

PUBLIC HEALTH

IN

INDIA

BY

N. R. DHARMAVIR

F. R. C. S. E., L. R. C. P. E., L. F. P. S. GI., D. P. H. (CANTAB.)

Fellow of the Royal Institute of Public Health; Fellow of the Royal Society of Medicine; Honorary Physician, S. Gulabdevi Tuberculosis Hospital for Women, Lahore; Medical Officer of Health for Padiham, Lancashire (1907—1926); M. O. Maternity & Child Welfare, Padiham (1915—1926); Union M. O. and Pub. Vaccinator, Burnley (1917—1926); and Hon. Consulting Physician, Lady Margaret Hospital Bromley (Kent) until 1926.

LAHORE

RAMA KRISHNA & SONS

1934

All profits accruing to the author from the sale of this book will be divided between the Sh. Gulab Devi Tuberculosis Hospital for Women, Lahore, and other charities.

All Rights Reserved

Printed by Bakhshi Amar Singh, at The Universal Printing Press, Anarkali, Lahore, and published for the author by Messrs. Rama Krishna & Sons, Book-sellers, Anarkali, Lahore.

€)

TO MY WIFE

**Without whose encouragement and active assistance
these pages would not have appeared in print.**

Prefatory Note.

This little volume goes out without the least anxiety as to whatever reception awaits it. It deals with the Public Health conditions of our people as I find them and how I consider they should be. Some of the material has been collected from the articles contributed to local papers and from papers read here and abroad. I have, however, added a good deal of matter relating to the problems of health in order to make the book useful to the general public, social, maternity and child welfare workers nurses, college students and even general medical practitioners.

In spite of the great care, errors and imperfections have crept into the printing and of these I am mindful, for they merely reflect the economic life of our people. In spite of all, I offer my thanks to all the pressmen employed in the little Anarkali press and the publishers who helped to bring this task to completion.—N. R. D.

CONTENTS.

	Page.
Introduction	... 1
PART I.	
HYGIENIC CONDITIONS.	
Chapter I.—Water and Health ✓	... 5
Chapter II.—Cleanliness of Human Food	... 12
Chapter III.—A Plea for Moderation in Eating	... 17
Chapter IV.—Vitamins as Factors in Health	22
Chapter V.—The Common Sense of Fasting ✓	28
Chapter VI.—Human Food	... 33
Chapter VII.—Our Food	... 37
Chapter VIII.—Milk Supply	... 47
Chapter IX.—The Tea and Coffee Habit ✓.	51
Chapter X.—Houses and Health ✓	... 54
Chapter XI.—Clothes and Health ✓	... 59
Chapter XII.—Disposal of Excreta and Refuse	... 66
Chapter XIII.—Household Pests and Animal Parasites	... 76
Chapter XIV.—Exercise and Sleep	... 94
Chapter XV.—The Burning Plains of the Five Rivers	... 101
Chapter XVI.—A Public Health Problem ✓..	107
Chapter XVII.—Simple Measures for the Preservation of Health	... 110

	Page.
Chapter XVIII.—Infant Feeding—I ...	122
Chapter XIX.—Infant Feeding—II ...	128
Chapter XX.—Some Troubles and Diseases of Child Life—I ...	135
Chapter XXI.—Some Troubles and Diseases of Child Life—II ...	140
Chapter XXII.—Troubles and Diseases of Child Life—III ...	150
Chapter XXIII.—Alcohol, Opium, Bhang, To- bacco, etc. ...	155
PART II.	
PREVENTABLE DISEASES.	
Chapter XXIV.—Malarial Fever ...	161
Chapter XXV.—Typhoid Fever and Paraty- phoid Fever ...	167
Chapter XXVI.—Cholera ...	172
Chapter XXVII.—Dysentery ...	182
Chapter XXVIII.—Plague ...	187
Chapter XXIX.—Dengue Fever ...	192
Chapter XXX.—Malta Fever in the Punjab ...	195
Chapter XXXI.—Tuberculosis ...	198
Chapter XXXII.—Dust and Tuberculosis ...	205
Chapter XXXIII.—Abdominal Tuberculosis— A Snake in the Grass ...	212
Chapter XXXIV.—Small-pox ...	217
Chapter XXXV.—Nasal Catarrh ...	224
Chapter XXXVI.—Malnutrition ...	229
Chapter XXXVII.—Pyorrhœa ...	232

	Page.
Chapter XXXVIII.—Rickets and Osteomalacia ...	236
Chapter XXXIX.—Heart Failure ...	243
Chapter XL.—Constipation ...	248
Chapter XLI.—An Undetected Low Fever ...	253
Chapter XLII.—Obesity : Its Prevention and Cure ...	259

PART III

MISCELLANEOUS PAPERS.

Appendix A.—The Sorry Plight of Our Women ...	263
Appendix B.—Mahatmaji's Latest Experiment in Dietary ...	268
Appendix C.—Lahore City—A Death-Trap... ..	273
Appendix D.—Observations on Weather Conditions in Lahore in 1929 ...	282
Appendix E.—Organotherapy—A Panacea ...	286
Appendix F.—Milk—Its Uses and Dangers ...	291
Appendix G (F).—Infant Feeding ...	306
Appendix H (G).—The Hopelessness of Indian Public Health Administration ...	320
Appendix I.—Sanitary Conditions in the Punjab ...	324
Appendix J.—Dalhousie—A Health Resort ...	336
Appendix K.—Food ...	344
Index ...	355
Corrigenda	361

Introduction

Born in a small village of the Punjab, I lived and played in my childhood in rural surroundings, being brought up in one of the poor, but disciplined, middle-class homes where our mothers ground the corn for our food, tended and milked the cow with scrupulous cleanliness, cleaned the house, claywashed the floors, bathed their children, prepared and washed household linen and clothes for the family, cooked the food, and, in short, performed all those hundred and one household duties which only mothers in such circumstances find time to attend to.

As a student I lived until the age of twenty-three in several towns of the Punjab, and I have a vivid recollection of the habits and customs of the people, the daily routine of life, the withering hot winds of June, the fan-less homes and ice-less drinks of summer, the oppressive heat of the monsoon days, the biting cold of winter, and the illnesses from which none escaped.

Circumstances kept me in England for 28½ years of the most active, and perhaps the most useful part of my life. Those years I spent as a medical practitioner, besides being for twenty years a part-time Medical Officer of Health in an Urban District of Lancashire. Keenly interested in Public Health problems, it was but natural that on my

return to India sanitary matters should appear to me in their true perspective.

In Great Britain, Medical Officers of Health are continually busy investigating problems of preventive medicine and putting into practice their far-reaching solutions for the well-being of the people. In India the case is quite different. No attempt appears to have been made to tackle a single problem. No one is safe from the onslaught of epidemics of infectious diseases that were prevalent in the days of my childhood. They are as numerous and as uncontrollable as ever. Insanitation, pollution of water, adulteration of food and milk and the dangerous and annoying pests which invade our homes are still with us. Wretched customs and dirty habits still go unchecked. Medical Officers and Directors of Public Health scarcely know where and how to begin, and it is no wonder that the education of even a medical student in sanitation is well nigh impossible in a province where no sanitation exists.

