative, etc., are also a problem to their parents. No cure can be prescribed for any of these without going into the root of the problem. But it is important to remember that children need love and security and that it is only when something goes wrong with their sense of security that they become problem children.

CHAPTER 54

DISCIPLINE

Many mothers have no clear idea as to how they should discipline their children. They do not want to scold their children again and again; yet they feel the need for some measure of control.

The aim should not be to control the child for the sake of control but to teach him self-control. Discipline is the system by which children are taught the ways and values of the home and the society.

THE NEED FOR DISCIPLINE

Discipline gives the child assurance that adults will check him in the expression of his 'bad' feelings and guide him in avoiding undesirable acts. 'Rules' provide the boundaries within which the children may move. Much of the laxity we see amongst our youth is largely due to the poor methods of discipline used in their early years. Grown-ups must assume some authority over the children in the interest of the children themselves and also to promote and preserve the way of life in which they believe. When there is no control, children become confused and feel insecure.

Some parents bow down to every little wish of the child, reasonable or unreasonable. This is not good either for the parents or for the child. The child should be made to understand that his parents, however much they might love him, have their own rights, and that they not only do not want him to be unreasonable or rude but also know how to be firm.

The child has to learn what is 'right' and what is 'wrong' in relation to the society in which he lives; and the child really wants to learn. One of his strongest urges is to do the right things and to behave so that he wins his parents' approval.

When Manu steals mangoes from the garden next door and his parents treat the act as a clever trick, and joke about it instead of showing disapproval of the act, Manu does not learn that he has done something 'wrong.' He does not learn to respect other people's rights or property.

BASIC FACTS

Parents should, in their attempt to discipline their children, bear in mind the following basic facts about child behaviour :

(i) Children need love and affection and security.
(ii) They want to feel well cared for and contented.
(iii) They need the chance to develop and to do more for themselves.
(iv) They must know clearly what is expected of them.

Children slowly learn what is right and what is wrong by observing and dealing with grown-ups. They acquire their own code of discipline. This is the real aim

of good discipline. Self-discipline grows out of the discipline which a child's parents have given him. It is a cooperative affair. It is not something that parents mete out to a child in an autocratic manner from a higher level. Parents must try and see that there are as few occasions as possible to use disciplinary methods. Children become more manageable if they are allowed to play lots of games, if they are allowed to do things for themselves, and if they are given the chance to do what they like doing. If the child is engaged in useful and pleasant activities, there will be fewer problems of discipline to cope with.

Little Nandini and Indumati are close neighbours. Indumati's mother provides her with several pieces of chalk, a slate, a few scraps of paper, a pair of scissors and a number of toys. When she is tired of playing, she is allowed to help her mother in little household chores. Indumati is always busy and therefore always happy. Nandini, on the other hand, has nothing to do and she gets bored. She pesters her mother. When the mother gets fed up, Nandini is asked to go outside and play; there she plays rough games, beats up other children and makes a nuisance of herself. In fact, her mother often has to bring her in and give her a beating.

Children will be more disciplined if they have a part in making the rules. The rules will then be their own rules and they will be more willing to follow them.

Talking things over with children is a very good idea because in this way they get the feeling that discipline is something to be worked out together and that the rules are not arbitrary or unreasonable. Discipline has to be a comfortable compromise in which rules are worked out together to the satisfaction of all concerned. Children should feel that they have a share in and are responsible for the life at home.

It is important to have confidence in our children and believe that children want to be good. One of their strongest desires is to be like those around them. They want to grow up and be good. This makes it easier to bring them under discipline and parents must see that this advantage is not lost.

Parents must therefore strengthen the bonds between them and their children. They must use every opportunity to let their children know that they love them. This is a major reason for their wanting to be good. Parents must make children their friends. The more fun they have together, the more secure the children feel, and the easier is the job of managing them.

CAUSES OF INDISCIPLINE

It is always necessary to look for the cause of the child's misbehaviour. Before you take any action, pause for a while and ask yourself : 'Why is he doing this ?' It is important for parents to know that 'bad feelings' inside the child can lead to 'bad actions.'

The three feelings in a child that cause most disciplinary problems are 'I am hurt', 'I am angry' and 'I am afraid.' When a child feels inadequate, he acts in a mean and nasty way. It is important to help him handle his 'bad' feelings and work them out in socially acceptable ways. The child counts on us for under-

standing his 'bad' feelings. He wants to share with us the things that bother him. Discipline will fail unless we show him that we accept him in spite of his bad feelings and that we understand him and still love him.

The child has to learn better ways of working these feelings out of himself. When we help a child to give vent to his bad feelings through acceptable actions, he becomes more willing to give up the unacceptable behaviour. Arun, aged three, has a new baby sister. He is confused about his own position and is jealous of all the care and attention the 'intruder' is getting. He takes to crying loudly. He tugs at his mother's sari whenever she is busy with the little baby. He does not do what he is told. And whenever he gets a chance, he pinches, bites or pushes the little baby. Arun's mother must understand his 'bad' feelings, talk to him and make him realize that these feelings are natural. She must give him special attention, make him feel more secure, give him responsibilities in caring for the baby and give him the opportunity to get rid of his aggression through painting, hammering, pounding, etc.

SOME SUGGESTIONS

The following suggestions will help you in tackling common disciplinary problems :

1. If the issue is important, be firm and see it through. Children must be controlled, even though they would like to have their own way.
2. Make sure that the child knows what you want. Make your requests clear, but do not argue unnecessarily. Do not give too lengthy or detailed reasons and explanations.
3. Do not threaten or nag. Try to be calm and unemotional.
4. Do not ever say 'Mother will not love you any more if.....' The child counts on your love and needs to know he will definitely have it. 'Parental blackmail' is harmful.
5. Do not bear a grudge or sulk after it is all over. Do something pleasant together and make the child feel that you still love him.
6. Give the child plenty of freedom and choice. Do not say 'no' unnecessarily—save it for important things. Do not give a choice when a thing has to be done.
7. Be consistent.
8. Try and substitute positive suggestions intead of a 'no.'
9. Never tell lies to children; otherwise they will have no confidence in you and will not know what to expect from you. Your love, approval and interest, as well as your genuine enjoyment in being with him are very important.

INDIVIDUAL APPROACH

The task of enforcing discipline is a highly individualized matter. It therefore depends largely on the child and on the circumstances under which it is to be enforced.

Parents may under certain circumstances find it absolutely necessary to punish children, but that does not mean that children need a dose of punishment regularly like codliver oil to grow up right.

If the child is handled in a friendly way, he will want to do the right thing most of the time. When he does occasionally go wrong, he is best straightened out in early childhood by such methods as diversion, guidance or even bodily removal from the situation, etc. As he grows older, his parents have at times to explain firmly why he must do this and not that. If they are sure in their own mind of how they expect him to behave and explain such behaviour to him in a friendly and reasonable way, they will have full control over him. The mother who does not excitedly and impulsively punish her child, but first thinks about the problem and then tackles it, is respected by the child.

REWARDS AND PUNISHMENT

Material rewards for good behaviour and punishment for bad behaviour are not necessary for effective discipline. When a child is punished, you say to him that he has been bad and show your disapproval of him by making him suffer. The child himself is not bad although his behaviour may have been. Good discipline should be directed towards the behaviour and not towards the child.

Spanking and whipping make the child stop a particular 'undesirable' activity but are not at all effective in teaching him discipline. Threatening to punish him, locking him up in a dark room, tying him up in a room, threatening him with the fear of the doctor, police or *sadhu*, or telling him that you will leave him and never love or speak to him again, are all examples of faulty and ineffective methods of handling children; such methods do not guide the child towards the final objective of self-discipline. Some parents who maintain that they do not believe in physical punishment, actually use a much more harmful method, *i.e.*, psychological punishment which involves shaming, lecturing, nagging, scolding or sulking and which wounds the child's sense of dignity. It is important to know that the disapproval should always be directed at the behaviour rather than at the child, and it should all be quickly over, leaving the air clear for a positive relationship between the parent and child.

In the same way, respect for the child's integrity is not shown by rewarding good behaviour. Rewards, of course, do result in the repetition of the behaviour that earned them. The child, however, learns to be good for the sake of the reward rather than as an expression of his own goodness. The best reward, if good discipline is to be maintained, is to show overt and appropriate signs of approval and appreciation. Children want to be accepted and loved more than anything else.

There are times when punishment or rewards are indicated but these techniques should be used with a great deal of understanding and consideration. Whatever the method of discipline, if the child is basically secure and if he is loved, respected and accepted by his parents, he will find it easier to move towards the goal of 'self discipline.'

CHAPTER 55

THE HEALTHY CHILD

A healthy child has the best chance of growing into a healthy adult. Parents have the great responsibility of providing a healthy environment for their children because the foundations of future health are laid in childhood.

SIGNS OF HEALTH

The child is healthy if he :

1. Is cheerful.
2. Is active and alert.
3. Has a smooth and glowing skin and glossy hair.
4. Has sparkling eyes.
5. Is free from fear, anxiety or tension.
6. Has a good posture.
7. Is free from all gross physical defects.
8. Has a good appetite.
9. Has proper height and weight according to his age, a firm and proportionate body, and good muscle tone.

WARNING SIGNALS

The child needs help if he :

1. Is listless and dull.
2. Is overactive and restless.
3. Has a poor posture.
4. Has such physical defects as flat feet, bow-legs or knock knees.
5. Is always suffering from cold, cough or pain in the joints.
6. Has a poor vision or hearing.
7. Is drowsy and fatigued.
8. Is constantly refusing to eat.
9. Is pale, underweight or flabby.
10. Has puffiness of skin, red rimmed eyes or a protruding stomach
11. Has constipation or diarrhoea.
12. Complains of aches and pains.

A number of factors are responsible for keeping the child in a healthy condition. They are :

1. Clean and healthy surroundings.
2. Clean and nutritious food.
3. Plenty of exercise, rest and sleep.
4. Cultivation of routine habits.

5. Proper clothing.
6. Playmates, toys, a playground and the opportunity to play.
7. Some simple rules and regulations regarding health and safety.
8. Proper preventive measures, and frequent and proper medical care.
9. A happy and tension-free home.

HEALTHY SURROUNDINGS

Children must live in clean surroundings. The house must be scrupulously clean and it should not be over-crowded. It should be free from pests and insects like bugs, rats, scorpions, etc. It should be free from damp and draughts. It should allow plenty of fresh air and light. There should be a proper outlet for the kitchen smoke. The latrine should be at a distance and kept scrupulously clean. If there are goats or any other animals, their shed should be built outside the house and kept very clean. Water puddles where mosquitoes breed should be prevented. There should be a dust-bin where the garbage can be covered up so that children cannot scoop it out to play with. Stern measures like burning neem leaves or incense powder twice daily should be taken to keep away flies and other insects.

If there is a verandah or a small yard, the child should be allowed to play there as much as possible. It is not healthy for children to be cooped up in a room all day.

The child gets his vitamin D from sunshine. In India, there is no dearth of sunshine. In fact, in this country, the problem is how to keep the child away from the hot burning sun. Children should be allowed to play outdoors in the open or under a large shady tree in the mornings and in the evenings. They should be made to play indoors or in a closed verandah during the afternoon.

DIET

An adequate diet is necessary for the healthy growth and development of the child. His present health and, to a large extent, his future well-being depend on the food that he consumes during these formative years.

Most Indian infants are breast-fed because it is the cheapest, the most wholesome and the most easily digestible food. When mothers breast-feed their babies, they have to be careful to see that their own diet is wholesome. Their diet must consist of plenty of milk, fresh seasonal fruits and vegetables, cereals, whole wheat *chapatis*, sprouted beans, dried beans and pulses, *dahi* or *lassi*, ghee, etc. Nursing mothers should also keep their own health in perfect condition and should take good care of their breasts and nipples to make breast-feeding easy for their babies.

Many mothers overfeed their babies, because their mothers-in-law or mothers insist on their feeding the infants each time they whimper. It is certainly harmful if the mothers follow a very rigid and strict schedule in feeding their children, but feeding a baby every time it cries is not good either. The baby does not always cry because it is hungry; it may be wet or in an uncomfortable position or too warm. It may suck away in spite of being full and then spill out what it takes in. There-

fore it is a good idea to let the baby develop a feeding rhythm of its own. By carefully observing the timings when the child shows signs of hunger during the first few weeks, the mother can soon find out when and how often the baby is to be fed. This is what is known as the *self regulation of feeding*. You will find that eventually this will work out to feedings at intervals of three to four hours and will eventually conform to the meal pattern of the family.

When mothers are working, whether outside or at home, they often do not have time to sit down peacefully and feed their babies. The feeding is thus often done hurriedly and haphazardly. The baby gets very little milk, feels frustrated and is always crying because it has not had enough. The baby has a small stomach and can suck very little at a time; so that it should be fed in as calm, peaceful and unhurried a manner as possible. The baby should be fondled, loved and cooed over while it is being fed; this is the time when a very pleasing and warm relationship is built up between the mother and the child. The baby should never be rudely or suddenly removed from the mother's breast.

When the baby is not breast-fed by the mother, for any reason, it is a common practice to give the infant either goat's milk diluted with water and sugar or cow's milk. The milk is generally given in a feeding bottle. It is extremely important to see that the bottle is sterilized and the rubber nipple properly washed and that both are kept on a table or shelf under some cover. Before feeding milk to the baby from a bottle, it should be warmed a little. The baby should be held in the mother's arms and fed by her to give the child the requisite warmth and feeling of security.

When the baby is one month old, it is time to give it two protective foods : four to five drops of cod-liver oil or shark-liver oil for the vitamins A and D, and two to three teaspoons of orange, tomato or *aonla* juice for vitamin C. Start the baby on a teaspoon of the juice diluted with cold boiled water and gradually increase the quantity. When it is about three months old, the baby is ready to be given foods other than milk.

Whatever food you begin with (fruit, vegetable or cereal), this should be a very slow and gradual process. The main thing is that it should be enjoyable. Struggling with the one idea of pushing the essential food down the baby's throat will only make it dislike the food. Help the baby to get used to the new foods and to enjoy eating them. *Dalia* (wheat porridge), dry toast and other hard foods, very softly cooked rice or dal, mashed potatoes, soft mashed fruit (cooked), mashed bananas, and later on, mashed vegetables (cooked) or vegetable soup should be given. Of course, very small quantities should be given at first. By the time the baby is one to one and a half years old, it can partake of regular meals. Many parents pay no attention to the baby's need for additional foods and give it only milk till he is more than a year old. But this is not at all desirable.

Many mothers feed their babies till they are about a year old and often even until much later. There is a belief that the longer the child is breast-fed, the less chances there are for the mother to conceive again. There is also the feeling that

while there is milk, the child should get it. Some mothers suckle their children even after they learn to eat a regular diet. Weak and sickly children and long awaited sons are breast-fed much longer. This is a form of over-protection.

Weaning of children is done in a very cruel and haphazard manner in many cases. It is common for mothers to apply quinine or other bitter medicines to the nipples. Sometimes, cotton wool is stuck to the nipples to frighten the child away. Weaning should be a slow and gradual process. The baby should be weaned when it is about eight months' old. Artificial means should never be resorted to. For example, mothers should not give children such 'pacifiers' as rubber nipples. It is a good idea to let the children get gradually used to drinking from a cup and spoon. However, force or nagging should not accompany weaning. Most babies like to feed themselves even before they are a year old. Allow them to do so because that is how they will learn. If you feed your child in spite of his eagerness to feed himself you will be making him over-dependent. He might later on refuse to accept food if you insist on feeding him. If you still continue to insist and try to push the food down his throat, he will realize that refusing food is a good way of drawing attention towards himself. He is liable to use this as a weapon for getting his wishes accepted.

Many of our children today are malnourished, not so much because of poverty as ignorance. It is the parents' responsibility, not only to provide children with the types of food necessary for their healthy growth and development, but also to help them like and enjoy these foods.

The child in an Indian home, generally, has two major meals a day in addition to which he is given milk and some snacks once in the morning and again in the afternoon after a nap. If the child is to grow healthy, he should have food that supplies his needs. A well-planned daily diet for the child should contain the following things :

For Growth and Repair of Tissue : Milk, cheese and *dahi* (for non-vegetarians, eggs, fish and meat); peanuts; dal and beans.

For Energy : Whole wheat *chapatis* and hand-pounded or parboiled rice; potatoes, sweet potatoes, yam, carrots or any other root vegetable; honey; nuts; ghee; and jaggery.

For Protection Against Ill-health : Oranges, guavas, *jamuns*, bananas, papayas or any seasonal fruit; a raw salad consisting of a few drops of lemon juice, grated cabbage, carrots, radish or cucumber; green or leafy vegetables (*palak, methi, cholai bhaji, parval*, lady's fingers); nuts and sprouted pulses.

To Build Bones, Blood and Teeth : Green leaves (*bhajis*, lettuce, etc.); dal; peanuts; curds; and dry fruits for minerals.

The child also needs plenty of clean fresh water to drink.

Every day on waking up, a mother's first thought is : 'What shall I cook today ?' The answer depends upon :

1. The amount of money at her disposal.
2. What food the children require for growth.

3. What is available in the market.
4. What food the children enjoy eating.

It is very important that a child should have a well-balanced meal. The meal can be balanced, even at a low cost, if the mother uses a little forethought and imagination.

Children differ greatly in their food needs. A child with a small appetite may be just as healthy and may grow just as well as one who eats a great deal. The child's food requirements vary according to his age, the amount of exercise or activity he has, the build of his body, and his appetite.