It appeared to me that hygiene should be taught in schools in all classes, and public interest and sanitary consciousness should be created by propaganda. With this latter aim in view I wrote a number of articles for a journal, purposely omitting scientific and technical matters, or details which require serious study, but trying to present the subjects dealt with in a readable form. It has been my endeavour to awaken the general public to hard and unpleasant facts, and to deal with

simple sanitary problems in such a form as to be easily comprehensible to the lay reader, but as most of the articles were written for a journal, a good deal of repetition has naturally crept in. This, however, is not without advantage, for it is not easy to impress these matters on the lay mind without frequent repetition or the presentation of a subject in various forms.

I have even gone so far as to express opinions which would appear to be unpalatable to my countrymen, or others which are opposed to the current professional views, *e.g.*, on the question of food and drink (the consumption of meat, fish, tea, coffee, etc.), in a climate, the shade temperature of which in some places touches 120 F. These opinions have, however, been formed after lifelong observation and experience, with one governing motive—the advancement of the health and happiness of the people.

In assembling these articles in book form, I have put together such subjects as (1) Water, (2) Food, (3) Drink, (4) Housing, (5) Clothes, (6) Disposal of Excreta, (7) Household Pests, (8) Exercise and Sleep, (9) Climate, (10) Clean and Dirty Habits, (11) Infant Feeding, (12) Troubles and Diseases of Child Life.

These are followed by preventable diseases which include malaria, typhoid fever, dysentery, cholera, plague, tuberculosis, etc. also constipation, pyorrhœa, obesity, heart failure, etc., while those articles which were written on miscellaneous sub-

jects, but are connected in one way or other with sanitary or health matters, form the appendix.

I am keenly conscious that the book, as presented, has numerous defects, and I do not claim that the subjects have been dealt with comprehensively, but if even a few hints are found which may prove serviceable to my readers in the matter of health and well-being, I shall be more than rewarded for my effort.

N. R. DHARMAVIR.

PADIHAM GROVE,
Lahore, May 1934.

PART I
HYGIENIC CONDITIONS
CHAPTER I
WATER AND HEALTH

The various organs of the human body consist among other substances, of from 50⁰/₁₀₀ to 90⁰/₁₀₀ of water, the bones containing almost 50⁰/₁₀₀. Water is thus the principal constituent part of the body. It is in fact its soul, for no body can exist long without it. While a person can live 64 days on water alone, he dies an agonising death within 18 days if both food and water are withheld. Water is required to replenish the fluids of the body and to remove various excretory substances, *e. g.* urine, excreta, perspiration, and respiratory vapour. It is thus evident that a very large intake of water is necessary to keep the system in a condition of well-being.

Our daily food, consisting of vegetables, lentils, grain, milk and its products, fruit, and even meat, eggs, fish, etc. supplies a very large amount of water which is their chief constituent, proteids, fats carbohydrates, salts, etc. being present in a very small quantity. Besides this we daily consume water in its natural state, and it scarcely ever happens that anyone avoids it from choice. In hot weather, especially in the tropics, when in consequence of heavy perspiration a very large amount of water is

removed from the body, nature provides pure water in the form of melons, water-melons, mangoes, cucumbers, grapes, etc., while in other seasons, we have oranges, maltas, sweet lemons, pomegranates, etc. These delicious fruits are nature's gift, providing wholesome water in health and sickness.

Apart from this, water is the best substance for cleaning our bodies and clothes, etc., and wherever human beings have congregated to live, they have seen that ample water is available. A spring, a river, a lake, or a well providing this need would be sufficient to attract them. In India charitably disposed persons build wells for travellers or wherever the lack of wholesome water has been felt.

Rainwater, collected either from roofs or in impounded reservoirs on the hills, is quite soft, or in other words, is free from magnesium and calcium salts which are usually present in spring and well water. Water in fact becomes hard only when rainwater, in percolating through the earth, has dissolved in its passage these salts. The water that is held up by an impervious layer only a few feet from the surface, feeds the shallow wells which are liable to pollution from above by dirt and mud used in cleaning the buckets, or by excretory matter allowed by unscrupulous people to find its way down from the sides through uncemented or worn brick walls on account of the slovenly habit of soiling the surrounding ground with urine, excreta, and other filth and decomposing organic matter. Often enough water sinks to a great depth through some

sandy or other pervious layer sandwiched between two impervious layers and, travelling miles underground, feeds our deep wells and perennial springs. Such wells and springs provide our purest water, as all dangerous organic matter absorbed on the surface becomes innocuous in its passage through sand or other natural filtering media, and often the source is situated on the clean virgin soil of our mountains. Such water, however, may be hard if it comes through chalk, lime or sand stone, etc. Lakes situated away from human habitation, as for instance mountain lakes, contain pure as well as soft water.

Mountain streams and springs should be looked upon with suspicion unless they are well protected from pollution, as they are often infected by human excreta on account of the practice of our people of using spare land near spring or river when attending to the calls of nature. That is why people have dysentery, diarrhoea, or typhoid when staying in hill stations. The picnic parties which are so enjoyable, are unfortunately often responsible for serious consequences, when thirsty children, or even grown-ups drink from any stream that comes in the way, for if one drinks water infected with the micro-organisms of dysentery, diarrhoea or typhoid, one cannot hope to escape every time. During the summer the mountain slopes, especially in the vicinity of streams or springs, are so ill-used by the visitors, who appear to have no consideration for the health or comfort of others, that all pleasure in the beauty of the scenery is ruined by the foul stench which greets the olfactory organ. If excreta or sewage

were properly collected and safely disposed of, there might be no danger, but as matters stand it is never safe to drink water from a stream or spring.

Rivers are clean at their source, but are quickly polluted on the plains by field drainage and decaying excreta etc., by the washings of manured lands, the washing of soiled clothes, and by decomposing dead bodies of children and animals which are thrown in. This water obviously soon becomes unsuitable for drinking or even for washing the mouth. River water is thus not only hard but dirty. It may, however, be remarked that cleansing agencies are continuously at work, *e.g.*, the sun's ultra-violet rays, the oxygen dissolved in the water, and the abundance of minute creatures, *e.g.*, waterfleas, infusoria, microscopic germs, and the fish which live on organic matter, etc.; and dangerous pollution is rendered innocuous more or less rapidly as favourable circumstances occur. It may be easily understood how water can be the medium of the spread of various diseases. Hard water does not cause any serious injury to health, but there are sometimes symptoms of dyspepsia and diarrhoea among those who are not accustomed to drinking it.