If you understand your child's food needs, you will not fuss, worry or force him; and his natural liking for food will never get spoilt. What the child's eating

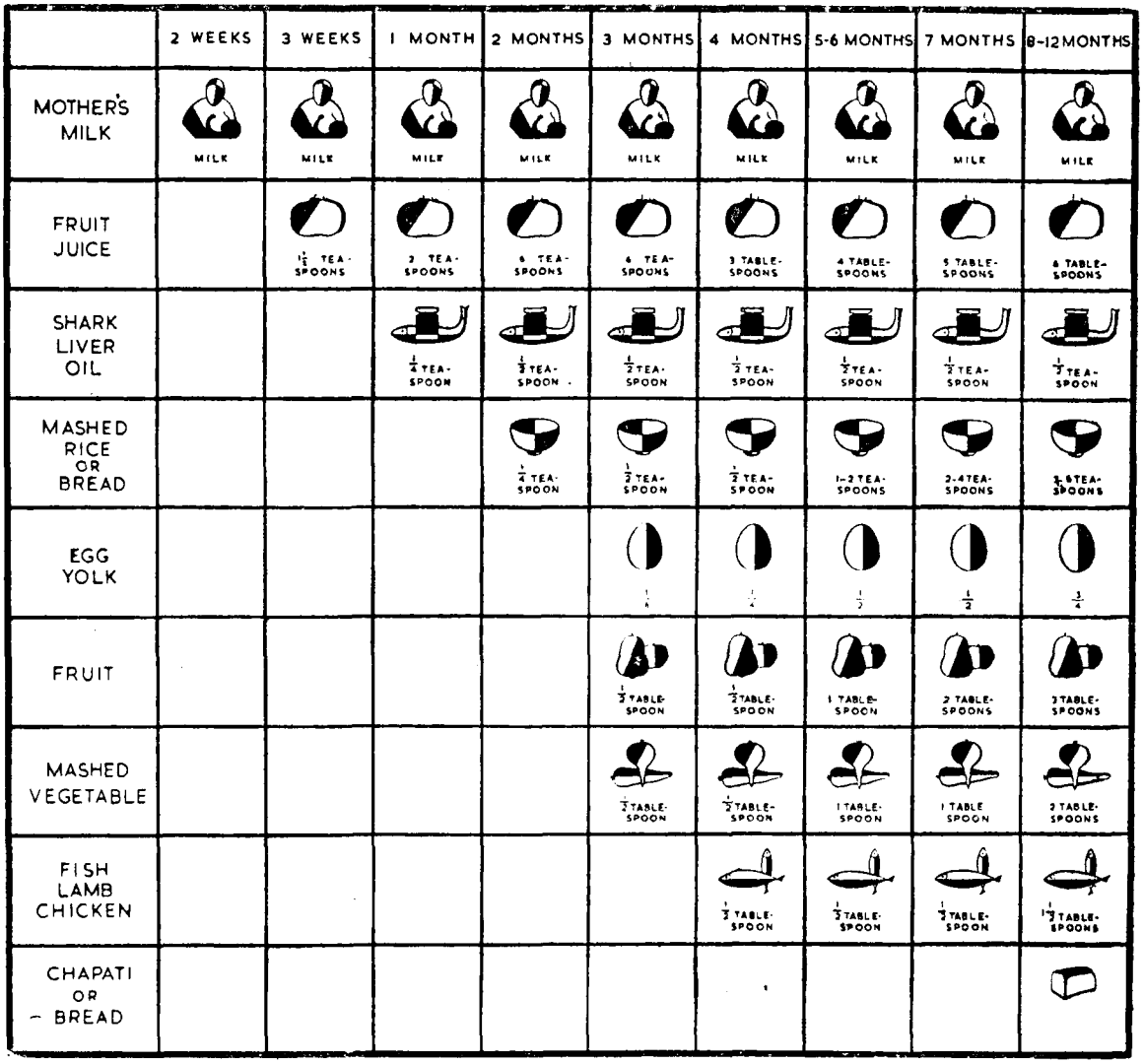

FIG. 60. CHART SHOWING FOOD SUPPLEMENTS FOR NORMAL INFANT

habits will be in later childhood depends greatly on how pleasant or unpleasant his initial experiences with food are. You should let him eat when he is really

hungry and then feed him the rest of the meal yourself. Choose a time when the child is not tired or sleepy. Guide the child; but do not interfere unnecessarily. Do not give him too much of attention. Let the child sit comfortably in the kitchen to eat while you continue to cook or do some other work. You should not get irritated over his slowness, awkwardness and spilling.

At times, even with the best of planning, mealtimes do not go smoothly. A child may not eat well at all times for a variety of reasons. The reason may be an approaching fever, lack of sleep, over-excitement, over-fatigue, lack of exercise, drinking too much milk or eating too many sweets at a neighbour's house. When the child's growth slows down at certain periods, his appetite also diminishes. Lack of appetite can also be caused by an emotional upset. If he is frightened or has had a scene with an adult or if he has undergone some exciting experience such as a visit to a circus or cinema, he will be in no mood to eat.

Then there are some conditions that just put the child off food, for example, a *thali* piled high with food. Children should be given small first helpings and given a second helping if they want more. Introducing too many new foods at one time may also make the child disinclined towards eating. New food should be introduced in a very small amount along with something that the child really likes and is familiar with.

Fluctuations in appetite normally occur in childhood. Children take a strong liking for a particular thing for a few days and just as suddenly they take a dislike to it. Take the disliked food off his menu for some time.

Sometimes, the parents themselves are responsible for creating eating difficulties among their children. If children constantly hear, 'Oh how I hate turnips' or 'Why did you cook *parwals* when you know how I dislike them ?' and similar other comments, they may copy the adults and acquire a dislike for certain kinds of food. Parents who have all sorts of food fads and who have various beliefs about the desirability of eating certain dishes at certain times of the year plant those ideas in their child's head. Such a child is more likely to form poor eating habits.

Most mothers do not realize all these underlying causes and start worrying whenever the child fails to eat as much as they think he should. Then they coax him to eat by promising rewards, playing with him, telling him stories, bribing him, promising to allow him to do something that was previously not allowed, scolding him, punishing him, etc. This extra attention and the special fuss is great fun for the child. To draw such attention, he begins to deliberately refuse food.

Wholesome food, properly prepared and served to the child without special comments or fuss, usually produces good results. This should be done right from the child's infancy. If the child refuses to eat, it is best to remove the food after a reasonable time without showing over-anxiety or concern. If the child is really hungry and finds that he gains nothing by refusing to eat, he will gradually learn to eat without delay, coaxing or bribing. Such an attitude will prevent the formation of faulty eating habits.

The following points are worth remembering, for they will help you make mealtimes more pleasant for your children.

1. Children will eat well, if they are given the foods they like, at the times they want it.
2. Find out how much your child needs, he might need more or less than you expect.
3. Accept the child's dislikes. You too have your dislikes. Substitute something else for the thing disliked or prepare it in a different way.
4. Do not nag or take up a 'do or die' attitude; not eating a particular food will not harm him. Do not be concerned; or rather do not show your concern.
5. Give the child plenty of your company at other times of the day, so that he does not feel that he has to make a fuss to keep you with him at mealtimes.
6. Do not complain about the child's poor eating habits in his presence to your neighbour or friends.
7. Do not hurry the child. Dawdling might mean that the child is not hungry or that he is just drawing your attention to him.
8. Make the meals as varied and appetizing as possible.
9. An attractive setting, a few flowers and a colourful mat to sit on, etc., will help a lot.
10. Seat the child comfortably on a mat with a small wooden stool of a proper height for his *thali.*
11. Let the atmosphere be relaxed; let there be no confusion or any other distraction.
12. Let there be pleasant conversation about matters other than food.
13. The preparation and serving should be attractive and appealing, with due consideration to the following :
    (*a*) colour combination;
    (*b*) form;
    (*c*) flavour;
    (*d*) consistency; and
    (*e*) temperature.
14. Children like familiar dishes.
15. Children like simple dishes served separately rather than mixed.
16. They like large pieces of food that can be held in the fingers and chewed.
17. They prefer simple food. Too highly seasoned or over-spiced dishes and dishes with very strong flavours are not liked by them. Do not give them too much of fried or heavy food. Cook a child's meal in just the right amount of water. Do not throw away the water in which food has been cooked. Do not undercook the food.

18. Vary the shapes and sizes of familiar foods (*e.g. puris* can be of different shapes).
19. Eating utensils must be sturdy and unbreakable, and yet light and easy to handle. Stainless steel is best.
20. Allow the child plenty of time. Let him spill or make a mess if he must. If it lasts too long, end the meal quietly and without any undue fuss.
21. Start with the conviction that your child is going to enjoy eating.

Everyday Food Plan : A housewife should have a clear idea of what dishes can be served at different times of the day.

Breakfast : The following items of food can be included in the morning meal :

1. Milk (plain or with saffron and cardamom).
2. *Bhakhari* or *bajra chapatis, idlis, dalia, sooji khir, upma* (or any other cereal dish), or *poodas* (pancakes of wheat flour or *besan*),
3. Soft fruit (bananas, papaya, guava, etc.); or dried fruit (cooked) such as apricot, figs or dried dates.
4. Honey, jaggery, mango and *aonla* preserves, or *paneer* (home-made cheese) can be served with the cereal.

Lunch and Dinner : As a rule, make the lunch a big meal and keep the dinner a light one.

1. *Chapatis, puris, parathas* (plain or with vegetables), *besan chapatis*, rice, rice with vegetables, *khichdi* (rice with dal), *upma*, wheat or *sooji halwa* sweet rice, *muthia* (a rissole of flour and vegetable), *dhokla* or dal *dhokali.*
2. One yellow or green vegetable (*palak*, turnip, pumpkin, lady's finger, brinjal, etc.).
3. One raw salad (shredded cabbage, grated cucumber, carrots, radish with leaves, *mogri*, tomato, etc., with lemon).
4. Milk or some milk preparation as *khir* or a *khova* sweet, buttermilk, *dahi, kadhi, avial*, etc.
5. Dal or 'sprouted beans, pulses or *chana.*

Afternoon Snack : Most children have the faulty habit of eating between meals and unfortunately mothers encourage them to munch things as they play. Quite often, to pacify her child, divert his attention or make him. stop bothering her, the mother gives him some snack or gives him money to buy something from the bazaar.

Many snacks, specially those bought from the bazaar, are unwholesome and unhygienic. Heavy sweets, *masala chana, kulfi*, peppermints, biscuits, etc., interfere with the child's appetite and are bound to spoil his regular meals.

Snacks consisting of wholesome nutritious food are very desirable. When the child wakes up from his afternoon nap, he may be given :

1. Milk or the juice of sugarcane, lemon, *mausambi, aonla* or mango.

2. Fruit (guava, *jamun*, *sitaphal* (*sharifa*), mango or any other seasonal fruit,
3. Peanut, *chana* or coconut toffee, dates, *golpapadi* (a wheat and jaggery preparation), *nankhatai* (butter biscuits,) toast, corn (*makai* or *bhutta*), *chewda* (beaten rice or puffed rice with peanuts, raisins, *chana*, etc.).

EXERCISE AND REST

Exercise

Before he learns to crawl, the baby gets his exercise by kicking, squirming, throwing his arms and legs around freely and by crying. His clothing or his bedding should not restrict these movements. The cloth cradle used in many parts of our country is unsuitable in this respect. In addition to his own efforts, a little help on the part of the mother will develop his strength. Put the baby on the bed or on the floor without clothes and allow him to kick freely. Exercise his hands and legs, and roll him gently. These exercise periods should be made enjoyable, and the exercise should not be overdone. This can be done before the bath.

Before the baby is put to bed, he should be picked up and played with. Before the evening feed, he should be undressed, sponged lightly, rubbed with oil or powder, and then dressed for the night.

When he learns to crawl around, of course, he gets all the exercise he needs. A safe corner which can be fenced off is good for the child to play freely in. Once the child can walk and run, he should be encouraged to play plenty of outdoor games and other games which help his muscles to grow.

How much exercise each child should have depends on individual needs. A thin, nervous and restless child who is over-active and gets tired easily should be given toys and games that will keep him quiet and rested, at least for a short period. On the other hand, a slow, heavy and sluggish child must be urged to go out and play.

Young boys and girls of a school-going age should not be made to forego their playtime in favour of their lessons. Many parents prevent their young boys from going out and playing with other boys in the neighbourhood for fear of their learning 'bad language' or dirtying their clothes. The needs of growing girls are ignored in many homes because they are kept indoors to look after the younger children and to help the mother in cooking and sewing.

Rest

Mothers should see that their children get some quiet breaks during the day; otherwise the children become cross and tired at the end of the day. Naturally, all parents want their children to develop well-balanced, healthy and strong bodies. This is possible only if they have both rest and exercise, according to their own individual needs. Rest is as necessary as exercise for a child.

Rest does not necessarily mean making the child sit quietly or lie down, without speaking a single word for a certain period. If a child is forced to do this, he becomes more restless. Providing him with toys and games which make him

relax is enough. Making flower garlands, sitting together and singing, reading, painting, telling stories, drawing, making clothes for the doll, making clay vessels for the doll-house, etc., are some of the activities which make the child relax and rest.

Sleep

Children require plenty of sleep to grow up well. In many homes, there is no regular bedtime for children. They are allowed to play around as late as 11 O'clock in the night. In other homes, even when the child is practically dropping off to sleep, no care is taken because he has to keep awake till dinner-time which may be very late.

Children may not like to go to bed unless it is made a pleasant and cheerful time and not an unpleasant duty. If a regular time is fixed for all other routines, he knows what is expected of him. Once in a while, on special occasions, the child may of course be allowed to stay up longer. Bedtime should not become a time for quarelling every night, with the mother insisting, the child pleading, and the father threatening. As in everything else, consistency is required. Do not fuss or hurry the child off to bed as if you wanted to get rid of him, but lead him to bed. He often hates to go to bed thinking that he will miss some fun. Let bedtime be peaceful. Talk for a little while with the child before he turns in. If you have time, tell him a story. Play a little game or share some activity with the child before bedtime and tell him that bedtime is approaching while a few minutes are still left. Each year the child can stay up a little longer.

If the child is to sleep on the ground, the bedding should be extra firm and comfortable. There should not be too many pillows and bed sheets. The bedroom must be well ventilated; it should not be too hot and stuffy or too cold and draughty. The child should be protected with a mosquito net. He should not sleep in the same bed as the parents and, if possible, not even in the same room. If this is not possible, at least a corner of the room can be screened off for him. It is desirable that the child should get used to the ordinary household noises. The parents should not talk in whispers or move about on tiptoe while he is asleep. Babies should be dry; otherwise they do not sleep well.

Children differ quite a bit in the amount of sleep they need. For the first few weeks, they sleep most of the time except when being fed or bathed. When two to three months old, they need 18 to 20 hours of sleep daily. At the age of six to twelve months, twelve hours of sleep with morning and afternoon naps are needed. When two to six years old, they should sleep 12 hours at night, and have one long nap in the afternoon.

A child may have difficulty in going to sleep because :

(*i*) He might have had a very strenuous day.
(*ii*) He may have been frightened by somebody during the day-time.
(*iii*) His afternoon nap might have been long.
(*iv*) He may not have had enough physical exercise.
(*v*) Perhaps he is just asking for attention because he feels insecure.

He may get up several times asking for water or wanting to go to the bathroom Some children walk or talk in their sleep; others have bad dreams. When they are unhappy, their feelings of fear, anxiety and uncertainty find expression in this manner. Many a mother is responsible for the poor sleeping habits of her child. She makes him over-dependent and makes him conform to every whim of hers. In such a case the child will sleep only with the mother. Fear of the dark or of being alone is another reason why children do not like to go to bed.

Some sleep during the day is necessary for young children. The average child should have a daily nap till he is about six years old. Even after that, a short nap or period of relaxation is absolutely essential. Five to ten minutes of such relaxation, either before or after the afternoon meal, is advisable. Children should not be allowed to go out for play and then recalled for a nap; they are then bound to resent it. The emphasis should be on resting rather than on sleeping. The child should have his afternoon nap early in the afternoons; otherwise there might be trouble getting him to bed at night. The length of the nap should shorten gradually. Children should not normally be awakened from a nap. But this may become necessary if the child develops the habit of taking a lengthy nap, specially if his sleep at night is affected. Do not make an issue of the afternoon nap. Do not ever use it as a punishment. If the child is very reluctant to go to sleep, let him play quietly in a corner or tell him a story so that he gets the needed relaxation.

ROUTINE HABITS

Encouraging regularity in elimination in children is desirable. It is usual and normal for the child to have a bowel movement once in a day; but some children have it twice a day and others once in two days. However, as long as the habit is regular and the movements are passed without any difficulty or are not loose, it should be considered normal and no attempt should be made to change it by giving him an enema or some medicine. Some parents actually labour under the false idea that all children require a good dose of castor oil, once a week or fortnight, to clean their systems.

Over-emphasis on making the child pass his motions or nagging the child about soiling his clothes might lead to constipation. A wrong diet may also be responsible for it. Praising him for success and not criticizing him unduly for failure are important in helping the child establish good bowel and bladder control. Parents should encourage him to use the latrine or a corner of the yard far away from the house for this purpose and should not allow him to sit just anywhere.

In some homes, parents are completely careless about wet and dirty clothes or puddles in the middle of the room. Some force the child into acquiring toilet control at a very early age when he is not ready for it. It is important to give him the correct help at just the right time. It is better not to be too pressing in your training efforts until the child understands what is expected of him and is able to cooperate with you.

A fair amount of regularity in his other routines such as eating, bathing, going to bed, etc., will also help in regulating his elimination habits. By noting the hours in which the child has his bowel movement daily, it is possible to help him at that time. When the child is about seven to nine months old, the mother can, after finding the time of his movement by careful observation, put him on a small pot. There should, however, be no coaxing or forcing and the mother should not make an issue of it.

It is important to prevent hard movements because they hurt and consequently frighten the child and might thus lead to constipation. Do not keep the child in the latrine for long periods or detain him there until he has a motion. Do not take him there too frequently. Do not nag, scold, frighten or threaten him. Be casual and natural. Do not shame him when he soils his clothes and do not look disgusted. Help the child to look at elimination as a normal physiological process.

Urine Training

Forcing the child to urinate by making special noises, coaxing him or detaining him in the latrine can be very harmful. At the same time not helping the child in gaining control is also not desirable. Between the ages of 1½ and 2 years the child should be taught not to wet his clothes or pass urine just anywhere. When the baby is old enough to hold on for about two hours, he can be taken to the bathroom when he has kept dry for two hours or so. It is only after he is two years old, that the child understands his own responsibilities, has enough self control, is sensitive enough to know that he wants to urinate, and can tell when he wants to go to the bathroom. The child may even then have 'accidents', but that is nothing abnormal. He might have been over-excited or nervous, or he might have been too absorbed in his play to remember. Sometimes children wet their clothes purposely when they are angry or resentful. Having a new baby in the house, joining school or moving into a new house or any such new situation may lead to 'accidents'.

A point to remember is that children should not be made to feel that there is anything dirty or shameful about elimination. Getting rid of body wastes must be treated as a matter-of-fact affair. Body parts and their functions must be referred to by their proper names so that the child will not feel ashamed of them. If a young child plays with his faeces or urine, instead of being violently disapproved or scolded, the child should be removed and cleaned and his attention diverted to something more interesting. He should be provided with plenty of opportunity to play with water and clay.

Bathing

The most usual time for bathing the baby is the morning. The child needs a daily warm bath with a soft soap. In the very hot summer, a tepid bath twice a day is desirable. It is a good practice to massage the baby with oil before his bath. The child should be taught to bathe himself as soon as he is able to do so. It is important to enjoy bathtime with the child. The mother should not frighten the child by pouring too much water over his head or allowing soap to get into his eyes. She should not be impatient if the child wants to play with the water in the

bucket or pour water over himself. She should let him splash about after she has cleaned him up. A small rubber toy or even a paper boat in the bucket can be lots of fun for the child and makes giving him a bath easier.

Brushing the Teeth

The child should be taught to clean his teeth with his finger using soap, coal powder or salt or with a twig from a neem, *babul* or banyan tree as soon as he is able to do so. He should be made to clean his teeth early in the morning, before bedtime and after each meal.

PROPER CLOTHING

Clothing should be chosen for the health, comfort, convenience and pleasure of the child. It should not be chosen merely for the pleasure of the adult who might enjoy dressing the child up like a doll.

While planning the child's wardrobe, you should ask yourself the following questions :

1. Can he play freely in those garments ?
2. Are they suitable for the weather or the occasion ?
3. Do they fit him in such a way that his growth, circulation of blood and muscular activity are not retarded ?
4. Do they promote independence and self-reliance : can the child take them off and put them on easily by himself ?
5. Will they wash well so that the child need not always be warned or worried about getting them dirty ?
6. Are they like other children's clothes so that the child does not look or feel different from others ?

The baby should wear the minimum of clothing because if he is over-dressed he will be uncomfortable and unhappy. If the baby is allowed to run around unclad, with no protection whatsoever, he may get dirty, hurt or bitten by insects.

Washing the Baby's Clothes

Few mothers have many changes for their babies, and so dirty clothes have to be washed daily. They should be washed in a separate bucket, as they need special care. Cottons need hot water and a hard soap. Woollens need warm and soapy water.

The baby's clothes should be washed by squeezing, kneading and rinsing them in warm water. The baby's skin is very tender and can be easily irritated. Therefore :

1. Use only the best soap which does not contain an excess of soda.
2. Never use washing blue as it is an irritant.
3. Do not starch the baby's clothes, specially those that are to be worn next to the skin.
4. Always air the baby's clothes and, if possible, dry them in the open.

Shoes

Well-fitting shoes help the child to learn balancing, climbing and running. Poorly fitting and badly shaped shoes injure the soft bones of the child's foot. Shoes should follow the natural shape of the feet. Shoes should be a quarter of an inch wider and half an inch longer than the outline of the child's foot on paper. They must be firm, flat, moderately flexible and not slippery. Shoes should be thicker at the middle of the sole. The heel should fit and the toe of the shoe should be deep and broad so that the toes of the child can move about freely. *Chappals* are not desirable as they provide no support for the foot. Buckles should be preferred to laces for they promote independence.

PLAY AND RECREATION

Playing is as serious a business to the child as his job is to an adult. Playing helps in the unfolding of the child's powers. It builds the child's body by strengthening his muscles. It builds his mind and helps him to think, solve problems, use his imagination and become resourceful. It also builds social awareness in the child because he learns to take other children into consideration while playing. Besides this, the child finds, through playing, a release for many of his feelings and emotions. The child finds an outlet for creative expression. He also becomes familiar with the situations in life.

However, the importance of playing is often not sufficiently realized. A child should never be unnecessarily interfered with or rudely interrupted while he is at play. Instead he should be praised, encouraged and given plenty of uninterrupted time for playing.

Most of us do buy toys for our children but completely ignore the fact that the right type of toys are a means of education. We ought to stimulate the child's efforts at thinking by providing suitable toys. Playtime can be an extremely enjoyable and constructive part of the child's day, if proper toys and games, good playmates and adequate time for play are provided.

Provide the child with a big wooden box for keeping his toys and teach him to put his toys away neatly when he has finished playing with them. Do not buy him a new toy thoughtlessly every time you go to the bazaar. Too many flimsy and easily breakable toys cause frustration. Too many mechanical toys kill the child's imagination and creativeness. Since the child plays most on the floor, see that the floor is clean and dry. In winter, it should be covered with *chattai.*

A small corner of a room or verandah can be set apart for the child's play. This is better than allowing him to play just anywhere and everywhere.

A small yard outside the house provides a wonderful place for the child to run about and play freely in. This yard should be properly fenced. If there is a large tree in the yard, a rope swing with a small plank for a seat can be fixed to a branch. A small heap of sand will give the child plenty of enjoyment. A small plot may be prepared by the child for his own gardening.

Playing with other children, specially with children of different age-groups is important for the child. Through group play, he learns that others have their feelings and rights too. He learns to share and adapt himself to different circumstances. He learns that certain types of behaviour are acceptable to the group, while certain others are not. He develops self-reliance, initiative and, perhaps, the qualities of leadership. It is important that the parents should realize that each child needs his own friends. Parents should not think that the company of other children in the family is enough. Such problems as over-dependence, jealousy, resentment, etc., arise when parents insist on the older child's looking after and playing with the younger one instead of encouraging each to find his own playmates.

Simple play materials—specially materials like sand, clay or paint—are best, because by playing with them children learn to use their imagination. It is better to give three-year—old Ramesh a set of wooden blocks than a train that runs on rails, because he can make not only a long train with the blocks but also a house, a tower and a bridge.

A child needs different types of toys at different ages. The following are some suggestions on this point.

Up to One Year : Bright rings or rattles of different shapes and made of a material that does not break or chip off easily; soft rag dolls, balls and animals of stuffed cloth; bright coloured balloons. Small, tightly closed tins with seeds inside them can also be used as rattles.

One to One and a Half Years : Things in which small objects can be put and taken out, *e.g.*, small baskets and large pebbles or tin cans and bottle covers; small wooden blocks; a plain box or a tin attached to a string for pulling; a stick with a wheel and a bell attached at one end; boxes, tins, old reels, pots, pans and spoons.

Two to Three Years : A small *sighri* or *chulha*, cooking utensils, small brooms, a dustpan, etc., balls, large and small; something which he can pound and bang on; animals on wheels; a big wooden packing box on sturdy wheels in which one child can sit while another child pulls or pushes; a bucket or a tin tub with water, in which the child can float paper boats or other light toys; sand and digging implements, little tins, spoons, sieves and small buckets; clay, paints, coloured chalk or even charcoal and bits of brick for drawing; a drum, a tambourine, or cymbals (small); a small home-made string instrument; beads and string; old clothes for make-believe play.

Three to Six Years : A small bamboo ladder; a four to five feet long plank of wood which can be fixed on one side of the verandah and on which the child can slide or jump; a fully-furnished doll's house, dolls of wood or rags and a cradle; a large slate and chalk; paints; clay; old paper or magazines and a pair of blunt scissors; a set of small gardening implements; and materials for creative activities. At this age, a child needs plenty of opportunity to experiment with things.

Six to Nine Years : Girls love playing with dolls, arranging and running the dolls' house, and sewing dolls' clothes. They play hop-scotch and 'Jacks.' They skip ropes. Boys play marbles, *gulli danda*, *hututu*, *kho*, cricket, shooting with a

catapult, target practice with simple home-made bows and arrows, etc. At this age, children can be helped to make toys with match-boxes, cigarette cartons, cardboard boxes, reels and small tins. Children love collecting beads, glass bottles, boxes, feathers, stones, etc.

Nine to Twelve Years : At this age, children begin to have hobbies and cultivate special skills and interests. They still love to collect things but their collections become more systematic and specific. They like simple handicrafts. Girls like sewing, knitting, embroidery, making things with shells or beads and making bags of coloured strings or little mats with wool. Boys like carpentry and enjoy vigorous outdoor games, group play and competitive games. Drawing, singing, having simple little variety programmes, *garba* (group dance by girls), *ras* (group dance in which both girls and boys participate) can be encouraged.

Keeping and caring for pets like goats, chickens or dogs is a very good occupation. Children enjoy doing this at all ages after 2½ years or so.

Stories and Music

Until the child is two years old, he cannot sit long enough to listen to a long story but he loves to look at colourful pictures of familiar objects and to listen to simple little rhymes. From the age of two onwards, the child just loves stories. He often has the same story told to him over and over again. Our literature, folklore and mythology are very rich in stories. Fables from the *Panchatantra* and incidents from the *Mahabharata* and *Ramayana* have always been popular with our children. Unfortunately, in spite of the richness and variety of our literature, there is a great dearth of children's literature. Simple little tales should, therefore, be intelligently adapted for children. Parents can make their own picture books by collecting pictures from magazines, calenders, etc., and pasting them together in a large file. Children love stories of animals, seasons and festivals. They also love stories in which other children do things with which they are familiar. Stories should be simple, short, full of humour and not too fanciful or imaginative. They should have a moral. Horror stories should not be told to children.

Story-telling provides a very good opportunity for developing a warm relationship between the parents and the children. A pleasant experience shared together does a lot to increase the child's feelings of security. Even if the parents cannot find time for telling stories, the grandparents can make a very rich contribution to the child's life. Little rhymes and songs that have come down to us from our mothers and grandmothers are very popular even today. Children love rhythm, words that rhyme, plenty of humour, nonsensical words and words that have nice sounds. The rhymes and songs should be about familiar things and activities. Lullabies or simple songs sung by the grandmother or mother while putting the child to sleep or while playing together, add to the child's enjoyment and future appreciation of music.

Festivals

The celebration of festivals, of which we have so many, is a good way of having fun in the family. These celebrations are enjoyable and promote mutual under-

standing. They increase the child's general knowledge. Celebrating Diwali, Holi, Uttaran (kite-flying), Janmashthmi, Ganesh Chaturthi, Christmas as well as the birthdays of family members and friends can make the child's life pleasant and free of tension. Lighting little oil-lamps, decorating the house with flowers, decorating the floor with *alpana* or *rangoli*, and helping in cleaning and arranging the house for Diwali, helping in the mixing of colours or in the preparation of a 'bonfire' for Holi, etc., are all great achievements for the young child and provide opportunities for creative self-expression.

It is not desirable to take children to films or other entertainment meant for adults. They might get frightened, confused or over-excited.

Leisure Time Activities for Children

The average Indian mother has a lot of work to do in the house. So a busy mother must train her children to amuse themselves instead of following her around and impeding her work. She should also train them to help her in the household chores. Children should be happily and creatively occupied during their leisure hours; otherwise they get restless, noisy, irritable and even destructive. The following are some activities which need very little supervision by adults but which will keep the child busy :

1. Claywork.
2. Making a scrapbook.
3. *Rangoli* or *Alpana*.
4. Drawing with chalk on a slate or with coloured crayons on paper.
5. Playing 'house.'
6. Making and playing with paper or rag dolls; making clothes for dolls.
7. Making and playing with small wheel toys made from old boxes, etc.
8. Making and playing with toys made from match-boxes, paper boxes or cardboard.
9. Gardening on a very small scale.
10. Collecting things like picture cards, stamps, etc.

When parents have the time, they should join in the children's activities. The whole family may together go out for a walk, make a little flower or vegetable plot, collect such things as shells, leaves and feathers, sing songs, play games and have joint hobbies or projects.

The child loves to help his father and mother when they are working. His help should always be enlisted and he should be allowed to assume the responsibility of doing such small tasks in the house as :

1. Making his own bed.
2. Arranging the mats, stools and *thalis* for meals.
3. Cleaning his own dishes; washing his own clothes.
4. Peeling vegetables, cleaning rice, etc.
5. Dusting and sweeping.

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6. Arranging flowers.
7. Serving the meals.
8. Feeding and caring for the pets.
9. Helping in the cleaning of the father's cycle or cart.
10. Shooing crows, cows, etc., away from the field.
11. Taking care of the younger children.

It is important to remember that children should receive praise, encouragement and appreciation for whatever work they do in the house. They should not be forced to do household chores as a punishment; they should rather be encouraged to do them as an enjoyable activity.

SIMPLE RULES FOR HEALTH AND SAFETY

Help the child in keeping clean by :

1. Health Rules

(*a*) Washing his hands both before and after meals and after going to the toilet.
(*b*) Bathing him regularly.
(*c*) Cleaning his teeth every morning and night and, if possible, after each meal.
(*d*) Encouraging regularity in elimination.

For good health, teach the child :

1. To cough and sneeze only into a handkerchief or a clean piece of cloth.
2. Not to spit anywhere and everywhere.
3. To use the latrine and not the front or backyard for answering calls of nature.
4. Not to eat food bought from the street vendor.
5. Not to play on the ground when he has no clothes on.
6. To wash when he returns from play.
7. Not to put stones, dirty rags, bits of grass, etc., in his mouth.
8. Not only to keep himself clean but to keep his surroundings clean too. The child should above all be taught civic sense.

Safety Rules

Many children get severely hurt and at times die due to accidents in the home. With a little forethought, these can easily be prevented. The following suggestions will prove useful :

1. Keep match-sticks out of the child's reach.
2. Cook on a high platform instead of on the floor.
3. Do not leave the child alone in the kitchen.
4. Buckets or pans containing hot water or any hot liquid should not be left on the floor, for the child may stumble against them or put his hands into them.
5. Do not leave sharp-edged things, glass pieces, broken furniture, etc., lying about.

6. Make high and unsafe places from which the child can fall secure for the child; have bars put on windows and a fence around the house.
7. Toys must be safe and not easily breakable or inflammable. They should not have poisonous paint on them.
8. Do not give very small toys to the child as he loves to put things in his mouth.
9. Do not allow small children to play with beads, buttons, pins, etc.
10. Do not give peanuts, popcorn or gram (*chana*) to a very young child for eating, because fragments of these can easily be drawn into the air passage when the child coughs, laughs or chokes. This may even prove fatal.
11. Keep all medicines, harmful drugs and poisons meant for rats or insects out of the child's reach on a high shelf.
12. Keep knives, scissors and other sharp instruments in a safe place.
13. Caution the child against playing in a busy street or in places which are overgrown with tall grass or bushes.
14. Carefully supervise the children during festivals. Many children meet with accidents while celebrating some of our festivals. Flying with fireworks during Diwali, burning 'Holika' during Holi, playing kites from roofs on uttrayan day, etc., often lead to accidents some of which even prove fatal. These can be prevented through careful adult supervision.
15. Never leave any small child alone; he may put small objects or insects into his mouth or nose. A good way of preventing accidents is to provide a simple bamboo pen in which the child can play happily. A bamboo pen can easily be made at home.
16. Teach the child to look at both sides of the road before crossing it. Teach him never to run after or jump into a running vehicle.

MEDICAL CARE

Our country has a very high rate of infant mortality. Many children succumb to diseases that occur due to ignorance and carelessness on the part of the parents. Often parents have no faith in doctors and prefer to use household remedies learnt from the elders in the family. Some diseases are even considered to be a personification of a particular Goddess or a result of God's curse on the family; hence preventive or curative measures against these diseases are not taken for fear of incurring God's wrath !

Parents should, however, realize that the doctor is always a good friend. Children should be helped to get accustomed to regular visits to a clinic. The child should have a thorough check-up at least twice a year even if he is not ill. The child's height and weight should be recorded and his teeth attended to. The doctor will examine the child, make recommendations about his feeding, and make sure

that everything is normal and under control. He will recommend measures for safe guarding the child against common diseases. If the doctor examines the child regularly, he will, in case of illness, recognize the significance of symptoms sooner and consequently be able to begin treatment almost immediately.

Preventive Measures

There is absolutely no excuse for the child's getting a disease for which successful means of prevention have now been found.

With modern advancement in medicine such diseases as smallpox, diphtheria, whooping cough, typhoid, tetanus or malaria can be prevented through medicine, inoculation or vaccination. Most diseases can be controlled, specially in the early stages, by specific treatment.

Many diseases are spread through unclean water, infected milk or food-stuffs. Keeping the child's environment clean and free from infection is therefore important. That is why :

1. Drinking water and milk should always be boiled.
2. Food should always be properly cooked.
3. Raw eatables should be properly washed.
4. All food-stuffs should be kept covered.
5. Water puddles should not be allowed to form; insecticides should be used to kill mosquitoes.
6. Latrines should be kept clean and well covered.
7. Children should sleep under mosquito nets.
8. As far as possible, children should be kept away from sick people.
9. Children should be isolated and kept in bed when they are ill.
10. When the child is down with an infectious disease, extra care should be taken about his diet, and the disposal of his body wastes. Care should also be taken to separate his utensils and his clothes from those of the others.

It is a mistake to think that common childhood diseases are mild and that every child must inevitably suffer from each of those diseases. Quite often they have very serious after-effects and result in death or severe physical defects which cripple the child for life. Therefore, all parents should be familiar with the causes and prevention of childhood diseases, thus safeguarding their children's health.

It is important to remember that poor health can also be caused through unhappiness. Some individuals resort consciously or unconsciously to illness. If the adults around the child are constantly groaning about their bad health and are getting a great deal of attention for it, the child might also feel like feigning illness. Where too much emphasis is laid on 'health' and where the child is constantly being warned about 'poor health' and forever being dosed with medicine or purgatives, he will be made over-anxious and will become a hypochondriac. If the child gets attention only when he is ill, he will most certainly feign sickness. Thus a happy child is more likely to be a healthy child.

A HAPPY HOME FOR A HEALTHY CHILD

A good home is that in which the family members live happily and harmoniously together. The child has a greater chance growing up into a happy and well balanced individual, if he is brought up in a wholesome atmosphere. The happy home is one where there are few conflicts and quarrels, where each child is loved and accepted as an individual having his own rights, where he is neither rejected nor smothered with excessive attention, where he is given understanding, sympathy, a feeling of 'belonging' and security.

Genuine interest in and enjoyment of the company of the child as an individual is necessary for the child's healthy growth and development. Above all, what children need most of all is their parents' TENDER LOVING CARE.

SECTION VIII

LIVING HAPPILY TOGETHER

CHAPTER 56

LIVING HAPPILY TOGETHER

THE CULTURAL BACKGROUND OF INDIAN WOMEN

The unique feature of Indian culture is that it has been built around the home. Even in the Upanishads which date earlier than 1500 B.C., there is mention of intellectual debates among women. Maithreyi and Gargi, two learned women of the Upanishads, were held in high esteem both at home and outside. In all religious functions such as performing *Yagna*, the wife was given a status equal to her husband's. There is a saying, 'where women are adored, there dwell the gods.' Women were able to participate in politics and battles as efficiently as men.

The degradation in the position of women in the home and the society must have happened only in recent times. Due to many reasons, women lost their equality with men and came to be treated as mere household drudges. After the Vedic and Puranic ages, women seem to have sunk into the background, perhaps due to the disturbances of the times. Wars and upheavals in the Buddhist age and in the early Christian era drove women still more to the background. Women were shunned as tempters and devils. Buddhism which emphasized the role of renunciation and asceticism in the attainment of Nirvana, considered that health, wine and women hindered spiritual advancement.

During the Muslim rule, women sank still further down because of the development of the purdah system which was not known to India until then. Since the Muslims were the ruling classes, the practice followed by their women of covering their heads became associated with high class society. Even among the Hindu ruling families and aristocrats, those who wished to rank themselves among respectable persons took to purdah. It was at this period that child marriage became prevalent among Hindus. There is evidence to show that till then marriages were performed only when the girls had come of age. Shakuntala and Damayanti chose their husbands through *Swayamwara*. *Gandharva Vivaha* prevalent among the princely and martial classes was an accepted ritual for romantic marriage. But with the advent of Muslim rule, there were widespread riots. Parents were therefore anxious to entrust their daughters to valiant men as early as possible. Married girls were considered safe, since unmarried girls were usually kidnapped. Seeing the *Tirumangalya* (*Mangal-sutra*) on the neck of a married women, the Muslims would keep away. Therefore, the child marriage system came into existence, specially among the Brahmins.

In the early British days, there was no change in the position of women. However, the culture of the unlettered survived the ravages of time as can be seen even today. Kasturba was not a scholar. She could but read and write a little. But

she is a typical example of all that we call great in our ancient culture. Her devotion to her husband was next only to her devotion to God. Her duty to her children, her ability to manage the home and her courage in coming out of the shell whenever circumstances so demanded are unparalleled.

Mahatma Gandhi brought about a great awakening among Indian women. Under his leadership, a large number of women offered Satyagraha. He gave them an important part in politics. In his non-violent struggle, women were the 'Shakti' or the motive force. Women who had never come out of their homes took part in the famous Salt Satyagraha. They left their families, husbands and children in the service of the country. They picketted liquor shops and shops selling foreign textile goods. They even went to prison.

Sarojini Naidu, Vijayalakshmi Pandit, Rajkumari Amrit Kaur and many others were 'made' by Mahatma Gandhi. Because of the effect of English education, the gulf between the educated and the uneducated was widest at that time. It was Mahatma Gandhi's movement which brought the two together and created an increasing sympathy and understanding between them. The village became the centre of constructive activity. The education of women and children began to get an increasing attention.