Shallow well water, which is usually the worst to drink from a health point of view, is bright, sparkling and very palatable, and ignorant and simple-minded people are lured into using it in preference to water obtained from deep wells or from a reliable source. In India epidemics of Typhoid Fever, Dysentery, Choleraic Diarrhoea and the more serious disease,

Cholera, are every year being caused by polluted water, the excreta of a patient somehow finding its way into the source of the water supply. Polluted water may also carry the eggs or larvæ of worms into the alimentary canal and cause such diseases as round worm, thread worm, tape worm, ankylostoma, filaria, and guinea worm. These worms live in the human body often undetected for years, but making the life of their host miserable. There is yet another disease which is commonly found in the hills, *viz.* goitre, which is often due to drinking bright, cool, and palatable, but polluted, water. Lastly, it is not possible to exclude Tuberculosis. The germ of this disease is almost ubiquitous in India and I have no doubt that in many ways, *e.g.* from dust, from infected sputum, and infected hands or clothes it finds its way into household water and causes abdominal Tuberculosis.

In order to secure good drinking water, wells should be sunk to a considerable depth. A deep well may have to pass through a number of geological strata. It must, in fact, pass through at least one impervious layer after the superficial porous bed, and may not be very deep, but usually layers of clay, sandstone, sand, gravel, oolites, chalk, etc. are encountered and the water-bearing strata as has already been mentioned have their outcrops on the tops of mountains, even near the perpetual snows of the Himalayas. These waters are free from excremental impurity which, even if it existed at the source, is rapidly removed during the long journey through the porous strata. They may, however, be

unfit for drinking purposes on account of containing a large amount of dissolved salts. The walls of the deep well should be properly steined with brickwork set in the cement as far down as the first impermeable layer so that the superficial water and the underground water resting on this earth may not find its way into it.

In India all water should be looked upon as unsafe for drinking purposes until its purity is proved to one's satisfaction, for there is an endless variety of means by which the water supply is polluted. On the one hand there is the gross ignorance and excusable helplessness of our people who continue from time immemorial to pollute their drinking water, and who would rather wash their mouths and clean their utensils with dirty canal water than with the clean pure water in their own houses; while on the other, there is the inexcusable apathy and indifference of Public Health officials in the matter of enforcing suitable laws and regulations for the prevention of pollution, and in helping to provide water which would be above suspicion. Under the circumstances, the safest course to follow, especially when travelling, is either to avoid drinking water by taking some juicy fruit instead, or to sterilise it by chlorinating or even by boiling and cooling if necessary.

Pasteur-Chamberlain or Eerkefeld filters can remove all dangerous bacteria from water, but the water to be filtered should be under pressure. There are also in vogue other filters made of spongy iron, or a

mixture of iron, charcoal and clay, etc., whose pretentious advertisements claim their ability to purify the dirtiest water, but all of these require frequent cleaning in order to be really serviceable.

Our people are an undisciplined crowd inseparably bound to hoary customs, and need to be awakened to the dawn of sanitary science. We are being left behind, whereas other nations march rapidly on. Changes can be seen almost daily in other countries while our own stands motionless and unchanging. The Government has provided lucrative posts, and Public Health Officials are in evidence, but not so their work so far as the provision of a pure water supply for the people is concerned.

CHAPTER II

CLEANLINESS OF HUMAN FOOD

Food as generally taken in India consists of *dals* (lentils, peas, etc.), various green vegetables, wheat, rice, Indian corn, and other cereals, *ghi*, butter, milk, curd, *dahi* (Yoghourt), cheese, fruit, nuts, sweets, flesh food, fish, eggs, etc.

The articles of food such as milk and its derivatives are usually obtained from the shops and no bye-laws exist to regulate the preparation and sale of these foods, or if they do exist they are never enforced for the protection of the public from diseases caused by their impurity or infection. They are found in all civilised countries, where rigid supervision is carried out by officials specially trained and appointed for the purpose. Farms, confectioneries, slaughter-houses, and stalls and shops for the preparation and sale of food are regularly visited, samples are taken and carefully examined, and in case of delinquency, prosecutions are undertaken by the Municipality or the Council.

Many dangerous diseases, *e.g.* Tuberculosis, Cholera, Typhoid, Dysentery and Diarrhoea spread from infected food. As an example take milk. It is probably the best pabulum on which pathogenic organisms live and thrive. Over and over again epidemics of Typhoid fever have been traced to the

milk supply, and as soon as the infected milk supply has been stopped, the epidemic has ceased. All purveyors of milk, cooked foods and sweets, also butchers and fish dealers, should be under the direct supervision of the Health Department, where a register of all the dealers in foodstuffs should be kept with their names, addresses and other necessary particulars relative to their trades. It is the duty of a Health Authority to see that the food in various shops is prepared under the best possible hygienic conditions, and to find suitable means for bringing about gradually the standard of ideal purity in the food supply of the public.

Take the case of milk again. It is liable to be infected with all sorts of pathogenic and other germs. The cow may be unhealthy and affected with Tuberculosis; its udders are usually covered with dung and urine and perhaps other dirt; the milker may have had Typhoid fever or may be suffering from Tuberculosis; his hands may not be clean; the utensils in which the milking process is carried on may be dirty; or the milk may have been adulterated with dirty water. In the West these and many other circumstances obtaining in the routine of the milk supply have been proved to be the cause of epidemics of dangerous diseases. It follows that for the purpose of procuring clean and pure milk, the animal should be healthy, and its udders carefully cleansed; that the milker should be free from infection and his hands washed clean with soap and water; that the utensils used for milking and for storing the milk should be immacu-

ately clean; that the cowshed, or place where the milking is done, should be free from dust and offensive effluvia arising from drains, etc.; and finally, that the milk should be stored in a clean and cool place protected from dust, flies and other insects.

Take next the instance of sweets: the cleanliness of the room where the various articles are prepared, the utensils employed for their preparation and the exposing of them for sale; the cleanliness and health of the workers engaged in their preparation and sale; also the purity of the milk and *ghi*, etc., are as necessary as in the case of the milk supply. Here a further danger arises from dust, flies, and insects when the sweets are exposed for sale and are kept all day uncovered in the shops. The danger from infection from flies, wasps, and other insects, from effluvia from open drains and from dust containing Tubercle bacilli, from dried up sputum and other pathogenic organisms is grave, and this I believe, is one of the reasons why delicious and highly nutritious Indian sweets have not been found in the homes of Europeans, who still continue to consume far inferior and much more expensive European sweets such as chocolates, etc. The latter are produced under ideally sanitary conditions, are sealed in clean wrappers and thus all danger of infection to the consumer is avoided. Flies and insects can be excluded from Indian sweets by the use of gauze cases, and dust by glass cases and the frequent sprinkling of the streets with water.

It appears to me hopeless under the present conditions to procure clean milk, sweets, or food from any of the dealers found in our country. In the City of Lahore, which I have visited after more than a quarter of a century, I find the roads and streets no better looked after than they used to be. They are so thickly smeared over with animal dung, littered with rubbish of all kinds, and covered with a layer of dust, which is continually raised by the traffic, that it is difficult to believe that they are ever swept clean. Open drains containing excreta and decomposing slime still continue to run day and night along each side under the overhanging wooden platforms on which the food materials are exposed for sale: flies, wasps and various insects swarm and deposit on the food the dirt which they pick up from the drains and excreta. This is the condition of the premier city of the Punjab, the seat of the Government and its Legislative Council. Here are the principal Provincial Law Courts, the Punjab University and its educational institutions, great banks, etc. Of course they are situated outside the ancient city. The Municipality has always a capable and fully qualified Medical Officer of Health and his staff of workers. Europeans and others who prize their health and can afford, live outside the city and I wonder if they ever visit it. They realise the dangerous vicinity of the great city only when epidemics of Cholera, Typhoid or Plague appear, and try to escape from their ravages by segregation and inoculations of various kinds.

I have touched here merely the fringe of the sanitary problem concerning the cleanliness of food. I wonder what the Municipalities, their sanitary directors and the various Medical Officers of Health have done during all these years for the protection of the people from the ravages of disease caused by the neglect of the very elementary principles of sanitation. I am amazed at the general apathy and the lack of imagination and sympathy on the part of those who know and understand. Is it not time, in this age of great sanitary advancement, that some rudiments of sanitation should be introduced into the life of this ignorant and poor people, so that some suffering and untimely death may be avoided among men, women and children?

CHAPTER III.

A PLEA FOR MODERATION IN EATING

Over-eating is an almost universal habit all over the world among people who can afford to indulge. It is practised at home, in the club, at public and private dinners, and at most social and political events in all civilised countries. In England people eat at least four times a day. They commence with ham and eggs, bacon or fish, toast, and coffee or tea, for breakfast; then comes midday dinner with beef, mutton or meat pie, peas and potatoes and pudding; for tea there is salmon, cucumber in vinegar, rabbit pie, etc., and tea and bread and butter; supper may be light or heavy according to the purse. This is the diet of working people on festive occasions or on holiday. The middle and upper classes arrange their meals according to their station in life. At the annual gatherings of members of the professional classes or of members of various societies, companies, etc., a dinner will usually cost from 15 sh. to £ 2 or Rs. 10 to 26, with wines and other drinks extra. It is said of some speakers (especially political) that their best speeches are made after a big dinner and plenty of wine. The working people of England can afford these luxuries only on holiday and instead of champagne, they have beer and whisky, but ordinarily they live on bread and butter, cheese, meat, fish.

peas, potatoes, and plenty of tea. It may be said without fear of contradiction that in countries like England people suffer and die from the effects of over-eating but not from starvation. I shall never forget seeing a fat working woman lying unconscious on the road. She was returning from a friend's house or it may have been a funeral after a tea consisting of rabbit-pie salmon, ham and eggs, bread and butter, etc. Her abdomen was tense with gases, but after she had vomited the curious concoction, which smelled strongly of whisky she was well again and ready probably to repeat the performance on her next invitation to tea. Death from starvation in such countries is either due to insanity or to extreme miserliness bordering on insanity, but death from starvation on account of the inability to obtain food, is very rare indeed. Infants may die of starvation after developing extreme malnutrition through ignorant feeding, but with all the child welfare organisations now in existence, even that is becoming rare. In fact in England no one need go without a meal, as the country believes that work and food are the birthright of an Englishman. By her wonderful organisation poor infants and children are given free milk. School children may have at least one square meal during school hours, and in time of distress they are provided with all the meals by the education authorities. Old men and women and widows receive pensions, the unemployed have unemployment benefit, commonly called the "dole" and waifs and strays can feed at the workhouse. Starvation is thus unknown. Over-eating, however, is universal, and yet people

do not know that they over-feed themselves. They are afraid of starvation and believe that excessive eating is necessary in order to strengthen the body. For their comfort the country provides, for the treatment and prevention of disease, all kinds of institutions, hospitals, convalescent homes, sanatoria, etc., and yet the diseases from over-eating *e.g.*, Cancer, Appendicitis, Gall-Stones, Gastric and Duodenal Ulcers, Bright's Disease, Diabetes, Flatulent Dyspepsia, Gastric Dilatation and Colitis. etc., are on the increase and surgeons and physicians are kept busy by the victims.

In India over-feeding is common among a certain class of people. Remarkably seductive food and most delicious sweets are made in order to beguile the palate and it can safely be said that over-eating is a luxury indulged in by all those who can afford and who can digest such things. Purdah women and widows probably escape, because for lack of fresh air and exercise, they are unable to digest such sumptuous meals. As over-feeding is hardly ever found amongst the poor, who form by far the largest proportion of the population of this country, the abovementioned diseases are rare. Those most commonly prevalent in India are starvation or poverty diseases, many of them infectious diseases—too many to enumerate—which have their epidemic and endemic home here : and worm diseases, malnutrition and exhausting fevers, which prevail from one end of the country to the other.

Over-feeding is an insidious practice encouraged

by parents, relatives and friends. It commences in childhood and unconsciously grows until the individual's stomach has become dilated and he never enjoys his food until he has overfilled his stomach. If he tries to diet and to reduce his food by self-denial he finds that a false craving for food begins to torment him and he has to exercise considerable vigilance in order to overcome it. This false appetite quickly passes off and the stomach can be reduced in size and the hankering after food overcome so long as the individual is below 45 or 50 years of age but after this it is, I believe, almost impossible for it to contract, and dilated stomachs acquired in youth continue to trouble the patient more or less. Over-feeding diseases common in middle age, often require surgical medical, electrical, hydropathic or spa treatment, etc., in order to restore some vigour, but the patient is compelled to retrench, for it is impossible to hurt nature with impunity. There is one thing that would be most useful, and that is voluntary starvation or fasting for one or two days a month, according to the circumstances, taking only water or lemon water during the fast. As age advances physical development is at a stand-still and the adipose tissue becomes a superfluous burden causing great strain on heart and lungs and the input of food should therefore be reduced to a minimum. Middle age, however, is the time of life when the consequence of indulgence in youth (whatever direction it may have taken) asserts itself. Many a person either loses his life or is compelled to adjust his living and mend his ways. He is a wiser man for the

experience; but not too soon, for he still has to bear the terrible handicap of one disease or another and life for him is not as pleasant as it might have been.

It behoves parents to exercise great vigilance in the matter of the diet of their children. Just as the baby at the mother's breast smilingly gives up when full or throws up the excess of milk which it has happened to take through the ignorance or inadvertence of the mother, just as an animal (*e.g.*, monkey) discards food, no matter how delicious, as soon as its stomach is full, so should the child grow up to live on simple fare and be assisted to cultivate natural habits. Men and women should exert the utmost control over youthful inclination to over-indulgence so that natural desires may be naturally allayed. This is the best mode of obtaining the maximum pleasure in life, for sooner or later over-indulgence will surely avenge itself by the victim's long suffering, or premature death.

CHAPTER IV.

VITAMINS AS FACTORS IN HEALTH

Vitamins are substances that are found in some of our important articles of diet and are most essential for growth, health, and vitality. Their chemical composition has not yet been worked out. It has been proved by laboratory experiments on animals, by the exigencies of war restricting the use of certain foods, and by clinical experience, that the diminution or absence of these substances is injurious to health, longevity and reproduction, and produces such diseases as Rickets, Polyneuritis, Eye diseases, Lung diseases, Beri-beri, Pellagra, etc., and makes one prone to many infectious diseases.