Today, India has progressed greatly in the field of women's education and development. There are more women legislators than ever before. They are rendering valuable service in all fields—education, social welfare, law, health and community development. They have been holding important positions as ambassadors, high commissioners, governors, ministers and judges, and in the United Nations.

FAMILY RELATIONSHIP

The Family

The family is the unit of society, and the oldest and most basic social institution in all countries. It can be defined as a social group consisting of a man and a woman living in the same house with their children and relatives. It is the outcome of man's efforts to find satisfaction for a multiplicity of wants. The family provides its members with :

1. Physical inheritance. (Children derive health, appearance and some attitudes from their parents.)
2. Protection during the period of growth.
3. Food, shelter, clothing and other necessities.
4. Education.
5. An affectionate atmosphere and security.
6. Spiritual values.

Not only does the family supply the child with a physical inheritance and fulfil his material needs, but it provides a 'home' and an atmosphere of love and freedom in which the child's personality, attitudes, sense of belonging, security, affection and sense of values develop.

What can the children and other members give in return to the family ? Child-

ren, for the sake of their own development and happiness, should share the daily responsibilities of their home, take care of the possessions, income and materials, share their pleasures with other members and be willing to help them maintain the standards of the family, and strive hard to attain the goals set before them. They must keep up family traditions, get on happily with others, develop fine personalities, use the income and resources wisely, and save for the future. They should guard their health. They should feel free to discuss their problems with their parents and other members of the family. They must be tolerant of each other's likes and dislikes. They should develop a community spirit to derive the joys and satisfactions of successful living.

The Joint Family System

The term 'joint family' is used when more than one family group live together and share one home and its facilities. It may be either 'bilateral' or 'unilateral.' A bilateral joint family contains relatives of both husband and wife. The unilateral family contains relatives by descent of only one side; it may be 'matrilenial' where the descent is on the mother's side or 'patrilenial' where the descent is on the father's side. The patrilenial type of joint family is more common and consists of a man, his wife and children, together with his son's children and perhaps his father or even grandfather. The matrilenial joint family system is prevalent in Malabar, specially among the Nairs; here the family consists of relatives from the wife's side and not from the husband's.

In the joint family system, all the members of the household live together even after marriage. They pool their resources, share the expenses and have the same establishment. The household in a joint family is a cooperative society of credit, production and consumption. Division of labour among several members and implicit faith in one another are the unique characteristics of a good joint family. Marriages in the joint family are arranged by the parents, the choice of bride and bridegroom being left to the older members of the family. Therefore, marriage is not only a union between two individuals, but also between two families. Society thus becomes a group of corporate families knit together by close ties of relationship, each group preserving its integrity, purity and individuality. The home engenders affection among the members brought together by marriage alliances. The sentiment lying at the root of the success of home life in a joint family is love; this implies regard behind it and mutual regard can spring only from a sense of self-sacrifice.

The joint family system which is surrounded by intense domestic affection, religion and hospitality, has been one of the outstanding features of the Indian home. Because of it, the home has functioned as a guest house, a shelter for the poor, an orphanage and a centre of philanthropic activities.

Thus the joint family system has been a sobering, elevating and uplifting influence on the cultural and emotional development of the members of the family.

However, with the disappearance of the old ideals of village life, the vast

development of industries and the impact of modern education, the joint family system is rapidly disappearing. Nevertheless, the complete family consisting of the husband, his wife and their children is still the most fundamental economic unit. Its role in giving economic protection to its members and providing them with a living is one that cannot be easily replaced by any other social agency.

INFLUENCE OF THE HOME ENVIRONMENT ON CHILDREN

The maturity of adults and the development of the character and personality of children depend upon two factors—heredity and environment. Heredity means the outward appearance and the inherent qualities and faculties that we inherit from our parents at our birth. Environment includes our parents, family, friends, surroundings, school, office, food, clothing, education, socio-economic factors and recreation. The individual is the product of all these influences. The child, born equipped with certain inherited qualities, grows into what training, education and other circumstances make him. He is like a seed. His growth depends upon the presence of such favourable factors in the family background as religion, housing, food, education, and the economic and emotional stability of his parents. The influence of homes determines the behaviour pattern of the citizens. A community of happy homes will produce citizens with character and integrity.

On the other hand, deficiencies in the environment at home warp the personalities of children. For example, suppose that the income of a particular family is insufficient even to meet the dire necessities of life. Its children, whose precious time should be devoted to play, study and sleep, are then compelled to work for wages. They have no opportunity for playing or for the free expression of thought. Thus the growth of the members of such a family is stifled.

Lack of proper facilities in the home affects morality. Children cannot grow and develop in a vacuum. If the father is a drunkard, smoker or gambler, his behaviour affects the finances of the family and demoralizes the character of his children. In a family where there is a single child, the parents may shower affection on him, not realizing that they are spoiling him. In some families, children are so attached to their parents that they cannot bear to be separated from them in the later stages. They never learn to adjust to other people or groups.

Thus the family has a very important part to play in building up good citizens. More than food and clothing, love and kindness shape the minds and feelings of babies. Many grown-ups who have had no home life and known no affection, when they were children, have turned into bad citizens. A good family life teaches children obedience, affection, honesty, dependability, cleanliness, cooperation citizenship and sincerity.

MODERN TRENDS IN FAMILY LIFE

There are many important trends in modern family life. Some of them are the diminishing size of the family, change in the family system, loss of traditional

function, vaning influence of the authoritarian elements in the family due to the advent of a capitalistic society, and the growing political, educational and economic independence of women. Changes in family systems have been accelerated by movements growing out of modern individualism and socialism. The family, like all other social factors, changes to fulfil new needs. Therefore, the family today must not only be protected and preserved, but also helped to meet the changing situation and retain its best values. Some of the factors which have caused changes in trends in family life are given below.

Increasing Mobility

Since the Industrial Revolution, several towns sprang into existence around industrial areas. Growing scientific advancements have led to tremendous developments in transportation and communication. People from rural areas migrated to towns in search of employment. Although this trend started in the western countries, the situation in India today is also the same. In the olden days, the family lived in the same house for generations, but now the modern family is constantly moving from house to house and from place to place. This constant movement affects the children and other members of the family. When a child suddenly finds himself in a new set up, his mental growth and adjustment are retarded. Life-long friendships are impossible in a constantly moving situation. This consequence of the increase in mobility is an important trend in modern family life.

Breakdown of the Joint Family System

The joint family system is slowly breaking down. Therefore, the modern family seems to have lost much of its former unity, cohesion, economic and social interdependence, loyalties, common interests and traditional integration. Once, the members of the joint family worked together as one unit sharing responsibilities. But now, brothers form their own families after their marriages, and remain individualistic. Thus, the size of the family unit has become smaller and common interests have been replaced by self-centredness.

Growing Individualism

Many changes in the family have been accelerated by movements growing out of individualism. The women's emancipation or freedom movement is one of them. The movement, while it has improved the status of wives and mothers, has also created in them an aloofness and a hostility towards the traditional family system. The modern woman receives the same education as the man, and competes with him for the same kinds of employment. Even between husband and wife, the roles which were once thought to be complementary are more individualistic today. The educated wife does not want to be considered inferior to her husband. She has her own interests outside the family. In the olden days, women derived the maximum joy in running their families, bringing-up children and looking after their husbands, without feeling the urge to go out. Today, society has attracted women into various activities outside the home. These changes have their own implications on the home and specially on the development of children. The child is deprived of its mother's company for several hours in a day.

The Dual Role of the Modern Woman

In the olden days, the man earned money outside the home and the woman looked after the home. As the 'uncrowned queen' of her home, she managed the various functions of the household but was never independent. As a girl, she was in the custody of her father; as a wife, of her husband; and as a widow, of her son. The modern woman wants to enjoy life on her own rights. She no longer depends on the goodwill of her husband for economic independence. She takes a job outside the home. Thus the modern woman has two important roles to play: the biological role and the professional role.

In the olden days, the family was a producing unit in which each member was a producer. The family produced goods and consumed them. But in modern times, with the advent of large-scale factories, the family often finds it impossible to make both ends meet. Therefore, the wife has to work outside the home to supplement her husband's income. As a mother, she has to care for her children also. Thus the modern woman is tortured between the maternal obligations and the professional duties, both of which are whole-time jobs.

Changes in the Legal Code

Some important changes in favour of women have been made in the legal code giving them the right to property and to divorce. Although divorce is discouraged in Indian society and seldom resorted to, it is gradually leading to the break-up of a growing number of homes. Broken homes handicap children by depriving them of one or the other of their parents. If divorce separates the child from its mother, he loses the softening influence of her companionship. If it deprives him of his father, then that part of the training which can be imparted by the father alone is denied to him. This is a great problem facing child welfare.

Family Life in Urban and Rural Areas

Urban areas are noted for the individualism of their families. Families living in rural areas are considered to be more friendly than those living in the cities. For rural women, household duties are the supreme and most sacred responsibilities, while city women generally treat them as being only of secondary importance. In most of the villages, the caste system still prevails. Today for many of us, the rise in economic standards in the cities and the attractions of city life make rural life less interesting.

These trends in family life and the changes in the role of the modern Indian woman have necessitated the imparting of education in home-making for the maintenance of happy homes.

WHAT MAKES A HOME HAPPY AND SUCCESSFUL

The goal of home-making is abundant happiness for the family. A good home gives the greatest possible joy to all its members. A happy person in turn enriches many a life by radiating his cheerful influence. By living happily and sharing together, even misfortunes and sad experiences become endurable.

What makes a family happy ? The answer will be 'many factors'. Happiness

is not a single entity. It is the product of our thinking, working, affection, interests, habits, attitudes, dislikes and relationships.

All of us desire happiness. However, life cannot always be happy. Ups and downs are common in family life. Life has both its harder and softer moments. Even in the happiest home, where each member of the family is aware of the needs of others and contributes to the welfare of all, there will be problems. We must be prepared to face all problems. However, many of our difficulties exist only in our imagination. We should not anticipate problems but meet them as they confront us.

We are what we are because of the combination of a number of internal and external factors—our childhood experiences, our schools, our teachers, our ways of living, our cultural backgrounds and the values held sacred by our families. Anything that has ever happened to us has had a part in making each one of us into a unique individual. That is why no two people are alike in the world. Yet there are some qualities common to all human beings. Each of us sees a little part of himself in others. We are always seeking something or the other. Sometimes, we know what we want. Sometimes we think we know. But often we do not know it at all. Yet, all that we do is done to fulfil some very urgent need.

To be happy, we must understand and respect the differences among individuals. No two people are ever alike in the world. Sometimes, what makes a person happy may not affect another; while at others what pleases one, may even annoy another. To live happily with others, these differences must be recognized and tolerated.

THE NEEDS OF HUMAN BEINGS

All human beings, whether they are babies, children, adolescents, or grown-up men and women, have some common basic needs. These needs are both physical and emotional. The basic physical needs include food, shelter, clothing and other necessities. Recognizing or meeting the physical needs is not difficult even with limited economic means. But understanding the complex emotional needs is a difficult task. Although an exhaustive list of the emotional needs cannot be made, certain essential needs are pointed out in the following pages.

The Need to Feel Secure

The experiences that build up a feeling of security also give safety, strength and peace to the individual. They make the person feel warm, loved and comfortable and give him the courage to challenge life's problems. Whether young or old, we need and want affection. Affection is fundamental to true happiness. The baby needs cuddling, since that is the only way he comes to know that he is being loved. The young child needs caressing. He recognizes gradually that smiles and kind faces mean that he is being loved. He expects affection from everybody in his family. As he grows older, he dispenses with physical expressions but expects verbal assurances. The teen-agers or adolescents express their affection to each other, but still continue to need their parents' sympathy and understanding. In marriage, the partners give and receive affection staunchly and supportingly, fulfilling each other's

needs and provide an abundance of affection for their children to grow and develop. Marriage is the only relationship that ensures a constant and mutual give and take of affection for life.

'Response' is essential to make people feel secure. All of us crave for responses for what we are, and not for what others want us to be. A mother tells her child, "Radha, I like you, when you are a good girl". But Radha wants to be liked regardless of her being good or bad. Radha wants to be assured that in spite of her naughtiness, she is loved and accepted. She needs the kind of response from her mother which will help her to know for certain that "Even if Mother is angry, I know that she loves me; I am her loved daughter even if I have been bad." These assurances will help to bring out the best in Radha and make her feel secure.

Response is shown to the infant when he is cared for and loved. A baby has little trouble in getting the needed attention, but as he grows up he must please others just as much as he has to please himself. If he does not, the response he expects is often denied. He still needs loving attention and kindly direction.

School-going children get responses from each other for what they are. At the same time, they need response from their families. Responding to their good acts and being less critical of their mistakes will help in building up their morale.

In later life, responses come mainly because somebody is our relative. We say, "He is my husband" or "He is my father;" and such remarks glow with love and understanding. Such approval makes one feel wanted, loved and secure. Too much criticism and condemnation destroy positive responses. They damage happiness.

All of us want to feel that we have a place in our family and community. Physical closeness to the mother gives a sense of belonging to the baby. As he grows up, the identification of the family members with him makes him feel that he belongs to the family. His parents must provide a harmonious atmosphere at home for him : a child who lives in a quarrelsome family never feels secure and lives under the constant threat of being thrown out. If the parents threaten their children when they spoil their possessions, children will feel uncertain of themselves and are apt to feel lost. Then they become naughty, and the parents scold them for being naughty. Such cycles lead to havoc. How are we to rescue them from their misery ? Such an answer as : "Never mind, I am sure you did not know it would break so easily," will immediately assure children of their parents' responses. As a person grows older, the need for belonging not only to the home, but to such circles outside the home as the club or the professional association is felt.

The Need to Feel Adequate

Without a feeling of adequacy, we shall lack faith in our own abilities. We shall lose courage. To feel adequate, we must build up experiences that promote self-respect and give us a sense of our own worth. Such self-respect is gained from a sense of achievement and from the recognition given by others to our merits.

We have to 'achieve' if we are to feel adequate. The satisfaction that results

from doing what one sets out to do brings happiness. The infant who manages to hold a doll, the child who passes a test, and the schoolboy who wins a trophy, all experience happiness and a sense of achievement. When the baby reaches an object after trying hard, when he crawls, gets up or walks, when he begins to feed himself, and when he discovers that he can dress independently, his accomlishments represent *achievements* for him and add to his happiness. At the same time, they indicate to the grown-up, that the child is becoming independent. If such demands as "do not touch," "do not play," "eat now," "sleep now" are imposed on the child by adults before he is ready to meet them, he may do what is expected of him, but his happiness and growth will be impaired.

Intellectual achievements are valued more than the satisfactions accruing from physical achievement. When the task appears to be impossible, the feeling of adequacy is injured. We all need a balance between success and failure. Too many failures cause discouragement. We often hear people say "I cannot do that." But we must be in a position to want to feel that "we can try" and get satisfaction from trying.

We need 'success' in some undertakings if we are to feel adequate. People must attempt things which they can do and get joy in doing them. Parents must give freedom to children to explore. Those who direct every detail of their children's lives deprive them of the happiness which comes from self-direction. Taking responsibility, making choices independently and carrying out one's own decisions contribute to one's self-respect and sense of adequacy.

We must feel 'wanted' and 'needed' to be adequate. We long to know that there is something which we alone can do and which no one else can do. There must always be a job for every one in the home. Even the smallest child can do something. The boy can feed the cat. The girl can clean some vegetables. Parents must also feel 'needed.' They are needed by the children. No one can take their place.

We need 'recognition' to make us feel adequate. We want other people to appreciate our accomplishments. Even the smallest of us feels honoured by recognition and strives hard to deserve it. Nowhere is insincere flattery expected; what is desired is to be told that we have done well when we *have* done well. We must not have too high an estimate of ourselves. But a wholesome and honest appreciation and enjoyment of our own talents and accomplishments strengthen self-respect and help us in getting due recognition from others. Happiness will increase as recognition replaces criticism and scolding.

The Need to Cooperate

We are happiest when there is a good balance between what we want and what we get. Because we have to live in a family group, where some of our interests come into conflict with and have to be sacrificed for those of others, we must cooperate with one another and be happy in that cooperation. We all need the help of others and we must help others. In helping others, we shall find satisfaction.

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The Need to Share

Some good work-habits will have to be developed for taking part in family work and enjoying it. First, acquiring the habit of doing whatever is to be done as good-naturedly as possible is most important. This can be developed from childhood, if the parents set an example by showing an interest in every activity of the child and giving him the opportunity to learn new things. Parents should also work closely with the child. Encouragement should be given to do difficult things. Secondly, the habit of completing any task once it is begun, even if things become difficult, should be cultivated. Thirdly, the habit of working happily and harmoniously with other people is very important in family life. Parents should share the responsibility of the home with the whole family. Every member must have a part in planning and executing the household work. This will save the mother's time and energy and give the youngsters training. The routine duties in the home can be done by children. Some mothers think that they are being kind to their children by not giving them any work in the home. This is really doing a great injustice to the children. By doing work in the home, boys and girls have a chance to share.

Children learn to shoulder responsibility only by actually shouldering it. Like adults, children wish to feel independent and do not object to doing certain things if they are not 'told' to do so. They enjoy doing things they do well. In a family, one girl may like to sew, another to clean and a third to cook. Laundry work, house-keeping, preparation and serving of meals, preservation of food, protection of health, looking after younger children, etc., can be shared by girls. Going on errands outside, shopping, mailing, etc., can be carried out by boys. The daily activities in the home can be listed and the members given the opportunity to share and take responsibilities.

All these needs must be met if we are to live happily and well. We must be loved and wanted if we are to feel secure. We must have a sense of achievement if we are to feel adequate. We must have social approval and the opportunity for sharing and cooperation.

ACHIEVING MENTAL HEALTH

Happiness is strengthened if the members of the family enjoy sound health. People who do not feel well cannot be considerate to others. Children who are not well are irritable. A child may be naughty because he has not had enough sleep or food. Out of the experiences in sharing, relationships become more understanding and sympathetic. Common interests bring and bind individuals closely together and pave the way for achieving mental health.

The Way We Think Affects Our Happiness

Our attitude is very important in attaining happiness. A deep inner courage gives us the strength to carry out our convictions in spite of obstacles. A person who has faith and courage is well-adjusted. He can take whatever life brings to him and yet be happy. He will have a steadying influence on others. This inner

courage comes when emotional needs are reasonably satisfied. However, there are people who fail to attain happiness, even when all their needs are met. They are those who are filled by their own thinking and who fail to understand themselves and others. As one grows in self-understanding, one grows in happiness.

WHAT CONSTITUTES A GOOD PERSONALITY

A good personality is of the greatest help in making a home successful. What do we mean by personality ? When we think of a 'good' personality, such expressions as agreeable, interesting, considerate, cooperative, optimistic, unselfish, sympathetic, trustworthy, dependable, etc., come to the mind. A combination of these traits gives us the most precious treasure that we can ever possess, *i.e.*, a fine personality.

How can these desirable qualities be developed ? This can be done by looking at oneself as if one were another person, and then evaluating oneself. We must discover our strengths and weaknesses. We must try to strengthen our desirable qualities by trying to behave correctly under all circumstances, however difficult they might be, by learning to appreciate one another and by working harmoniously with the other members of the family. In such a family there will be joy and success. And the success of one will be the happiness of all.