Few scientific ideas have gained currency with the public with as much rapidity as has the idea of vitamins, and chemists have not been slow in exploiting public credulity by advertising the remarkable methods employed for preserving, introducing and condensing vitamins in their patent products. Babies' and children's foods, convalescents' panaceas, and so-called food tonics now contain the requisite quantity of all the vitamins and are sold at considerably high prices. Physicians too, unfortunately, freely prescribe these articles to their deluded patients, whereas it would be much safer, much more useful, and far more

economical to prescribe a wisely chosen dietary containing an ample and suitable vitamin supply.

It is useful to describe in simple words the vitamins which are found in nature, freely manufactured by the benign rays of the sun for the use of living creatures in the wonderful laboratory of this earth.

Vitamin A is a most remarkable substance, for when food deficient in this vitamin is administered experimentally, it causes widespread weakening of the tissues and of the functions of the various organs. It appears to be not only a constituent of the tissues of the body, but it plays an important role in maintaining the normal conditions and control of the nutrition of the body. Respiratory diseases are very common among animals whose food is deficient in this vitamin. During the war children taking margarine instead of butter suffered from a most distressing eye disease. As deficiency in this vitamin weakens the body in many ways and increases its susceptibility to all sorts of infections as well as to pyorrhœa, it is very probable that this vitamin plays the most important part in the general health and length of life.

Recent investigations have proved that a large quantity of this vitamin can be stored in the liver, and that this reserve store is highly beneficial. It is thus manifest that persons wisely selecting their daily food can store a large amount of reserve which may protect them from all kinds of diseases.

Vitamin A is present in butter, milk, the green leaves of many plants, lettuce, cabbage, tomatoes, etc.

Vitamin B has recently been found to consist of two substances both of which are essential to growth. It has been noticed that the want of one of these constituents produces in human beings a disease called *Beri-beri*, and animals experimentally fed on food deficient in this, develop a similar disease. Investigators have come to the conclusion that the deficiency of the other constituent causes the disease known as *Pellagra*.

This vitamin is found in the germ of rice, wheat and other cereals, also in nuts, cabbage, spinach, etc. Marmite and yeast contain it in a very large quantity. Much of the vitamin of cabbage and spinach is lost in cooking. The polishing of rice also removes this vitamin and machine milling carries away a considerable quantity from wheat. Unpolished rice and hand-milled wheat are thus more suitable from the point of view of the intake of this vitamin.

Vitamin C. In not very far-off times, when sailing ships had to take very long journeys and the storage of fresh fruit and vegetables for food was impossible, the sailors lived on fish, tinned food, dried vegetables, bread, etc. and usually developed a disease called *Scurvy*. It was a most debilitating disease affecting the gums and mouth and was cured by taking lime or lemon juice. Even in these days, when fresh fruit is available

on board ship, passengers are given a slice of lemon with the early morning cup of tea, as a protective measure. It has now been understood that this disease is due to the deficiency of Vitamin C. It is found more or less in all juicy fruits, especially lemon, lime, and orange. It is also found in many vegetables. This vitamin is destroyed by cooking much more easily than any other.

Vitamin D is particularly useful in the growth of bones. Children fed on food which is deficient in this vitamin develop Rickets, that well-known disease which is the cause of bow-legs, knock-knees, defective spine, flat-foot, pigeon-chest, chronic Bronchitis and even Tuberculosis. Children brought up in dark dingy houses and alleys where the sun's rays hardly ever enter, very quickly develop the disease. The ultra-violet rays, which form the normal constituent of the sun's rays, have the power, by absorption, of preventing and curing this disease; and thus it is that ultra-violet rays are artificially prepared and used for the benefit of children in all the up-to-date hospitals of the world. Unfortunately it is not possible to use the sun's rays in the tropics on account of the presence of heat rays, which have a very deleterious effect. Early in the morning, however, when the air is cool, the body can be exposed to the sun's slanting rays with beneficial effect. It is these ultra-violet rays which are, in some inexplicable way, stored in the diatoms and other low forms of marine life on which the cod lives, thus storing

Vitamin D in its liver in a large quantity. For this reason cod liver oil and its various preparations are considerably employed by hospitals and medical practitioners for patients suffering from Rickets, Marasmus, and Tuberculosis. This remedy has certainly a high curative value, but in India, where good milk and butter and green vegetables should be abundantly procurable together with ultra-violet rays, this expensive fish-oil treatment should not be necessary. In fact, in India, as in Japan, Rickets should be non-existent and the prevalence of this disease in the large cities of the Punjab effectively proves that the children's supply of food, fresh air and sunlight is very defective.

Vitamin E has recently been discovered and appears to be essential for reproduction.

Enough has been described to impress the importance of vitamins as essential factors in health, happiness and long life. It must also be understood that, although the intake of a certain quantity of vitamins may prevent the diseases caused by their deficiency, in order to ensure full physical and mental vigour, that quantity must be increased even to 80 times, for it has been proved by carefully conducted experiments on animals, that this quantity is advantageous on account of the ability to store it. Vitamins are abundantly found in milk, cream, butter, cereals, green vegetables, eggs, fruit and nuts; and whatever quantity of vitamins is found in the flesh and organs of animals, is due to the consumption of green grass, fodder and vege-

tables. A child should take a quart of good milk every day and an adult should add at least a pint to his daily diet. Uncooked vegetables, *e.g.*, lettuce, cabbage, radish, cucumber, and carrot should be freely taken and can be made very palatable by the addition of salt, cream and a little lemon juice. Fruit and nuts should also constitute a good part of the dietary.

The cultivators of the Punjab, the Sikhs and Jats, conform very closely to this diet, which together with the fresh air, protects them from the effects of the sun's scorching heat and from those devastating diseases, which destroy our populace in regularly recurring epidemics, or undermine the constitution in various ways.

CHAPTER V.

THE COMMON SENSE OF FASTING

Fasting is an institution which is enjoined on their followers by all the great religions of the world. Hindus are required to fast one or two days in each month, while Mohammedan communities set apart one month of every year during which they abstain from food and drink for the whole day, breaking their fast only at night. Parsis have two days in each month but their fasting consists only in the avoidance of meat, as is also the case with Roman Catholics who fast every Friday. The Chinese, I am told, fast once a year and, like Hindus and Mohammedans, no food or drink passes their lips during the day. This fasting has some spiritual basis with which I am not concerned here. I am mainly interested to see whether it has any significance from the point of view of the health of the individual, and would like to give here the opinions which I have formed from personal observation and experience.

It may be stated at the outset that the medical profession is quite silent on this matter. It has usually been taught that sufficient nutritious food should be taken both in sickness and in health in order to keep the vitality of the body in such a state as to withstand the onslaught of diseases (infectious or otherwise) in the case of healthy persons or to tide over any dangerous period in sickness.

This view is quite correct in principle, but when one has to deal actually with food there are so many mistakes of omission and commission, indulgence and ignorance, that it is almost impossible to act up to the principle laid down by medical science. There is a great variety of opinions about the quality and quantity of food that should be taken either by the healthy or the sick. When I went to England 35 years ago, I was told that in order to keep healthy and well and to escape the rigours of the cold weather one must take meat and wine and when, in the year 1902 in Wales, a friend of mine developed a severe attack of double pneumonia and a consultant was called in to pronounce the prognosis, his view was that there was no possible chance of the patient's recovery because he was a vegetarian and therefore must have a very poor vitality. Needless to say my friend contradicted that opinion by recovering completely.