THE CHARACTERISTICS OF A SUCCESSFUL HOME

From the above considerations we can sum up that a successful home is one :

(*a*) That provides a place where we may rest, feel secure and have some privacy.
(*b*) Where we can be ourselves and express our personalities freely.
(*c*) Where we can extend hospitality to our friends.
(*d*) Where we grow physically, mentally and spiritually.
(*e*) Where we can share in the work and recreation of the household.
(*f*) Where we have an abundance of affection and goodwill.

To make a home successful, we ought to get along well with others. Getting along well is essential for success in our present and future work, for success in marriage and family life, and for personal happiness. True happiness comes from giving.

APPENDICES

APPENDIX I

EDIBLE PORTION OF COMMON FOODS

Name of food	*E. P. % (as purchased)*
Cereals	
Ragi	85
Rice (raw)	96
Rice (parboiled)	99
Rice flakes	96
Wheat	97
Pulses	
Beans (dry, whole)	85
Bengalgram (with husk)	95
Bengalgram dal	93
Blackgram (with husk)	97
Blackgram dal	89
Greengram (with husk)	90
Greengram dal	90
Masoor dal	94
Peas (dry, whole)	92
Redgram dal	94
Leafy Vegetables	
Agathi	49
Amaranth tender	66
Betel leaves	94
Coriander leaves	85
Drumstick leaves	68-69
Fenugreek leaves	65
Manathakkali leaves	59
Mint	56
Spinach	55
Roots and Tubers	
Beetroot (scraped)	88
Carrot (peeled)	75-77
Carrot (scraped)	93
Colocasia (*arbi*)	96

Name of food	*E.P.% (as Purchased)*
Roots and Tubers—(contd.)	
Onion (small)	95
Onion (big)	90
Radish (without tops)	90
Tapioca	77
Yam (ordinary)	89
Potatoes (pared)	78
Potato (scraped)	89
Potato (peeled after cooking)	95
Other Vegetables	
Ash gourd	83
Bottle gourd	80-90
Bitter gourd	97-99
Cluster beans	87-90
Broad beans (*Avarai*)	85
Brinjal	90-98
Cucumber	94
Drumstick	93
French beans	84-93
Lady's finger	87-95
Mangoes (green, with skin)	94
Mangoes (green, without skin)	86
Nellikai (*aonla*)	84
Peas	42
Plaintain flower	38
Plantain green	71-79
Plantain stem	81-89
Pumpkin	89
Ridge gourd	76-80
Snake gourd	82-86
Tomato green	98
Tomato ripe	89
Fruits	
Apple	89
Custard apple	46-67
Grapes (blue)	85

Name of food	*E.P. % (as purchased)*
Fruits—(contd.)	
Grapes (blue, without skin)	65
Grapes (green, with skin)	90
Grapes (green, without skin)	79
Limes	45-55
Mangoes	67
Melons	74
Oranges	80
Plantain (yellow)	70
Plantain (hill)	56
Pineapple	74
Wood apple	59
Nuts	
Almonds (with shell)	23
Coconut (large)	56
Coconut (medium, with fibre)	44
Coconut (medium, without fibre)	46
Groundnut (raw, whole)	71
Walnuts (with shell)	48
Condiments	
Coriander seeds	98
Chillies (green)	90
Condiments—(contd.)	
Chillies (dry)	93-96
Cumin seeds	99
Fenugreek seeds	79
Garlic	70
Ginger	90
Mustard seeds	98
Pepper corns	98
Tamarind pulp	33
Flesh Foods	
Beef	90
Brain (sheep)	97
Crab (dressed and cooked)	37
Eggs (hen)	87
Eggs (duck)	85
Mutton	87
Pork	92
Fish	
Seer-fish (dressed and cooked)	75
Pomfret (dressed)	83
Sea fish (small, mixed dressed)	60
Prawns	67

APPENDIX II

ORANGE SQUASH

Ingredients

Orange juice	1 lb. (0.45 kg.)
Sugar	1¼ lb. (0.66 kg.)
Water	3/4 lb. (0.34 kg.)
Citric acid	3 teaspoons
Potassium metabisulphite	15 grains or 1½ tolas (0.972 gm.)
Edible orange colour	Just enough to bring an attractive colour.

Method

1. Select fresh oranges, peel them and extract the juice.
2. Add sugar and water in the proportion mentioned above.
3. Add citric acid in the proportion of 1 teaspoon of citric acid to one pound of the prepared mixture.

4. Stir the mixture till the sugar dissolves. Add a little orange colouring.
5. Dissolve 5 grains (0.324 gm.) or 1/2 a tola of potassium metabisulphite per pound (0.45 kg) of the mixture, and add this to the prepared mixture. Bottle and preserve.

Mix four parts of water to one part of the squash for drinking.

MANGO SQUASH

Ingredients

Mango pulp	1 lb. (0·45 kg.)
Water	1 lb.
Sugar	1 lb. (0.45 kg).
Citric acid	1/2 oz. (14 gm.)
Potassium metabisulphite	15 grains or 1½ tolas (0·9729 gm.)
Edible orange colour	Just enough to bring an attractive colour

Method

1. Select fresh, fully ripe, juicy, rather tart but sound fruit.
2. Wash the fruit thoroughly. Remove the stalks and dirt.
3. Rub the fruit lightly between the palms of the two hands to thin down the pulp as much as possible.
4. Remove the stalk portion of the fruit and squeeze out the juice leaving the least possible quantities of it on the skin and stone.
5. Mix the above ingredients thoroughly avoiding heating as far as possible. Strain through a coarse, muslin cloth. Add the preservative, *i.e.*, potassium metabisulphite at the rate of 5 grains (0.324 gm) per pound (0.45 kg.) of the prepared product.
6. Pour the product into bottles (which have been thoroughly cleaned and previously heated in boiling water for 15 to 20 minutes) leaving a head space of 1″ to 1½″.
7. Cork air-tight, either with a crown cork seal or with an ordinary cork slightly wetted and pushed in. Store the bottles in a cool and dry place.

LEMON SQUASH

Ingredients

Limes	3 dozen limes to give 2 lb. (0.90 kg.) lime juice
Clean white sugar	4 lb. (1.80 kg.)

Method

1. Fill bottles of 16 oz. (453 gm.) capacity with the sugar, leaving a head space of about 1 to 1½″.
2. Pour the juice into the bottles and stir well until all the sugar is dissolved in the juice.
3. Slightly wet the cork and push it in.

4. Store the bottle in a cool and dry place.

The squash can be diluted with water before serving in the ratio of 1 : 7.

MIXED JAM

Ingredients

Papayas	3 lb. (1.36 kg.)
Pineapples	3 lb. (1.36 kg.)
Sugar	6 lb. (2.72 kg.)
Citric acid	6 oz. (170.09 gm.)
Total output	8 lb. (3.62 kg.)

Method

1. Select fully ripe and sound fruits.
2. Wash them thoroughly.
3. Peel the papayas and pineapple.
4. Remove the seeds of papayas and the eyes of the pineapples.
5. Cut them into small pieces.
6. Add sugar.
7. Add citric acid at the rate of 10 to 15 grains (0.648 to 0.972 gm.) per pound (0.45 kg.) of the fruit. Mix the ingredients well.
8. Cook the mixture on a medium fire till it reaches the desired consistency.
9. Cool and put the jam into sterilized jars of 2 lb. (0.9 kg.) capacity and seal.

GRAPE JAM

Ingredients

Grape pulp	1 lb. (0.45 kg.)
Guava	3 (for pectin)
Sugar	1 lb. (0.45 kg.)
Citric acid	1/2 oz. (14 gm.)
Total output	2 lb. (0.9 kg.)

Method

guava

1. Wash the fruits thoroughly in running cold water.
2. Cut the fruits thinly and cover them.
3. Boil the mass in water for about half an hour, occasionally crushing with a wooden ladle. Cook till the extract shows good stickiness.
4. Put the mass in a coarse cloth and strain.

grapes

1. Crush the grapes with a wooden ladle, and separate the stones and skin by hand.
2. Mix the guava extract, sugar and citric acid.
3. Cook on a medium fire till the temperature reaches 222°F (105.54°C). Put the boiling hot jam in sterilized bottles or jars and cool it. Then seal with wax.

APPENDIX II

SWEET MANGO CHUTNEY

Ingredients

Raw, peeled and sliced mangoes	1 lb. (0.45 kg.)
Sugar	1 lb. (0.45 kg.)
Salt	3/4 oz. (18.5 gm.)
Spices (cardamom, cinnamon etc.)	1/2 oz. (14 gm.)
Black pepper	1/4 oz. (7 gm.)
Chillies (powdered)	1/4 oz. (7 gm.)
Onions (chopped)	1 oz. (28 gm.)
Ginger (chopped)	1/4 oz. (7 gm.)
Garlic (chopped)	1/4 oz. (7 gm.)
Vinegar	3 oz. (85 gm.)
Total output	1½ lb. (0.678 kg.)

Method

1. Wash, peel and grate the mangoes. Remove the stones and weigh. It should now weigh 1 lb. (0.45 kg.).
2. Add sugar and salt. Leave for about half an hour.
3. Tie all the spices in a muslin cloth. Put the grated mango with sugar, salt and the muslin bag containing spices on the fire. Stir often.
4. Cook till the mango pulp is soft.
5. Remove the bag, after squeezing it to get the flavour of the spices.
6. Add vinegar and cook till the mixture is sufficiently thick.
7. Cool the chutney for a while and then bottle it in sterilized bottles.

MANGO PICKLE IN OIL

Ingredients

Peeled and sliced fruit	2 lb. (0.9 kg.)
Common salt (powdered)	8 oz. (226.80 gm.)
Fenugreek (*Methi*) (coarsely ground)	4 oz. (113.40 gm.)
Nigella (*Kalaunji*) (coarsely ground)	1 oz. (28.34 gm.)
Turmeric (powdered)	1 oz. (28.34 gm.)
Red chillies (powdered)	1 oz. (28.34 gm.)
Black pepper (powdered)	1 oz. (28.34 gm.)
Fennel or aniseed (*saunf*)	1 oz. (28.34 gm.)
Sarson or mustard oil (moisture-free)	Sufficient to keep the surface of the jar covered with an oil layer

Method

1. Select raw but fully developed, preferably tart, mangoes. The mangoes should be free from blemishes and rots.
2. Wash the fruit thoroughly by scrubbing them with your hands to remove dirt.

3. Steep the fruit in water for 4 to 5 hours.
4. Slice the fruit lengthwise using stainless steel knives and discard the stones. Cutting with ordinary knives made of iron or steel will discolour the product.
5. Mix the mango slices with all the *masalas* and salt and put them in a clean jar. Cover with lid and tie the mouth of the jar with a clean cloth.
6. Keep the jar in the sun for 2 to 3 days. Give a thorough shake to the jar once a day.
7. Open the jar and add enough mustard oil to form a small layer of oil on the top. Cover with the lid and tie the mouth of the jar with a cloth.
8. Keep the jar in the sun every day for 1 or 2 weeks, giving it a thorough shaking occasionally.
9. During this period examine the pickle occasionally and add more oil if necessary.

ORANGE MARMALADE

Ingredients

Pectin extract from the fruit .. .. .. 2-3 cups
Sugar .. .. 3 cups

Selection of the Fruit

'*Maltas*' (tight skinned oranges) and '*Khattas*' (rough lemons) are suitable fruits for proper acidity and pectin. Even fruits of an inferior quality but sound otherwise (*i.e.*, lacking in their normal juice content) can be used for the purpose. Two '*maltas*' are used for each '*khatta.*'

Preliminary treatment

Wash the fruits thoroughly in cold running water to remove dust.

Preparation of Fruit

Carefully peel off the outer thin portion of the fruit with sharp, stainless peeling knives leaving as much of the albedo portion intact as possible. Preserve the peel of about one-third to one-fourth the number of oranges for shreds.

Shredding of Slices

The peels of tight skinned oranges preserved for shreds are cut into fine shreds with sharp cutting knives and then boiled in sufficient quantity of water for about 10 minutes. The water is changed two or three times, if necessary.

Extraction of Pectin

Slice the peeled fruit into thin slices and add enough water to cover them.
Cook the mass for about half an hour occasionally crushing by means of a wooden ladle till the extract shows good stickiness.
Strain the hot pulpy extract through a coarse muslin cloth.
To the pomace add 1/3 to 1/4 its quantity of water.
Strain again and take a second and similarly, if possible, a third extraction.
Mix all the three extracts together and discard the residual fruit pulp.
Keep the mixed extract overnight for sedimentation in a deep vessel.

APPENDIX II

Testing of Pectin

To a teaspoonful of the clear extract, add two teaspoonfuls of methylated or rectified spirit. Formation of one big clot indicates the extract to be rich in pectin. Small and numerous clots indicate medium pectin. A thin gelatinous precipitate shows poor pectin.

Adding of Sugar

To every cup of the clear extract, add 1/2 and 3/4 cup of sugar respectively if the extract contains rich or medium pectin. If, however, the extract is poor in pectin, concentrate the mixture till it gives a good pectin test and then add the requisite quantity of sugar.

Cooking

Cook the mixture to 218° F (103.33°C). (This temperature is reached just about 15 to 20 minutes before the end point at sea-level). Then add the boiled shreds of the orange peel. Continue boiling till the temperature reaches 222°F (105.54°C) or the product gives the sheeting test, *i.e.*, it falls from the ladle in the form of flakes and not drops.

Note—For each rise in the altitude by 500 ft., a decrease of 1° F should be effected in the above cooking temperature.

Packing and Storage

Pour the product into clean, dry and sterilized glass jars and seal them air-tight after cooling. Store the jars in a cool dry place.

GUAVA JELLY

Ingredients

Guava extract	2 to 3 cups
Sugar	4 cups
Citric acid	10 to 15 grains (0.648 to 0.972 gm.) for every pound (0.45 kg.) of fruit

Selection of Fruit

Select sound, firm and rather tart fruits. The fruits should be free from blemishes. Soft fruit does not possess the property of setting and hence should be avoided as far as possible.

Preliminary Treatment

Wash the fruit thoroughly under running cold water scrubbing with hand where necessary.

Preparation of Fruit

Cut the washed fruit with stainless steel knives (the ordinary knives stain the fruit black and thus make the product unattractive) into small pieces and cover it with water adding citric acid at the rate of 10 to 15 grains (0.648 to 0.972 gm.) per pound (0.45 kg.) of the fruit.

Extraction of Pectin

Boil the mass for about half an hour, occasionally crushing with a wooden ladle, till the extract shows good stickiness.

Put the mass in a coarse cloth and separate the extract. Add to the pomace one fourth its weight of water and take another extraction. Get a similar extraction once again. Strain the extracts and then keep the mixed extracts overnight in a deep container for settling.

Testing of Pectin

Decant the clear extract carefully. To a teaspoonful of this clear extract add two teaspoonfuls of methylated spirit. The formation of one big clot indicates that the extract is rich in pectin, whereas slightly smaller clots indicate that the pectin content of the extract is medium. The formation of a thin gelatinous mass with very small clots shows that the extract is poor in pectin.

Addition of Sugar

To every cup of the clear extract, add 3/4 or 1/2 cup of sugar respectively, according as the extract contains rich or medium pectin. In case the extract is poor in pectin, concentrate it till it gives a good pectin test and then add the requisite quantity of sugar.

Cooking

Cook the mixture till the mass boils at 222°F at sea level or till it gives a sheeting test, *i.e.*, if it is held in the spoon it starts dropping in the form of flakes and not in drops.

Note—For each rise in the altitude by 500 feet, the boiling point of water falls by 1°F and a corresponding decrease may be effected in the cooking temperature.

Packing and Storage

Pour the finished product into clean, dried and sterilized glass jars, after having kept a wooden board below them. (This prevents the glass containers from breaking when the hot product is poured into them). Let the product cool and then seal the jars air-tight.

TOMATO KETCHUP

Ingredients

Tomato pulp	1 lb. (0.45 kg.)
Onions (chopped)	7 gm.
Garlic (chopped)	1/2 gm.
Cloves (whole)	1/4 gm.
Spices (Coarsely powdered cardamom, black pepper and cumin seeds)	3/4 gm.
Mace (*Joyitri*) (not ground)	1/16 gm.
Cinnamon	1/3 gm.
Red chillies	1/4 gm.
Salt	5½ gm.
Sugar	1/2 oz. (14 gm.)
Vinegar	4/5 oz. (22.6 gm.)
Sodium benzoate	2 grains (.1296 gm.)
Total output	1 lb. (0.45 kg.)

Selection of Material

Select fully ripe and deep red tomatoes, which are also free from bruises.

Preliminary Treatment

Wash them thoroughly.

Preparation of Material

Cut them into pieces and crush them with a wooden ladle.

Extraction of the Pulp

Heat the crushed mass to boiling point and then let it remain on the fire for 3 to 5 minutes. Strain it coarsely, pressing out the pulp completely and removing the seeds and skins.

Heating

Tie all the spices loosely in a muslin cloth. Put this muslin bag in the pulp.

Add 1/3 of the total quantity of sugar and heat the mixture till it thickens to 1/3 of its original quantity.

Remove the muslin bag and squeeze it to extract the flavour of spices. Add vinegar, salt and the remaining sugar.

Heat for another few minutes, until the volume of the finished product becomes once again equal to one third that of the original pulp.

Addition of Preservative

Add 2 grains (1.3 gm.) of sodium benzoate.

Mix it well. This quantity of the finished product is then uniformly mixed with the rest of the product for packing.

Boiling and Pasteurization

Pour it into sterilized bottles, seal them air-tight with crown seal and pasteurize them in boiling water for 3 minutes.

Cooling and Storage

Cool the bottles in air and store them in a cool and dry place.

LIME AND GREEN CHILLI PICKLE

Ingredients

Lime	1 lb. (0.45 kg.)
Green chillies	1 lb. (0.45 kg.)
Salt	2 oz. (56.69 gm.)

Selection of Material

Select good sized green chillies and sound, fully mature (with deep yellow skin) and juicy limes.

Preliminary Treatment

Wash the limes and the chillies thoroughly in running cold water.

Preparation of Material

Remove the stalks of the chillies without injuring their caps and cut the limes into halves or quarters depending on their size.

Addition of Salt

Put half the salt in clean, sterilized and wide-mouthed glass jars; partially squeeeze the juice of the limes over that salt and put them into the jar. Give longitudinal incisions into the green chillies individually. Fill them with salt and add them to the same jar. Add th rest of the salt. Stir the mass well so as to effect a thorough mixing.

Further Treatment

Keep the mass in the sun with occasional shakings for about a week so that the limes get softened. The softening of the limes is indicated by their skin turning light brown and the chillies turning from green to brown. The pickle is, at that stage, ready for use.

Note—Care should be taken to keep off moisture from the pickle. Otherwise it will get mouldy and spoilt.

MANGO PAPAR (LEATHER)

Selection of Material

Select fully ripe fruits of the sucking variety. The fruits should have a deep, scarlet-yellow pulp and should yield a high percentage of juice. Partially rotten and even over-ripe fruit should be discarded as they impart an unpleasant flavour to the product.

Preliminary Treatment

Wash the fruit thoroughly in cold water scrubbing them with your hands to remove juice stains.

Extraction of the Pulp

Rub the fruit between the two hands to thin down the pulp.

Remove the stalk end and squeeze out the pulp leaving the minimum possible quantities of it with the skin and the stone of the fruit.

Strain the pulp through a fine mosquito net cloth to remove the coarser particles of pulp. This will also mix the pulp thoroughly.

Traying of the Pulp

The uniformly mashed pulp of the fruit is spread in very thin layers on trays $2\frac{3}{4}' \times 2'$ made of copper or brass, the inside of which have been tinned to avoid corrosion. The inside bottom of the trays is covered with sheets of buttered glazed paper to avoid sticking.

Drying

The trays are placed in the sun for drying but are covered with a fine netting to keep off insects, etc. When the first layer of the juice has dried, another layer of the fruit pulp is put on it to dry in the same manner. This process is repeated until a layer of the dried pulp which is sufficiently thick, say 1/4" to 1/2" and which resembles more or less the texture of leather is obtained.

Sulphuring of the Product

Expose the product to sulphur fumes obtained by burning a small quantity of sulphur (depending upon the weight of the product) at the bottom of a

closed box. This treatment helps the product in retaining its attractive colour for a considerable period.

Packing and Storage

The sheets of mango leather are cut into pieces of a suitable size and shape. They are then wrapped in butter paper and finally packed in glass jars for storage.

PINEAPPLE JUICE

Selection of Fruit

Select ripe and fully developed fruits with the characteristic rich aroma. Fruits of a low-grade variety or culled fruits of a superior variety can also be used.

Preliminary Treatment

Remove the crown with a sharp twist of the hand. Peel the fruit with a sharp and large-sized stainless steel knife. Remove the eyes as far as possible with a sharp V-shaped stainless steel knife and discard all damaged portions.

Preparation of Fruit

Cut the fruit into small pieces and pass them through a mincer or chop them finely with a sharp stainless steel knife.

Extraction of Juice

(a) Wrap the prepared fruit in a thick cloth and press out the juice in a small basket type hand press; or

(b) use a worm type juice extractor to extract the juice. Strain the juice through a coarse muslin cloth.

Sweetening of Juice

Add sugar according to taste (about 1 oz. per lb. will normally do) and strain the juice again through a coarse muslin cloth.

Preservation of Juice

Heat the prepared juice rapidly in an aluminium or stainless steel pan on a direct fire to a temperature of 180° to 185°F (82.22° to 85°C). Pour the hot juice into plain cans, if a can sealer is available*, leaving a $\frac{1}{4}$" head space and seal the can immediately. Alternatively, pour the juice into previously sterilized warm bottles up to the brim and seal them air-tight with crown corks.

Processing

Process the cans in boiling water and the bottles in water at 175° to 180°F (79.44°C to 82.2°C) for 25 minutes at sea level.**

The juice may also be preserved with potassium metabisulphate which is added at the rate of 1 oz. (28.34 gm.) for every 100 lb. (45 kg.) of the finished product.

Cooling and Storage

Cool the cans immediately in running water but allow the bottles to cool gradually. Store the cooled products in a cool and dry place.

*The size of the can will be according to the sealer. Dixie or any other type of can sealer available in India is suitable for the purpose.

**At higher altitudes the processing time should be increased by 2 minutes for every rise of 1,000 ft. or 304·8 metres in the altitude.

Use

Pineapple juice is taken as a cool drink either as such or with plain soda.

CANNING OF JACK FRUIT

Plenty of jack fruit (*Arotocarpus integrifolia*) is available during season in Bengal, Bihar, Madras and Mysore. There are several varieties, some having crisp and others fibrous or leathery bulbs. The colour of the bulbs varies from light yellow to orange. The fruit has a strong flavour.

Selection of Fruit

Select ripe fruits which have crisp, yellow bulbs and a good flavour.

Cut the fruit, first across and then lengthwise, into eight or sixteen pieces.

Preparation of Fruit

Remove the pithy and gummy core by means of a sharp knife to free the bulbs.

Smear a little cooking oil on the hand to prevent stickiness. Separate the bulbs from the rind and the surrounding carpels.

Trim off the top and bottom of the bulbs and remove the seed inside along with its thin covering. Cut the bulbs into halves, quarters or smaller slices.

Preparation of Syrup

Prepare 50° Brix syrup of 0.5 per cent acidity by dissolving sugar in an equal weight of water and adding 8 ounces (226.79 gm.) of citric acid per 100 lb. of the syrup. Filter the syrup.

Filling and Syruping

Fill 18 to 20 or 8 to 10 ounces of the prepared fruit into plain A $2\frac{1}{2}$ or butter size cans, respectively.

Pour hot syrup (175° to 190°F or 79.44° to 87.66°C) over the fruit leaving about a 1/4″ head space.

Exhausting

Place the filled cans, with the lid loosely placed on the tops, on a vessel containing hot water at 180°F (82.22°C) with the top of each can about an inch above the surface of the water. At the end of 10 minutes, the cans are ready for closing.

Sealing

Remove the cans from the exhaust vessel and seal them immediately by means of a can sealer.

Cooking and Processing

Immerse the sealed can in a vessel containing boiling water. To prevent direct heating, place a thick piece of folded cloth at the bottom of the vessel.

At sea level, cook for 30 minutes by keeping the water boiling all the while.

Cooling and Storage

Remove the cans from the pan and place them under running water to cool them quickly to a temperature slightly above the room temperature. This prevents the over -cooking of fruit and at the same time, by quickly drying the outside of the cans, prevents them from rusting during storage. Store the cans in a cool, dry place. The product will keep well for about 1½ years if all the processes have been done correctly.

Uses

The canned jack fruit can be served either alone or with such other fresh or canned fruit as mango, banana or pineapple to give delightful fruit salads.

CANNING OF PINEAPPLE

Ingredients

1. Pineapple	6
2. Sugar	1½ lb. (0.68 kg.).
Total output	9 lb. (4.08 kg.)

Selection of Fruit

Select fresh, fully ripe and sound pineapples.

Preparation of Fruit

Cut into 1/2″ thick slices and remove the peel, central core and the eyes of the fruit.

Filling and Syruping

Prepare the sugar syrup by adding an equal quantity of water to the sugar. Cook for 4 to 5 minutes.

Place about 5 to 6 slices in a one-pound can and fill the space between them with 50% sugar syrup leaving about a 1/2″ head space. Remove the scum that comes on the top.

Exhausting and Sealing

Place the cans with their lids on loosely in a pan containing boiling water—the water level outside should be about 2″ below the tops of the cans. Cover the pan. Heat to a temperature ranging between 150°F and 170°F (71.11° and 76.22°) for 10 minutes. Seal the can with a can-sealer.

Pasteurization and Cooling

Put the sealed cans in boiling water and boil for about 15 minutes. Remove the cans quickly and leave them in cold running water.

Storage

Take out the cans while they are still warm and allow them to dry in air. Store them in a cool and dry place.

Uses

The canned fruit may be used as a sweet dish either alone or in a cream and fruit salad.

NOTE—For places above sea level, the cooking time should be increased by two minutes for every rise of 1,000 ft. (304.8 metres) in the altitude.

CANNING OF MANGOES

Although a large number of varieties of mango are grown all over India, only a few of them are suitable for canning. Among the south Indian mangoes which are commercially important, *Badami Benishan, Neelum* and *Raspuri* give good canned products. Canned *Bangalora* is of only a fair quality. *Rasam* varieties are juicy and fibrous and are therefore not suitable for canning.

Selection of Fruit

Select only firm ripe fruit which are free from all blemishes.

Washing

Wash the fruit well in running water to remove dirt and other extraneous matter.

Preparation

Peel the fruit with a stainless steel knife by working it round the fruit so that the peel is lifted in one long strip.

Slice the two sides of the fruit and cut each slice lengthwise into two halves.

Remove the pulp on the thin sides of the stone in two sections. Thus, from each fruit six longitudinal slices of approximately equal size are obtained.

Filling and Syruping

Fill 18 to 20 or 8 to 10 ounces, respectively, of the prepared material into A 2 1/2 or butter size plain cans.

Pour hot sugar syrup of 50° Brix containing 0.5 per cent citric acid at a temperature of 175° to 180°F to prevent shrinkage of the fruit. Leave about a 1/4 inch head space while covering the slice with the syrup.

Exhausting

Place the filled cans in a vessel containing hot water at 185° to 190°F (85°C to 87.77°C) with the top of the cans just above the surface of the water. At the end of 10 minutes, the cans become ready for closing. The process removes the air from the content of the cans and this helps to prolong the storage life of the canned product.

Sealing

Remove the cans from the exhaust vessel, place the lid on top and close the can hermetically by means of a good can-sealing machine. Small can sealers are now available in India.

Cooking or Processing

Immerse the sealed cans in a vessel containing boiling water. To prevent direct heating, place a thick piece of folded cloth at the bottom of the vessel. Cook for 25 minutes* keeping the water boiling all the time. This destroys any spoilage organisms inside the can.

Cooling and Storage

Remove the cans from the sterilization vessel and cool them quickly in running water to a temperature slightly above the room temperature. This prevents

*NOTE: For places above sea level, cooking time should be increased by two minutes for every rise of 1,000 ft. (304.8 metres) in the altitude.

over-cooking and also helps in drying the outside of the cans. The canned product keeps well for more than 1½ years.

Uses

The canned mangoes are served either alone or mixed with other fresh or canned fruits and cream in fruit salads.

DEHYDRATION OF RIPE BANANAS

Selection of Fruit

Select firm, ripe fruits, which are free from blemishes and bruises of all kinds.

Preliminary Treatment

Wash the fruit thoroughly to get rid of any extraneous matter.

Preparation of the Fruit

Peel the fruit suitably to remove all the inedible matter adhering to the skin. Halve the fruit lengthwise or cut them into slices crosswise. Immerse the cut fruit for about 15 minutes in a one per cent solution of sodium carbonate and wash it up by carefully rinsing the fruit in clean fresh water.

Loading

Spread the fruit on flat bottommed wooden trays with the cut surfaces facing upwards.

Sulphuring of the Fruit

Keep these trays in a fumigation chamber (sulphur box). Expose the cut fruit to the fumes of sulphur dioxide obtained by burning sulphur at the rate of 8 lb. (3.62 kgm.) per ton of fruit for every 1,000 c.ft. (28.32 cubic metres) of the chamber volume.

Dehydration

Remove the trays and put them in the drier (home type) preventing as far possible any contact of the fruit with iron. Maintain a temperature of 130° to 140°F (54.66° to 60°C). It will then take about 15 to 20 hours to get a final product having a moisture content of 18 to 22 per cent.

Packing and Storage

Pack the finished product in moisture-proof paper and keep them in friction top tins thereby preventing direct access of moisture to the finished product.

DRYING OF FRUITS

Selection of Material

Select sound and ripe fruits which are free from bruises and are of first grade quality.

Preliminary Treatment

Wash the fruit thoroughly in running cold water or with several changes of water to remove dirt and other extraneous matter.

Preparation of Fruit

Prepare the fruit as given in the column III of the Table below, e.g., peel, trim and cut into pieces or slices of a suitable size. Spread it on specially constructed

wooden trays, their size being 3′×8′ or 3′×6′ or 2′ × 3′ depending upon the type of the fruit used, the quantity of the fruit handled and the method of drying. Also sulphur the fruit, if necessary (as directed in column V of the attached chart).

Loading and Drying

The trays laden with the required quantity of the fruit (column IV of the Table are placed singly in long rows on a wooden framework constructed (about 1 feet above the ground level), directly in the sun in an open yard. A fine mosquito net should be used for protection against flies, bees, wasps, etc. When nearly dried, they are finished in a home drier to eliminate the last traces of moisture at temperatures given in column VI of the Table below.

DRYING OF FRUITS

Sl. No.	*Product*	*Preparation of Tray*	*lb. per sq . ft on tray*	*Treatment on tray**	*Safe finishing temperature*
1.	Apples	Peel and core: then slice or cube	2	Sulphur 20 minutes	165°F (73·28°C)
2.	Apricots	Halve and pit	2	Sulphur 60 minutes	160°F (71·11°C)
3.	Bananas	Peel; then halve lengthwise or slice crosswise.	1 to 2	Sulphur 30 minutes	160°F (71·11°C)
4.	Berries (blackberries, logan berries or raspberries)	Sort and wash if necessary	..	Sulphur 15 minutes (optional)	150°F (65·55°C)
5.	Strawberries	Hull and sort	1 to 2	Sulphur 30 minutes	150°F (65·55°C)
6.	Cherries	Dip in boiling 1/2% soda solution	2 to 3	Sulphur only white cherries 20 minutes	160°F (71·11°C)
7.	Dates	Wash gently and dip them once in boiling 1/2% caustic soda solution	2	..	140°F (60°C)
8.	Figs	Wash thoroughly	2 to 3	Sulphur only adriatic variety 60 minutes	150°F (65·55°C)
9.	Grapes, Sultana	Dip in boiling 1/2% lye solution; then rinse	3	Sulphur 60 minutes	150°F (65·55°C)
10.	Grapes, Muscat and wine varieties	Dip in boiling 2½% lye solution; then rinse	3	Sulphur 60 minutes	150°F (65·55°C)
11.	Peaches	Halve and pit (peeling optional)	3	Sulphur 60 minutes	170°F (76·22°C)
12.	Pears	Peel, halve, core (cubing optional)	2 to 3	Sulphur 30 minutes	160°F (71·11°C)
13.	Plums	Halve and pit	2 to 3	Sulphur 60 minutes	150°F (65·55°C)
14.	Prunes	Dip in boiling 1/2% lye solution	3 to 4		165°F (73·88°C)

*By burning 8 lb. (3·624 kg.) of sulphur per ton of fruit for 1000 c.ft. (28·32 cubic metres) of chamber space.

APPENDIX II

DRYING OF VEGETABLES

Selection of Vegetables

Select sound, tender and good quality vegetables which are free from bruises. Grade them according to size, maturity and colour.

Preliminary Treatment

Remove the inedible portions and wash the vegetables thoroughly in running cold water to remove soil, dust and other extraneous matter.

Preparation of Vegetables

Prepare vegetables as given in column III of the Table given below followed by treatment on the tray as given in column V.

Drying

Although both sun-drying and dehydration can be practised with almost equal advantage for the drying of vegetables, it is more convenient and efficient to adopt the latter method, as a product of uniform quality and better appearance can thereby be obtained. Moreover, the drying is done under a controlled set of conditions : a temperature of 120 to 130°F (48.88 to 54.66°C) or slightly more being maintained by the proper adjustment of the heating system and a fairly regulated outflow of the moist air being made possible through the slits at the top.

Description of the Home Drier

A small scale dehydrator called the 'home drier' is most conveniently and efficiently used for drying vegetables at home. It consists of a strong galvanized iron sheet box 3′×2′×3′ with a strong perforated iron sheet bottom, the sides and the top of this box being enclosed in a wooden frame-work. The box is supported on an iron stand 1½ feet high. A kerosene oil stove or charcoal hearth can be used as the source of heat. The moisture is let off through two slits (2′×1.5′) with collapsible metallic flaps along the length on both sides, about 4″ below the top. The drier can accommodate 7 trays (2¾′×2′). Care is taken to regulate the temperature and outflow of the moisture from the drier. The finishing should be done at temperatures given in column VI of the Table given below.

Packing and Storage

When vegetables have been dried and finished according to the directions given in the Table given below, they should be put into confectionery tins and sealed air-tight with tin or wax depending upon the length of the period of storage.

DRYING OF VEGETABLES

S. No.	*Product*	*Preparation of Tray*	*lb. per sq . ft. on Tray*	*Treatment on Tray*	*Safe finishing temperature*
1.	Beans, string	Prepare as for canning	2	Blanch in steam 3 to 5 minutes (optional)	160 °F (71·11°C)
2.	Beets	Prepare as for canning; slice 1/4" thick	2	..	160 °F (71·11°C)

DRYING OF VEGETABLES—*contd.*

S. No.	*Product*	*Preparatian af Tray*	*lb. per sq. ft on tray*	*Treatment on tray*	*Safe finishing temperature*
3.	Cabbages	Shred; blanch 2 minutes in boiling 1% sodium bicarbonate solution; rinse	1 to 2	..	150°F (65·55°C)
4.	Carrots	Peel and cube	2	Blanch in steam 5 minutes	150°F (65·55°C)
5.	Onions	Peel; slice 1 inch thick; dip in cold 3% brine	1	..	140°F (60°C)
6.	Peas	Prepare as for canning	1 to 2	Blanch in steam 3 to 5 minutes (optional)	150°F (65·55°C)
7.	Potatoes	Peel; slice or cube; dip in boiling water 2 minutes	1 to 2	Blanch in steam 3 to 5 minutes (optional)	150°F (65·55°C)
8.	Sweet potatoes	Peel; slice 1/4 inch thick	1 to 2	Blanch in steam 5 minutes	150°F (65·55°C)
9.	Pumpkins	Remove seeds; slice or shred into thin pieces	2	Blanch in steam 4 to 5 minutes	170°F (76·22°C)
10.	Spinach	Wash thoroughly	1	——	160°F (71.11°C)
11.	Tomatoes	Slice 1/2 inch thick; or peel and halve	1 to 2	Sulphur 30 minutes (optional)	150°F (65·55°C)

CANNING OF CURRIED VEGETABLES

Ingredients

Mixed vegetables	12 lb. (5.42 kg.)
Mustard (whole)	3/4 oz. (18.52 gm.)
Coriander (powdered)	3/4 oz. (18.52 gm.)
Red chilli (powdered)	1/2 to 3/4 oz. (14 gm. to 18.52 gm.)
Caraway seeds	3/4 oz. (18.52 gm.)
Common salt (powdered)	3½ oz. (85.19 gm.)
Turmeric (powdered)	1½ to 1¾ oz. (42.52 gm. to 46.87 gm.)
Vegetable fat (hydrogenated oil)	14 oz. (398.88 gm.)
Water	as necessary

Selection of Material

Select mature and tender vegetables which are free from blemishes and rots. Grade them according to maturity and colour as best as possible.

Preliminary Treatment

Chop off the inedible portions, and wash the remaining vegetables thoroughly in running cold water to remove all dust and foreign matter, scrubbing with hands if necessary.

Preparation of Vegetables

Prepare the vegetables as normally done for use in the home kitchen, *e.g.*, shell the peas; remove the hand leaves of cauliflowers, and cut the flower head into flowerets of a suitable size; remove the outer hard leaves of cabbages, and cut into shreds of $\frac{1}{4}''$ to $\frac{3}{8}''$. Peel the root vegetables and cut them into slices of a suitable size. Then grade them according to the size and quality.

Preparation of Liquid Medium (gravy)

Heat the required amount of fat in a pan to a temperature at which mustard grains when added to it produce a cracking sound. At this stage, put the entire quantity of mustard in the fat and fry it for a few minutes; after this, add the other spices and salt, and fry likewise. Add the requisite quantity of water, stir thoroughly and bring to a boil.

Filling the Cans

Fill the prepared raw vegetables in $2\frac{1}{2}$ size cans followed by the addition of hot gravy, in the proportions given as under for some typical packs.

Combination of Vegetables	*Weight of Vegetables (ounces)*	*Weight of Gravy (liquid ounces)*
1. Potatoes-cauliflowers	17.0 to 17.5	10.5 to 11.0
2. Potatoes-cauliflowers-tomatoes	19.5	8.5
3. Potatoes-tomatoes	24.0	4.0
4. Potatoes-peas	15.0	13.0
5. Potatoes-peas-cauliflowers	16.0	12.0

Note 1 For other combinations, similar proportions may be used.