In the year 1901, the nephew of a personal friend of mine called on his uncle on his way to Germany where he was to be treated for Phthisis from which he was suffering in an early stage. The treatment in those days consisted in keeping the patient in the woods away from city or town. He was required to walk a certain distance and if wet by rain, had to allow the clothes to dry on his back. He was given a weighed quantity of food three or four times a day consisting of milk, butter, eggs, meat, vegetables, etc. He was required to finish everything even if unable to retain it, and after vomiting

had to finish the remainder even though he vomited again, so rigid were the rules of the treatment. Some patients did recover, but many died under this drastic regime, which was devised with the idea that the more nutritive food was eaten and kept down somehow or other, the greater were the prospects of recovery. After about a year's stay in Germany the young fellow in question returned on a month's leave and I saw him on his way home to Durham. He was very fat but the disease was not cured. He dreaded the return to the Sanatorium so his father built him a house outside Durham, but when I saw him again a few months later he was like a skeleton and died soon after.

Later, in 1910, when Sanatorium treatment was becoming common in England, food was still given in large quantities and patients were expected to drink a big tumblerful of milk four times a day with meals in addition to the ordinary food. The son of an Indian friend of mine developed Tuberculosis in England and was treated under this regime in a Sanatorium in Devonshire. He became fat and looked the picture of health when I saw him there a few months later. Unhappily, however, he developed albuminuria and, returning to India, died six months later.

Thus it gradually grew upon observers that the fattening of the body by excessive feeding was not conducive to health, but was rather the means of accumulating toxins in the system and hence detrimental to the recovery of the patient. In India unfortunately overfeeding is still practised in

sickness, especially in cases of Tuberculosis. Food in these cases should be light, simple, and appetising, and the patient should never be forced to take food which he detests.

This, however, is by the way. The reader should distinguish between chronic starvation (which is the lot of millions of our countrymen) and occasional fasting. Chronic starvation undermines the system, saps the vitality of nerve and muscle, debilitates the heart, and weakens the other organs, so that the victim falls an easy prey to any disease which comes his way. Occasional fasting, on the other hand, is practised with the object of improving the health or curing disease. The fasting which is preceded and followed by overeating (as practised by our people in India) is hardly beneficial to health. On the contrary it is likely to cause acute derangement of the alimentary system and may even disturb the lungs and kidneys, etc. To my mind complete fasting, *viz.*, the avoidance of all food and drink for more than a day or two would prove actually injurious, but a fast in which water, or better still lemon water, is allowed can be kept up for two or even three weeks with benefit in the case of certain diseases. I myself have fasted for 72 hours with much benefit. The first and second day I took lemon water and the 3rd day simply hot water. My experience with lemon water was very good, but the hot water was not so agreeable. I walked nine or ten miles a day on the first two days and otherwise did all my work without any discomfort. In order to reduce his high blood pressure a friend of mine fasted for

more than a fortnight and another did the same for Bright's disease, the former with considerable benefit to his health and the latter with the result that for four or five years she has been, I hear, in very good health.

Thus, fasting appears to be a good natural remedy for such ills as acute Nasal Catarrh, and Bronchial Catarrh; abdominal troubles caused by over-eating or irregular eating or the taking of indigestible food, drugs, stimulants, etc., *e.g.* Gastric Catarrh, Gastritis, Indigestion, Dyspepsia, Congestion of the liver, acute attack of Piles; Kidney disease, diseases of the blood vessels caused by high living, *e.g.*, high blood pressure, etc.; and constitutional diseases, *e.g.*, Gout, and some kinds of Rheumatism.

The ancients seemed to know the benefits of fasting and wisely introduced its practice into the religious life of the people. There is a great field for those practising the ancient systems of medicine among our people if they only realise the importance of fasting in many diseases, such as I have enumerated above. One should, however, bear in mind the fact that voluntary fasting is only beneficial for the ailments of the well-fed, not for the millions of our starving and famine-stricken countrymen who are doomed to a continual fast inasmuch as they never have a full meal to the end of their days. Fasting, carefully and judiciously carried out, would, I have no doubt, prove a boon to many sufferers and a sovereign remedy in many ailments.

CHAPTER VI.

HUMAN FOOD

For the millions of our poor, starving countrymen one feels sad and helpless, and it is fortunate that this article is not likely to reach their eyes or ears, for of what use is it to point out to them the effect of one diet, or another in relation to health and longevity? For the benefit of those who can afford to choose their diet, however, it may be useful to discuss the merits of a vegetarian diet as opposed to a meat regime.

When I was a student, medical teaching was all in favour of a meat or mixed diet. We were told that the meat diet was physiologically and scientifically a correct diet, that it provided all the principal elements in the best form, was easily digested and assimilated, provided greater energy to the body and suitable material for the development of brain and nerves, and was non-irritating and free from indigestible and bulky cellulose. Vegetarian food, on the other hand, must be taken in a much larger quantity for the same amount of nutrition and energy provided by the mixed diet. It caused Flatulence, Dilated Stomach, Indigestion, Appendicitis, Gastric Ulcers, and other diseases, such as Dysentery, Diarrhoea and even Cholera. The vegetarian diet was also considered poor for brain development.

Slowly and steadily the meat diet cast a

in milk, their stock being confined to goats. They are, however, great fruit-eaters, especially of apricots and mulberries. They use apricots and mulberries in both the fresh and the dry state, drying sufficient of their rich harvest of them for use throughout the autumn and winter months. Dried mulberries are mixed with their whole-meal flour and made into cakes which form their staple article of diet. Meat is a luxury used only on special occasions. These people are unsurpassed by any Indian race in perfection of physique; they are long lived, vigorous in youth and age, capable of great endurance and enjoy a remarkable freedom from disease in general. To see a man of this race throw off his scanty garments and plunge into a glacier-fed river in the middle of winter is to realize that enforced restriction to the unsophisticated foods of Nature provided these be of the right kind is no bar to the attainment of perfection of physique."

It is clear from these quotations that meat is not at all a necessity for the development of great physique, physical strength and endurance. Besides this, men and women are found in various European countries, in America, and in India, who, though vegetarian, are intellectual giants, great thinkers, and social reformers. George Bernard Shaw, John Wesley, Edward Carpenter, Mrs. Besant, Isaac Newton, Swami Dayanand and Mahatma Gandhi are only a few well-known names.

I do not wish to dilate on the various diseases

found in animals fed for slaughter and in increasing quantity after, sometimes causing ptomaine poisoning, (that dread of all meat eaters)—whereas clean vegetables, fruit, nuts and milk provide the most wholesome food in which no toxins exist.