Note 2 With the above proportions of vegetable and gravy, the final product will consist of about 70% solid and 30% liquid portions. If, however, a product with less of liquid portion is required, the proportion of vegetable may be increased.

Exhausting and Sealing

Place the filled cans in a boiling water bath (with a false bottom) without any loss of time and keep them there till the temperature of the central portion of the can reaches 160° to 180°F (71.11 to 82.22°C). This eliminates as much of the pocketted air inside the can as possible. Then seal immediately with a can sealer.

Processing (Cooking and Sterilization)

Cook the vegetable (packed and sealed in the can) at 240°F (104° C) *i.e.*, 10 lb. steam pressure in a pressure cooker for 60 to 75 minutes depending upon the

size and type of container, the kind and maturity of the vegetables, the quantity of fat in the final product, etc.

Cooling and Storage

Remove the cans from the pressure cooker, after releasing the pressure of steam inside. Place them immediately under running cold water till they become fairly cool, wipe the cans dry and finally store the product in a cool and dry place.

GUAVA CHEESE

Ingredients

Guava pulp	1 lb. (0.45 kg.)
Sugar	1 1/2 lb. (0.78 kg.)
Butter	2 oz. (56.70 gm.)
Citric acid	1 gm.
Salt	1/2 teaspoonful
Colour (red edible)	Sufficient to give an attractive deep fruit colour to the product.

Selection of Material

Select firm, sound and fully ripe fruit of the best quality.

Preliminary Treatment

Wash the fruit thoroughly to remove dirt, soil, etc.

Preparation of Fruit

Trim the bruised and blemished portions. Cut the sound portions of the fruit into small pieces with a stainless steel knife as the ordinary knives will stain it black.

Extraction of Pulp

Add an equal quantity of water and boil till the fruit softens well. Strain the pulp through a fine mosquito net cloth to separate the seeds and rough skins.

Cooking

Mix the guava pulp, sugar and butter, and heat till the mass becomes sufficiently thick. Just before finishing, add the remaining ingredients, having first dissolved them in a small quantity of water.

NOTE :—For every rise in the altitude by 500 feet the boiling point of water decreases by 1°F and hence a corresponding increase of 2 minutes in the processing time should be effected.

Finishing of the Product

Smear a china plate with butter and spread the finished product over it to form about a 1/4" thick layer. Allow the product to cool and set. Then cut into pieces of an attractive shape. Wrap them in butter paper and store them in a clean, dry glass container which is finally sealed with wax.

PREPARATION OF PETHA CANDY

Ingredients

Peeled *petha* (ash gourd)	1 lb. (0.45 kg.)
Sugar	1 lb. (0.45 kg.)

Essence (such as rose water)	1/2 oz.
Citric acid (0.1%)	0.1 oz. (28.34 gm.)
Lime	0.1 oz. (28.34 gm.)
Water	1½ lb. (0.67 kg.)
Output	2 lb. (0.9 kg)

Selection of Material

Select a sound and mature *petha.*

Preliminary Treatment

Wash the *petha* well to remove soil and any other extraneous matter.

Preparation of Fruit

Cut the fruit longitudinally into slices and remove the seeds and inner soft pulp. Carefully peel off the outer hard surface and cut the peeled slices into one inch cubes.

Lime Water Treatment

Prick the fruit with a fork.

Prepare fresh lime water. This has to be done by mixing an ounce of quick lime to each pound of water. This should be vigorously stirred, allowed to settle and finally decanted and filtered.

Keep the cut *petha* pieces in lime water for three to four hours, depending upon the softness of the fruit. The softer the fruit the longer is the period for which it is left.

Washing

Drain off the lime water and wash the pieces in fresh running water.

Blanching

Blanch the pieces for about 15 to 30 minutes by immersing them in boiling water. Spread the pieces on a clean white sheet to remove the moisture.

Preparation of Syrup

Make the sugar syrup by dissolving 2 parts of sugar in 3 parts of water. This will give 45° Brix syrup. The quantity of syrup prepared should be equal to double the quantity of the prepared *petha.*

Cooking

Boil the *petha* in the syrup for 1/2 an hour, and allow it to stand overnight. After 24 hours drain off the syrup.

Increase its concentration to about 45° Brix by adding more sugar.

Boil the *petha* again for 1/2 an hour in this syrup and then remove it.

Repeat the last two steps for 3 to 4 hours, till the concentration of the syrup is about 70° Brix, and the temperature reaches 224°F (106.06°C).

At this stage add 1/2 gm. of 0.1% citric acid. Allow the whole mass to stand over and then drain the syrup. Add the essence.

Packing and Storage

Store in a dry container. If you want to crystalise the *petha,* cut it further into small cubes and roll in fine sugar. Keep it in a dry bottle.

APPENDIX III

Food Values of Some of The Common Foods

Value per 100 grams

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (Micro-mgm.)*	*Vitamin C (mgm.)*
Cereals																	
Bajra	*Pennisetum typhoideum*	*Bajra*	12·4	11·6	5	2·3	1·2	67·1	0·04	0·257	14·3	356	220	330	3·2	160	0
Barley	*Hordeum vulgare*	*Jau*	12·5	11·5	1·3	1·2	3·9	69·6	0·03	0·22	3·0	336	17	470	5·4	200	0
Jowar or Jola	*Sorghum vulgare*	*Jowar*	11·9	10·4	1·9	1·8	—	74	0·03	0·28	6·2	355	136	345	1·8	364	0
Maize, dry	*Zea mays*	*Mukka*	14·9	11·1	3·6	1·5	2·7	66·2	0·01	0·35	2·0	342	1,502	420	1·4	100	0
Oatmeal	*Avena sterilis*	*Jai*	10·7	13·6	7·6	1·8	3·5	62·8	0·05	0·38	3·8	374	0	540	1·1	120	—
Ragi	*Eleusine coracana*	*Mandal, Okara*	13·1	7·3	1·3	2·7	3·6	72	0·35	0·28	17·4	328	70	420	1·1	100	—
Rice (raw and home pounded)	*Oryza sativa*	*Arwa Chawal*	13·3	7·5	1·0	0·9	0·6	84·2	0·01	0·18	2·9	345	0	210	3·9	160	0
Rice (par-boiled and home pounded)	*-do-*	*Usna Chawal*	12·6	8·5	0·6	0·9	0·9	77·4	0·01	0·28	2·8	349	15	210	4·6	90	—
Rice (raw and milled)	*-do-*	*Arwa Chawal*	13·7	6·8	0·5	0·6	0·2	78·2	0·01	0·16	3·1	345	0	90	1·9	30	—
Rice (par boiled and milled)		*Usna Chawal*	13·3	6·4	0·4	0·7	0·2	79·0	0·01	0·14	4·0	348	0	210	3·8	90	0
Rice (raw and unmilled)	*-do-*		14·1	7·2	2·3	1·3	—	75·1	0·01	0·23	4·5	350	0	290	4·6	—	—
Wheat (whole)	*Triticum aestivum*	*Gehun*	12·8	11·8	1·5	1·5	1·2	71·2	0·04	0·31	4·9	346	108	450	5·0	120	0
Wheat flour (refined)	*-do-*	*Maida*	13·3	11·0	0·9	0·6	0·3	73·9	0·02	0·12	2·5	348	43	120	0·9	70	0
Pulses																	
Bengalgram whole (with outer husks)	*Cicer arietinum*	*Chana*	9·8	17·1	5·3	3·0	3·9	60·9	0·20	0·24	9·8	360	316	300			3

APPENDIX III

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Colorific value per 100 (gms.)*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (micro-mgm.)*	*Vitamin C (mgm.)*
Blackgram dal (without outer husk)	*Phaseolus Mungo*	*Urd*	10·9	24·0	1·4	3·2	0·9	59·6	0·20	0·34	9·5	347	64	420	2·0	370	0
Greengram whole (with outer husk)	*Phaseolus aureous roxb.*	*Moong*	10·4	24·0	1·3	3·5	4·1	56·7	0·12	0·32	7·3	334	158	470	2·1	390	1
Lentil	*Lens culinaris medic*	*Masur dal*	12·4	25·1	0·7	2·1	0·7	59·0	0·07	0·29	4·8	343	450	450	1·5	490	0
Redgram (without outer husk)	*Cajanus cajan*	*Arhar dal*	13·4	22·3	1·7	3·5	1·5	57·6	0·07	0·30	5·8	355	220	450	2·4	506	506
Soyabean	*Glycine Max. merr.*	*Bhat*	8·1	43·2	19·5	4·6	3·7	20·9	0·24	0·69	11·5	432	710	730	2·4	760	..
Peas (dried)	*Pisum sativum*	*Matar*	16·0	19·7	1·1	2·2	4·5	56·5	0·08	0·30	5·1	315	66	470	1·9	380	0
Field bean (dry)	*Dolichos lablab*	*Val*	9·6	24·9	0·8	3·2	1·4	60·1	0·06	0·43	2·7	347	0	520	1·8	160	0
Leafy Vegetables																	
Agathi	*Sesbania grandiflora*	*Agathi or Jaint*	73·1	8·4	1·4	3·1	2·2	11·8	1·13	0·08	3·9	93	9,000	210	1·2	90	169
Amaranth (tender)	*Amaranthus tricolour*	*Cholai*	85·7	4·0	0·5	2·7	1·0	6·3	0·40	0·08	25·5	46	9,200	30	1·0	100	99
Bengalgram leaves	*Cicer arietinum*	*Chana sag*	73·4	7·0	1·4	2·1	2·0	14·9	0·34	0·12	23·8	97	1,631	90	0·6	100	61
Brussels sprouts	*Brassica oleacea gemmifera*	—	85·5	4·7	0·5	1·0	1·2	7·1	0·04	0·08	·8	52	210	50	0·4	20	72
Cabbage	*Brassica oleacea capitata*	*Bandgobi*	91·9	1·8	0·1	0·6	1·0	4·6	0·04	0·04	0·8	27	2,000	60	0·4	30	124
Carrot leaves (leaves only)	*Daucat carota*	*Gajar-ka-Sag*	76·6	5·1	0·5	2·8	1·9	13·1	0·34	0·11	8·8	77	9,500	40	0·5	200	79

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (micro-mgm.)*	*VitaminC (mgm.)*
Celery leaves (tender leaves only)	*Apium graveolens Var Dulce*	*Ajwan-ka-Patta*	88·0	6·3	0·6	2·1	1·4	8·6	0·23	0·14	6·3	64	6,650	0	1·2	10	62
Curry leaves (leaves only)	*Murraya Koenigii*	*Gandhella*	63·8	6·1	1·0	4·0	6·4	18·7	0·83	0·06	7·0	108	12,600	80	2·3	210	4
Drumstick (leaves only)	*Moringa oleifera*	*Saijan*	75·9	6·7	1·7	2·3	0·9	12·5	0·44	0·07	7·0	92	11,300	60	0·8	50	220
Fenugreek (leaves only)	*Trigonella foenum graecum*	*Methi*	86·1	4·4	0·9	1·5	1·1	6·0	0·36	0·05	17·2	49	6,450	50	0·7	150	54
Lettuce	*Lactuca sativa*	*Salad*	93·4	2·1	0·3	1·2	0·5	2·5	0·05	0·03	2·4	22	1,650	90	0·5	130	10
Manathakkali	*Solanum nigram*	*Makoy*	82·1	5·9	1·0	2·1	—	8·9	0·41	0·07	20·5	68	—	—	—	—	11
Neem, tender	*Azadirachta indica*	*Neem*	59·4	11·6	3·0	2·6	2·2	21·2	0·13	0·19	25·3	158	4,600	60	1·5	0	104
Spinach (leaves only)	*Spinacea oleracea*	*Palak*	92·1	2·0	1·7	1·7	0·6	2·9	0·07	0·02	10·9	26	9,300	30	0·5	70	28
Roots and Tubers																	
Beetroot (all except the central stub)	*Beta vulgaris*	*Chukundar*	87·7	1·7	0·1	0·8	0·9	8·8	0·3	0·01	1·0	43	0	40	0·4	90	88
Carrot (all except the stalk)	*Daucas carota*	*Gajar*	86·0	0·9	0·2	1·1	1·2	10·6	0·08	0·03	2·2	47	3,150	40	0·6	20	3
Colocasia	*Colocasia Esculenta*	*Arbi*	73·1	3·0	0·1	1·7	1·0	21·1	0.04	0·14	1·7	97	40	90	0·4	30	0
Onion, big	*Allium cepa*	*Piaz*	86·8	1·2	0·1	0·4	—	11·6	0·18	0·05	0·7	51	0	80	0·4	10	11
Potato	*Solanum tuberosum*	*Alu*	74·7	1·6	—	0·4	0·6	11·0	0·01	0·04	0·7	99	40	100	1·2	10	17
Radish, pink (all except the small rootlets)	*Raphanus sativus*	*Muli*	90·8	0·6	0·3	0·9	0·6	6·8	0·05	0·02	0·5	32	5	60	0·4	20	17

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate*	*Calcium*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (micro-(mgm.)*	*Vitamin C (mgm.)*
Sweet potato	*Ipomoea batatas*	*Shakarkandi*	68·5	1·2	0·3	1·0	0·8	28·2	0·02	0·05	0·8	120	10	80	0·7	40	24
Tapioca	*Manihot esculenta*	*Maravali Simla Alu*	59·4	0·7	0·2	1·0	0·6	38·7	0·05	0·04	0·9	159	—	50	0·3	100	25
Yam (elephant)	*Amorphophallus camapanulatus*	*Zamin-kand*	78·7	1·2	0·1	0·8	0·8	18·4	0·05	0·03	0·6	79	434	60	0·7	70	0
Yam (ordinary)	*Typhonium trilobatum*	*Ratalu*	69·9	1·4	0·1	1·6	1·0	26·0	0·06	0·02	1·3	111	130	70	0·7	0	0
Other Vegetables																	
Artichoke	*Cynara scolymus*	*Hattichak*	77·3	3·6	0·1	1·8	1·2	16·0	0·12	0·10	2·3	79	63	230	—	10	0
Ashgourd (all except seeds and outer coat)	*Benincasa hispida*	*Petha*	96·5	0·4	0·1	0·3	0·8	1·9	0·03	0·02	0·8	10	0	60	0·4	10	1
Bittergourd (all except seeds and stalk)	*Memordica charantia*	*Kreala*	92·4	1·6	0·2	0·8	0·8	4·2	0·02	0·07	1·8	25	210	72	0·5	90	88
Bittergourd small variety (all except seeds and stalk)	*-do-*	*-do-*	83·2	2·1	1·0	1·4	1·7	9·8	0·05	0·14	9·4	60	210	72	0·4	60	96
Brinjal (all except the stalk and the calyx)	*Solanum melongena*	*Baigan*	92·7	1·4	0·3	0·3	1·3	4·0	0·02	0·05	0·9	24	124	40	0·9	110	12
Broadbeans (all except the fibrous outer coat)	*Vicia faba*	*Sem*	85·4	4·5	0·1	0·8	2·0	7·2	0·05	0·06	1·4	48	16	100	0·8	—	12

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micromgm.)*	*Niacin (mgm.)*	*Riboflavin (micro-(mgm.)*	*Vitamin C (mgm.)*
Calabash cucumber (all except the outer coat and stalk end)	*Legenaria siceraria*	*Lawki Ghia Kaddu*	96·3	0·4	0·1	0·3	0·4	2·5	0·02	0·01	0·7	13	0	30	0·2	10	6
Cauliflower (all except the stalk and central core)	*Brassica oleracea botrytis*	*Gobi*	90·8	2·6	0·4	1·0	1·2	4·0	0·03	0·06	1·5	30	51	40	1·0	100	56
Celery stalks	*Apium graveolens vardulce*	*Ajwan-ki Dandi*	93·5	0·8	0·1	0·9	1·2	3·5	0·03	0·04	4·8	18	—	—	—	—	6
Cluster beans	*Cyamopis tetragonoloba*	*Gwar-ki-phali*	81·0	3·2	0·4	1·4	3·2	11·0	0·11	0·06	4·5	59	316	90	0·6	90	47
Colocasia stems (all except the fibrous outer coat)	*Colacasia esculenta*	*Arwi-ki-dandi*	94·0	0·3	0·3	1·2	0·6	4·2	0·06	0·02	0·5	21	174	70	0·1	70	3
Cucumber (all except the outer coat and stalk end)	*Cucumis sativus*	*Kakari*	96·3	0·4	0·1	0·3	0·4	2·5	0·01	0·03	1·5	13	0	30	0·2	10	
Double Beans	*Faba vulgaris*	*Chastang*	73·8	8·3	0·3	1·0	4·3	12·3	0·04	0·14	2·3	85	—	—	—	—	22
Drumstick	*Moringa oleifera*	*Saijan*	86·9	2·5	0·1	2·0	4·8	3·7	0·03	0·11	5·3	26	184	50	0·2	70	120
French beans	*Phaseolus vulgaris*	*Bakla*	91·4	1·7	0·1	0·5	1·8	4·5	0·05	0·03	1·7	26	221	78	0·3	59	14
Jack, tender	*Artocarpus heterophyllus*	*Kathal*	84·0	2·6	0·3	0·9	2·8	9·4	0·03	0·04	1·7	51	0	50	0·2	40	—

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (micro-mgm.)*	*Vitamin C (mgm.)*
Knol-khol (all except the stalk and rootlets)	*Brassica caulorapa*	*Kohl Rabi*	92·7	1·1	0·2	0·7	1·5	3·8	0·02	0·04	0·4	27	36	50	0·5	88	85
Lady's finger (all except the tip and stalk end)	*Abelmoschus esculentus*	*Bhindi*	89·6	1·9	0·2	0·7	1·2	6·4	0·07	0·06	1·5	35	88	70	0·6	100	13
Leeks	*Allium porrum*	*Vilayiti Iasson*	78·9	1·8	0·1	0·7	1·3	17·2	0·05	0·07	2·3	77	30	225	—	—	11
Mango green (seed discarded)	*Mangifera Indica*	*Am (keri)*	87·5	0·7	0·1	0·4	1·2	10·1	0·01	0·02	5·4	44	150	40	0·2	10	3
Nellikai or Aonla	*Phyllanthus emblica*	*Aonla*	81·8	0·5	0·1	0·5	3·4	13·7	0·05	0·02	1·2	58	15	30	0·2	10	600
Parvar	*Trichosanthes dioica*	*Parwal*	92·0	2·0	0·3	0·5	3·0	2·2	0·03	0·04	1·7	20	255	50	0·5	60	29
Peas English (pods discarded)	*Pisum sativum*	*Matar*	72·0	7·2	0·1	0·8	4·0	15·8	0·02	0·14	1·5	93	139	250	0·8	10	9
Plantain green (the stalks, ends and rind discarded)	*Musa papientum*		83·2	1·4	0·2	0·5	0·7	14·7	0·01	0·03	0·6	66	50	45	0·3	20	24
Pumpkin (all except seeds and outer coat)	*Cucurbita maxim*	*Kaddu, seetaphal*	92·6	1·4	0·1	0·6	0·7	4·6	0·01	0·03	0·7	25	84	60	0·5	40	2
Snakegourd (seeds rejected)	*Trichosanthes anguina*	*Chichinda*	94·6	0·5	0·3	0·5	0·8	3·3	0·05	0·02	1·1	18	160	40	0·3	60	0
Tinda, tender	*Citrullus vulgaris*	*Tinda*	93·5	1·4	0·2	0·5	1·0	3·4	0·02	0·03	0·9	21	23	40	0·3	80	18
Tomato, green	*Idcopericonesculantum*	*Tamatar*	93·1	1·9	0·1	0·6	0·7	3·6	0·02	0·04	1·8	23	320	69	0·4	10	31