Though vegetarianism, in the sense in which it exists in India, has not made great strides in the West, vegetables and fruit are being eaten more, and milk, which was at one time ousted from the dietary of the British working man, is being gradually reintroduced. Thirty years ago it was impossible to get pure vegetarian food outside a dozen or two vegetarian restaurants in Great Britain; in Scotland there was only one such and that was in Glasgow. Two or three vegetarian restaurants existed in London, but (with the exception of Manchester) the number in the provincial towns could be counted on the fingers of one hand. To the credit of Manchester be it said that the city has a Unitarian Church—probably a century old—the members of which are actually pledged to a vegetarian diet, and a number of vegetarian restaurants have existed there at one time or another. Now, however, vegetarian diet can be obtained in almost any restaurant in London and most of the first-class restaurants in the provinces.

Dietary is thus occupying more and more the attention of scientific men, and though it is true that even enlightenment and intellectual progress kill prejudices in eating and drinking very slowly, progressive ideas are percolating comparatively rapidly

among the people of the West. The following note in the *New York Nation* just to hand clearly shows the trend of western thought in this matter :

"A Nation of Lettuce Eaters! To this have the descendants of the frontier fallen; from bear meat to lettuce; from venison dried in the sun to a plant little higher in the scale of eternal values than the grass of the fields. These reflections are caused by the despairing cries from the packers, who claim that salads have nearly driven roast beef off the American dinner table, and who estimate that the annual consumption of meat is 45 per cent. less than it was ten years ago, while that of salad has increased 110 per cent. . . . Thus at the same time that the consumption of lettuce has increased that of pastry, white bread, and potatoes is said to have fallen off 25, 20 and 15 per cent. respectively. Nevertheless, examination of the changes in our national diet shows an advance in the direction of sensible eating. We eat more fruit and fresh vegetables, more whole-wheat bread, more cereals, more poultry and eggs, we drink more milk."

It is time that doctors, professors, leaders of thought, and other educated people set about to revise their ideas on what constitutes a clean, wholesome and salubrious diet.

CHAPTER VII.

OUR FOOD

The physique, health and well-being of an individual depends upon many circumstances. In the first place heredity plays a very important part. The offspring of weakly parents are naturally weak in constitution. If a parent suffers from some constitutional disease, such as rheumatism, the children often develop the disease in one form or another during some part of their lives. A parent suffering from Chronic Bronchitis imparts some weakness of the chest and lungs to the offspring. Similarly, if the parents are strong and well-developed and long lived, the children inherit a strong constitution with an inherent tendency to long and healthy life. This hereditary constitution may, however, be modified by various circumstances encountered during a lifetime, *e. g.*, food, atmospheric conditions, and soil. Some constitutions will not stand cold, while others cannot bear heat. Some people develop rheumatic pains and neuralgia if they happen to live on damp soil. In the district of Gurdaspur, Kangra, etc. the soil is polluted in the villages by the eggs of certain parasites. These eggs develop into larvæ which enter through the naked feet finally working their way into the intestines and sucking the blood until they make their victim pale, anæmic, and almost lifeless. These worms discharge millions of eggs in the stools of the

patient which continue to pollute the villages and infect others. Thus, it may be seen that even people born with good constitutions may have them ruined by unsuitable circumstances, while those inheriting weak constitutions may develop strong ones through favourable conditions of life.

The condition, however, which plays by far the most important part is the food we eat. The importance of food lies in this, that it alone builds the constitution. The organs gradually grow, the brain develops, the muscles grow in size, the bones enlarge and form the framework of the body, supporting the various organs of the body and preserving them from outward injury while being used in all its different movements. Unsuitable food may cause such diseases in the bones that they break on very slight jars, or it may cause stone in the liver and kidneys, and other organs may also be affected. It is therefore with the subject of diet that I wish to deal, a subject the study of which has only recently been seriously taken up by the Medical profession. In my Annual Report for the year 1924 on the health and sanitary condition of the district (in England) for which I was Medical Officer of Health, I wrote:—"Of even greater importance, however, is the subject of the food we eat. Medical men have been more concerned in the consideration of food in sickness than in health, and medical students in the colleges and universities are engaged in the study of disease and its treatment and have little time for the study of a diet which

would preserve health. Such diseases as Gastric Ulcer, Duodenal Ulcer, Gall-stones, Renal stones, and many catarrhal and inflammatory conditions of the Gastro-Intestinal Tract, are evidently of dietetic origin and could be classified as preventable if more attention had been paid to the investigation of food in health. The public is left to the vagaries of the culinary art, and tastes are cultivated for all sorts of injurious articles. Constipation, with all its deleterious consequences, is the rule, and purgatives are taken daily in practically every household in the country."

As in England, so in other parts of the world, certain foods have acquired the dignity of a national diet. People develop a taste for the particular kind of diet common in the country to which they belong, having grown accustomed to it from childhood, and this makes it difficult for scientific men to pass impartial judgment on the value of their food and drink. To take only one example, such men as McCollum and Simmonds in their book "Newer Knowledge of Nutrition" speaking of arguments advanced in favour of a vegetarian diet, are led to say "Some of the arguments offered in sober earnestness in support of abstinence from flesh foods are suggestive of mental invalidism." and yet further these same authors say, "the more valid arguments concerning the use of meat as contrasted with the fleshless dietary regimen are based upon the view that meat is unwholesome and that it contains waste products having

poisonous properties which tend to damage the tissues. This view is upheld by experimental results. Professor Fisher (1907) of Yale conducted experiments with flesh abstainers and flesh eaters, and found the former possessed of greater endurance than the latter. The tests involved holding the arms outstretched, knee bending and other exercises. The flesh abstainers were three to six times as capable of endurance as were the flesh eaters. Similar results have been reported by Kellogg (1907 and 1909).²⁷ Such is the force of habit and custom that these arguments in favour of a vegetarian dietary have no effect on the views and opinions of these learned American authors: I must, however, leave them there and go on to deal with the two kinds of diet which are the most common in India, *vis.*, the vegetarian diet consisting of milk, curd, butter, fruit, nuts and vegetables; and the meat diet, which includes, besides the foregoing substances, the flesh of animals, *e.g.*, bacon, beef, mutton, goat, fish, fowl, etc.

By the end of the last century there arose in India some thinking men who considered meat-eating essential, not only for the proper development of the body and health, but also for the development of self-respect, self-sacrifice, and heroism among the people. These individuals commenced not only to eat meat, but carried on also a vigorous propaganda among Hindus. Christians and Mohammedans were already meat-

eaters, but Hindus as a class were chiefly vegetarians, especially the Brahmins, Jains, Banias, etc. Mohammedans took meat according to their means, the very poor indulging only on rare occasions, while among the more recent religious bodies, the Sikhs were mainly agricultural people and meat did not form part of their daily diet. They lived mostly on milk, butter, ghi, curd, buttermilk, vegetables, raw and cooked cereals, and a very little fruit. In the early years of this century the Brahmos were considered the most advanced sect of people who tried to break loose from all Hindu superstitions. They, at least in the Punjab, considered that meat-eating was synonymous with physical, social, intellectual and political development, though the question of dietary did not enter into their religious beliefs. The Arya Samaj, among the recent reform societies, was probably the only religious society whose founder, Dayanand, wrote "Gokaruna Nidhi" and actually condemned meat-eating. He himself was a life vegetarian and in physical, intellectual and spiritual development, was a unique personality. It is not surprising that, in the last quarter of the nineteenth century, the advocates of a meat dietary introduced the subject into the Arya Samaj with such force that two irreconcilable factions arose, dividing the Society chiefly on the basis of diet.