Name of the food-stuff in English	*Botanical Name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (microgm.)*	*Niacin (mgm.)*	*Riboflavin (microgm.)*	*Vitamin C (mgm.)*
Turnip	*Brassica rapa*	*Shalgam*	91·1	0·5	0·2	0·6	—	7·6	0·03	0·04	0·4	34	Trace	40	0·5	40	43
Vegetable marrow	*Cucurbita pepo*	*Gia*	94·8	0·5	0·1	0·3	0·8	4·3	0·01	0·03	0·6	20	0	20	0·4	0	18
Water chestnut, raw	*Trapa bispinosa*	*Singara*	70·0	4·7	0·3	1·1	0·6	23·3	0·02	0·15	0·8	115	20	50	0·6	70	9
Fruits																	
Pomegranate	*Punica granatum*	*Anar*	78·0	1·6	0·1	0·7	5·1	14·6	0·01	0·07	0·3	65	0	60	0·3	100	16
Pomelo	*Citrus maxima*	*Chakotra*	88·0	0·6	0·1	0·5	0·6	10·2	0·03	0·03	0·3	44	200	30	0·2	30	20
Quince	*Cydania oblonga*	*Bihi*	85·7	0·3	0·1	0·3	1·7	11·9	0·01	0·02	0·4	49	—	—	—	—	10
Radish fruit	*Raphanus sativus*	*Singri*	90·5	2·3	0·3	0·8	1·4	5·4	0·08	0·10	2·8	34	50	70	0·2	50	69
Raisins (preserved)	*Vitis vinifera*	*Kishmish*	18·5	2·0	0·2	2·0	0·9	76·4	0·10	0·08	4·0	315	0	60	0·5	100	0
Sharifa or *Seethaphal* (Custard apple)	*Anona squamosa*	*Sharifa*	73·5	1·6	0·3	0·7	—	23·9	0·02	0·04	1·0	105	Trace	—	—	—	—
Strawberry	*Fragaria vesca*	—	87·8	0·7	0·2	0·4	1·1	9·8	0·03	0·03	1·8	44	30	30	0·2	20	52
Tomato, ripe	*Lycopersicum esculantum*	*Tamatar*	94·0	0·9	0·2	0·5	0·8	3·6	0·01	0·02	0·1	20	585	120	0·4	60	27
Wild olive	*Eleocaipus oblongus*	—	63·9	1·4	0·1	0·9	—	33·7	0·01	0·02	2·0	141	—	—	—	—	—
Tamarind pulp	*Tamarindus indicus*	*Imli*	20·9	3·1	0·1	2·9	5·6	67·4	0·17	0·11	10·9	283	100	60	0·7	—	3
Zizyphus	*Zizyphus mauritiana*	*Ber*	85·9	0·8	0·1	0·4	—	12·8	0·03	0·03	0·8	55	70	—	—	—	—

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (mgm.)*	*Vitamin C (mgm.)*
Palmyra fruit, tender (outer peel rejected)	*Borassus flabellifer*	*Tar*	92·3	0·6	0·1	0·2	0·3	6·5	0·01	0·02	0·5	20	0	10	0·2	10	4
Rose apple	*Syzygaium jambos*	*Pannir Koya*	89·1	0·7	0·2	0·3	—	9·7	0·01	0·03	0·5	43	—	—	—	50	—
Papaya ripe	*Carica papaya*	*Papita*	89·6	0·5	0·1	0·4	—	9·5	0·02	0·01	0·5	40	1,110	40	0·2	250	57
Peaches	*Anygdalis persica*	*Aru*	90·1	1·5	0·2	0·6	—	7·6	0·02	0·04	2·4	38	0	20	0·5	30	6
Pears, country	*Prunus persica*	—	86·0	0·2	0·1	0·3	1·0	11·5	0·01	0·01	1·0	48	14	20	0·2	30	trace
Pineapple	*Ananas comosus*	*Annanas*	87·8	0·4	0·1	0·4	0·5	10·8	0·02	0·01	1·2	46	40	—	—	120	63
Plantain (ordinary)	*Musa Paradisica*	*Kela*	73·4	1·1	0·1	0·7	—	24·7	0·01	0·03	0·5	104	124	50	0·3	170	6
Plantain (red variety)	*Musa rubrumbi*		74·1	1·6	0·1	0·8	—	23·4	0·02	0·03	1·5	101	329	90	0·4	60	15
Plums, red, Nilgiris	*Prunus domestica*	*Alucha*	89·3	0·7	0·2	0·6	—	9·2	0·02	0·02	0·5	41	230	120	0·3	30	1
Guava, hill	*Psidium Guajava*	*Amrud*	85·3	0·1	0·2	0·6	4·8	8·1	0·05	0·02	1·2	38	0	20	0·3	20	15
Jack fruit	*Artocarpus heterophyllus*	*Kathal*	77·2	1·9	0·1	0·8	1·1	18·9	0·02	0·04	0·5	84	292	30	0·4	130	6
Jambu Fruit	*Synigium cuminii*	—	78·2	0·7	0·1	0·4	0·9	19·7	0·02	0·02	1·2	83	80	30	0·2	10	18
Karwanda, dry	*carrisa carandas*	*Karwanda*	18·2	2·3	9·6	2·8	—	67·1	0·16	0·06	39·1	364	—	—	—	—	—
Lemon	*Citrus limon*	*Neebu*	85·0	1·0	0·9	0·3	1·7	11·1	0·07	0·01	2·3	57	0	20 (juice)	0·1 (juice)	10 (juice)	39 (juice)
Lime	*Citrus aurantifolia*	*Neebu*	84·6	1·5	1·0	0·7	1·3	10·9	0·09	0·02	0·3	59	26	20 (juice)	0·1 (juice)	20 (juice)	63 (juice)

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (micro-mgm.)*	*Vitamin C (mgm.)*
Grapes (blue variety)	*Vitius labruscara vinifera*	*Angur*	82·2	0·6	0·4	0·9	2·8	13·1	0·02	0·02	1·3	58	15	40	0·3	10	3
Grape fruit (Triumph)	*Citrus paradisi*	*Do.*	92·0	0·7	0·1	0·2	—	7·1	0·02	0·02	0·2	32	—	120	0·3	20	31 juice
Grape fruit (Marsh's seedless)	*-do-*	—	88·5	1·0	0·1	0·4	—	10·0	0·03	0·03	0·2	45	—	120	0·3	20	—
Nuts and Oilseeds																	
Almond	*Prunus amygdalus*	*Badam*	5·2	20·8	58·9	2·9	1·7	10·5	0·23	0·49	4·5	655	0	240	2·5	150	0
Cashewnut	*Anacardium occidentale*	*Kaju*	5·9	21·2	46·9	2·4	1·3	22·3	0·05	0·45	5·0	596	100	630	2·1	190	0
Coconut	*Cocos nucifera*	*Narial*	36·3	4·5	41·6	1·0	3·6	13·0	0·01	0·34	1·7	444	Trace	45	0·8	100	1
Gingelly seed	*Sesamum indicum*	*Til*	5·3	18·3	43·3	5·2	2·0	25·0	1·45	0·57	10·5	563	100	1,010	4·4	60	0
Groundnut	*Arachis hypogea*	*Mungphali*	7·9	26·7	40·1	1·9	3·1	20·3	0·05	0·39	1·6	549	63	900	14·1	300	—
Pistachio nut	*Pistachia vera*	*Pista*	5·6	19·8	53·5	2·8	2·1	16·2	0·14	0·43	13·7	626	240	670	1·4	—	0
Walnut	*Juglans regia*	*Akhrot*	4·5	15·6	64·5	1·8	2·6	11·0	0·10	0·38	4·8	687	10	450	1·4	30	0
Condiments, spices, etc.																	
Asafoetida	*Ferula foetida*	*Hing*	16·0	4·0	1·1	7·0	4·1	67·8	0·69	0·05	22·2	297	8	0	0·3	40	0
Cardamom	*Elettaria cardamomum*	*Elaichi*	20·0	10·2	2·2	5·4	20·1	42·1	0·13	0·16	5·0	229	0	220	0·8	170	0
Chillies green stalks (all but the dry)	*Capsicum frutescems*	*Hari Mirch*	85·7	2·9	0·6	1·0	6·8	3·0	0·03	0·08	1·2	29	576	190	0·9	390	111

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (microgm.)*	*Niacin (mgm.)*	*Riboflavin (microgm.)*	*Vitamin C (mgm.)*
Chillies, dry	*Capsicum frutescems*	*Lal mirch*	10·0	15·9	6·2	6·1	30·2	31·6	0·16	0·37	2·3	246	576	930	9·5	430	50
Cloves, dry	*Syzygium aromaticum*	*Laung*	25·2	5·2	8·9	5·2	9·5	47·9	0·74	0·10	4·9	293	422	80	0	130	0
Coriander	*Coriandrum sativum*	*Dhania*	11·2	14·1	16·1	4·4	32·6	21·6	0·63	0·39	17·9	288	1,570	220	1·1	350	0
Cumin	*Cuminum cyminum*	*Jeera*	11·9	18·7	15·0	5·8	12·0	36·6	1·08	0·51	31·0	356	870	550	2·6	360	3
Fenugreek seed	*Trigonella foenum—graecum*	*Methi*	13·7	26·2	5·8	3·0	7·2	44·1	0·16	0·37	14·1	333	160	340	1·1	290	0

Name of the Food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (micro-mgm)*	*Vitamin C (mgm.*
Ginger, fresh	*Zingiber officinale*	*Adrak*	80·9	2·3	0·9	1·2	2·4	12·3	0·02	0·06	2·6	67	67	60	0·6	30	6
Garlic, dry (all except the seeds)	*Allium sativum*	*Lahsun*	62·0	6·3	0·1	1·0	0·8	29·0	0·03	0·31	1·3	142	0	160	0·4	230	13
Mace	*Myristica fragrans*	*Javitri*	15·9	6·5	24·4	1·6	3·8	47·8	0·18	0·10	12·6	437	5,045	250	1·4	420	0
Mustard	*Brassica juncea*	*Rai*	8·5	22·0	39·7	4·2	1·8	23·8	0·49	0·70	17·9	541	270	—	4·0	75	Trace
Nutmeg	*Myristica fragrans*	*Jaiphal*	14·3	7·5	36·4	1·7	11·6	28·5	0·12	0·24	4·6	472	0	330	1·4	10	0
Pepper, dry	*Piper nigrum*	*Kali Mirch*	13·2	11·5	6·8	4·4	14·9	49·5	0·46	0·20	16·8	305	1,800	90	1·4	140	—
Tamarind pulp	*Tamarindus indica*	*Imli*	20·9	3·1	0·1	2·9	5·6	67·4	0.17	0·11	10·9	283	100	—	0·7	70	3
Turmeric	*Curcuma domestica*	*Haldi*	13·1	6·3	5·1	3·5	2·6	69·4	0·15	0·28	18·6	349	50	30	2·3	0	0

FOOD VALUES OF SOME OF THE COMMON FOODS

(Value per 100 grams)

Name of the food-stuff in English	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value*	*Vitamin A (International Unit)*	*Carotene (Vitamin A)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (micro-mgm.)*	*Vitamin C (mgm.)*
Flesh Foods																
Egg (duck)	71·0	13·5	13·7	1·0	—	0·7	0·07	0·26	3·0	180	1,200	900	120	0·2	280	—
Egg (hen)	73·7	13·3	13·3	1·0	—	—	0·06	0·22	2·1	173	1,200	1,000	100	0·1	180	0
Fish (Mangalore small fish)	77·9	21·5	1·6	2·0	—	—	0·06	0·41	2·3	100	26	9·0	100	1·0 to 3·9	—	—
Liver (sheep)	70·4	19·3	7·5	1·5	—	1·4	0·01	0·38	6·3	150	22,300	= 0	360	17·6	1,700	20
Mutton (muscles)	71·5	18·5	13·3	1·3	—	—	0·15	0·15	2·5	194	31	0	180	6·8	270	—
Chicken	72·2	25·9	0·6	1·3	—	—	0·03	0·25	—	109	—	—	—	—	—	—

e of the food-stuff in English	Moisture (gm.)	Protein (gm.)	Fat (gm.)	Mineral matter (gm.)	Fibre (gm.)	Carbohydrate (gm.)	Calcium (gm.)	Phosphorus (gm.)	Iron (mgm.)	Calorific value	Vitamin A (International Unit)	Carotene (Vitamin A	Thiamine (micro-mgm.)	Niacin (mgm.)	Riboflavin (micro-mgm.)	Vitamin (mgm.)
Milk and Milk Products																
Milk, Cow's	87·5	3·2	4·1	0·8	—	4·4	0·15	0·10	0·2	67	150	15	51	0·1	180	
Milk, buffaloe's	81·0	4·3	8·8	0·8	—	5·1	0·21	0·13	0·2	118	160	—	40	0·1	100	
Milk, goat's	86·8	3·3	4·5	0·8	—	4·4	0·13	0·12	0·3	71	60	—	50	0·2	120	2
Milk, human	88·0	1·1	3·4	0·1	—	7·5	0·03	0·01	0·2	65	70	—	20	—	20	3
Curds	89·9	2·1	1.5	—	—	6·2	0·15	0·10	0·3	46	102	—	50	0·1	160	1
Buttermilk	97·5	0·8	1·1	0·1	—	0·5	0·03	0.03	0·8	15	Trace	0	—	—	—	—
Skimmed milk powder	4·1	38·0	0·1	6·8	—	51·0	1·37	1·00	1·4	357	0	0	45	1·0	164	5
Cheese	40·3	24·1	25·1	4·2	—	6·3	0·79	0·52	2·1	348	273	—	—	—	—	—

FOOD VALUES OF SOME OF THE COMMON FOODS

(Value per 100 grams)

Name of the food-stuff in English	Name of the food-stuff in Hindi	Moisture (gm.)	Protein (gm.)	Fat (gm.)	mineral matter (gm.)	Fibre (gm.)	Carbohydrate (gm.)	Calcium (gm.)	Phosphorous (gm.)	Iron (mgm.)	Calorific value	Vitamin A (International Unit)	Carotene (Vitamin A)	Thiamine (micro-mgm.)	Niacin (mgm.)	Riboflavin (micro-mgm.)	Vitamin C (mgm.)
Miscelleneous food-stuffs																	
Arrowroot flour (West Indian)	*Arrowroot -ka-atta*	16·5	0·2	0·1	0·1	—	83·1	0·01	0·02	1·0	334	0	—	—	—	—	—
Betel leaves	*Pan-ka-Patta*	85·4	3·1	0·8	2·3	2·3	6·1	0·23	0·04	7·0	44	0	9,600	70	0·7	30	5
Coconut, tender	*Kacha Narial*	90·8	0·9	1·4	0·6	—	6·3	0·01	0·03	0·9	40	—	—	—	—	—	2
Cod-liver Oil	*Machli-ka-tel*	—	—	100·0	—	—	—	—	—	—		60,000 to 2,00,000	0	—	—		
Halibut-liver oil	—do—	—	—	100·0	—	—	—	—	—	—	900	30,00,000	0	—	—	—	
Jaggery	*Gur*	3·9	0·4	0·1	0·6	—	95·0	0·08	0·04	11·4	383	0	280	20	1·0	—	
Makhana	*Makhana*	12·8	9·7	0·1	0·5	—	76·9	0·02	0·09	1·4	348	—	Trace	—	—	—	—
Red palm oil	*Surkh kajur ka Tel*	—	—	100·0	—	—	—	—	—	—	900	—	40,000 to 50,000	—	—	—	—
Sago	*Sabudana*	12·2	0·2	0·2	0·3	—	87·1	0·01	0·01	1·3	35	—	0	10	0·2	—	—
Sugarcane juice	*Ganna-ka-ras*	90·2	0·1	0·2	0·4	—	9·1	0·01	0·01	1·1	39		10	—	—	40	—
yeast, dried (brewer's)		13·6	39·5	0·6	7·0	0·2	39·1	0·44	1·49	43·7	320	—	110	6,000	40·0	4,000	—

M13DofA/61—GIPF.

Name of the food-stuff in English	*Botanical name*	*Name of the food-stuff in Hindi*	*Moisture (gm.)*	*Protein (gm.)*	*Fat (gm.)*	*Mineral matter (gm.)*	*Fibre (gm.)*	*Carbohydrate (gm.)*	*Calcium (gm.)*	*Phosphorus (gm.)*	*Iron (mgm.)*	*Calorific value per 100 grams.*	*Carotene or Vitamin A (I.U.)*	*Thiamine (micro-mgm.)*	*Niacin (mgm.)*	*Riboflavin (micro-mgm.)*	*Vitamin C (mgm.)*
Loquat	*Eriobotry japonica*	*Loquat*	88·2	0·6	0·3	0·5	0·8	9·6	0·03	0·02	0·7	43	933	—	—	—	—
Mango, green	*Mangifera indica*	*Aam*	90·0	0·7	0·1	0·4	—	8·8	0·01	0·02	4·5	39	150	—	—	30	3
Mango ripe	*-do-*	*Aam*	86·1	0·6	0·1	0·3	1·1	11·8	0·01	0·02	0·3	50	4,800	40	0·3	50	13
Melon, water	*Citrullus vulgaris*	*Tarbuz*	95·8	0·2	0·2	0·3	0·2	3·3	0·01	0·01	0·2	16	0	20	0·1	40	1
Orange loose-jacket	*Citrus aurantium*	*Santara*	86·2	0·9	0·3	0·6	0·4	11·6	0·05	0·02	0·1	53	326	120	0·3	60	68
Apple (all except the core and stalk)	*Malus sylvestrus*	*Seb*	85·2	0·3	0·1	0·3	0·8	13·3	0·01	0·02	1·7	55	0	120	0·3	20	2
Banana, Nendran	*Musa pardisiaca*	*Kela*	61·4	1·3	0·2	0·7	—	36·4	0·01	0·05	0·4	153	0	150	0·3	30	1
Bilimbi	*Averrhoa bilimbi*	*Kamrack*	94·4	0·5	0·3	0·3		5	0·02	0·01	1·2	19	31	90	0·6	40	32
Cape gooseberry (Flesh, skin and seeds)	*Physalis peruviana*	*Rasbhari*	82·9	1·8	0·2	0·8	3·2	11·1	0·01	0·07	2·0	53	2,380	50	0·3	20	49
Cashew fruit	*Annar cardium occidentale*	*Kaju-kaph*	86·3	0·2	0·1	0·2	0·9	11·6	0·01	0·[illegible]	0·2	48	39	20	0·4	50	180
Dates preserved (Persian, seeds rejected)	*Phoenix dactylifera*	*Khajur*	26·1	3·0	[illegible]	1·3	2·1	67·3	0·07	0·08	10·6	283	600	[illegible]	0·8	30	
Durian, ripe	*Durio zibethinus*	—	58·0	2·8	3·9		—	34·1	0·01	0·05	1·0	183	20	—	—	—	—
Figs	*Ficus carice*	*Anjeer*	88·1	1·3	0·2	0·6	2·2	7·6	0·[illegible]	0·03	1·2	37	270	60	0·6	50	5