As time has passed, meat eating has made great strides in our country. Those of our countrymen who happen to go to Europe for study, business or pleasure, find it quite convenient to act on the

proverbial injunction "When in Rome do as the Romans do". Beef, pork, ham, mutton, fish, etc., form the major part of their daily food and most of them return home confirmed meat-eaters. One seldom comes across well-to-do, educated men and women who abstain from a flesh diet. Only very recently two young Doctors, fresh from our local Medical College, told me that people would be far stronger and healthier if they would take meat, forgetting unfortunately that it is only a small proportion of wealthy people who can afford such luxuries, while millions can with difficulty provide themselves with one decent meal of anything, let alone meat.

The doctors of to-day prescribe indiscriminately to unwary patients various products (the number of which is legion) of the organs of animals. European firms sell to the gullible public their proprietary foods containing the organs and even the blood of animals, deliberately deceiving them by suppressing the names of these contents. Thus it is no exaggeration to say that in India among well-to-do people, meat forms the major part of their daily food in health as well as in disease.

I do not, however, think this great increase in meat eating is due to religious or intellectual conviction. It is in fact due to Western travel, Western education and Western ideas and association. In the West too, old customs and habits and hereditary tastes constitute the *raison d'être* for this dietary (also the prevalence of alcoholic drink

and smoking) and not any scientific reasoning. There, as a matter of fact, it is the more thoughtful, intellectual people who are turning towards vegetarianism.

I do not propose to discuss the merits or demerits of one kind of diet or the other, but will quote here from the writings of a great diet expert who has been engaged for many years in research work on the dietary of Indian people. I refer to Lt.-Col. Robert McCarrison, C.I.E., M.D., D.Sc., LL.D., F.R.C.P., I.M.S., who says with reference to the Sikhs and the people of Hunza:—
“The high degree of physical efficiency of the Sikhs is attained on a diet of wholemeal bread, legume seeds, tubers and roots, vegetables, and clarified butter, supplemented with liberal amounts of cow’s, buffalo’s or goat’s milk (whole milk, butter-milk and curds). Beef is never eaten by them, but goat’s flesh, mutton and game are eaten occasionally, although not in large quantities. In Sikh regiments, for instance, a pound of meat is eaten by each man two or three times a month, while 16 ozs. of milk are taken daily. In their own homes much larger quantities of milk are used than is possible in regimental life. It is to be noted that milk and milk products are constant constituents of their food, other animal foods being regarded more as a luxury than as a necessity.”

The people of Hunza make less use of meat than either the Sikhs or the Pathans. Their food is much the same as that of the Sikhs but less rich

in milk, their stock being confined to goats. They are, however, great fruit-eaters, especially of apricots and mulberries. They use apricots and mulberries in both the fresh and the dry state, drying sufficient of their rich harvest of them for use throughout the autumn and winter months. Dried mulberries are mixed with their whole-meal flour and made into cakes which form their staple article of diet. Meat is a luxury used only on special occasions. These people are unsurpassed by any Indian race in perfection of physique; they are long lived, vigorous in youth and age, capable of great endurance and enjoy a remarkable freedom from disease in general. To see a man of this race throw off his scanty garments and plunge into a glacier-fed river in the middle of winter is to realize that enforced restriction to the unsophisticated foods of Nature provided these be of the right kind is no bar to the attainment of perfection of physique."

It is clear from these quotations that meat is not at all a necessity for the development of great physique, physical strength and endurance. Besides this, men and women are found in various European countries, in America, and in India, who though vegetarian, are intellectual giants, great thinkers, and social reformers. George Bernard Shaw, John Wesley, Edward Carpenter, Mrs. Besant, Isaac Newton, Swami Dayanand and Mahatma Gandhi are only a few well-known names.

I do not wish to dilate on the various diseases

which are caused by the excessive use of meat, nor would I put forward any further arguments in favour of a vegetarian diet. Milk is the natural diet of infants, on which alone they thrive for the first year or two. Milk again is probably the one single diet which is beneficial in most diseases. Milk and its products with the addition of cereals, vegetables, fruit, and nuts, contains all the nourishment requisite for development, health and longevity. This is the diet which can easily be produced in this great agricultural country. It would, however, be necessary to devote our attention to the proper feeding, housing, breeding and general care of our cattle, *viz.*, cows and buffaloes and to the production of suitable fruits and nuts. British cows yield as much as 100 maunds of milk and 4 maunds of butter in a year. In India cows and buffaloes can be bred to yield a similarly large amount of milk and butter, and the latter animal even a larger quantity of milk. This land under proper organisation can be made to yield milk, ghi, butter, fruit, nuts, and vegetables in a larger quantity than is sufficient to feed the whole nation and give health and strength into the bargain. As it is, however, the animals are slaughtered, the nation loses the milk, and the land is impoverished for lack of manure. No attention is paid to the scientific feeding and breeding of cattle and, therefore, the milk is less in quantity and poorer in quality. Similarly, fruit is indifferently grown and its use is not encouraged, so that almonds, dates, walnuts, raisins, coconuts,

pine kernels, etc., which would provide a large quantity of nourishment, are seldom taken as food.

Unfortunately in this topsy-turvy land of ours neither the nation nor the Government has time to think of this elementary problem of a suitable diet for the people of the country. When Great Britain was in the throes of war and could not procure sufficient beef and other meat, she began, out of sheer necessity, to make propaganda in favour of vegetarian food and actually broadcast vegetarian menus for the use of housewives. Restaurants began to supply vegetarian meals, but alas, superstitions and injurious customs and habits die hard and allow of no scientific interference, and the British have returned to the old carnivorous regime. In India necessity is always present. It is an agricultural land, its cattle can give wholesome milk, provide manure and till the land for the growing of fodder for the cattle and food for the people.

Let our people think over this great problem in true unbiassed spirit and I have no doubt they will come to the same conclusion as I have, *viz.*, that milk, nuts, fruit, cereals, green vegetables, tubers, etc., are all that are necessary for human food, and the slaughter of animals for this purpose is a relic of barbarism which is beset with dire injury to our country.

CHAPTER VIII.

MILK SUPPLY

In Lahore 6 seers of milk can be had for one rupee ($1\frac{1}{2}$ quarts for 6d.). This milk is dirty and poor in quality and liable to prove dangerous to health. As delivered it may be adulterated with dirty water and may thus be deficient in cream, etc. It may also contain cow-dung, hairs, flies, mosquitoes, wasps, etc., and all sorts of dangerous pathogenic organisms which transmit such diseases as Typhoid, Dysentery, Diarrhoea and Tuberculosis.

The Government, probably at some loss, conducts dairies for the sale of milk, butter and cream at various stations where British Officers (civilian and military) and British soldiers live, and thus provide milk for their benefit. In Lahore the Government Dairy milk is sold in closed bottles at 5 annas per seer (about $6\frac{1}{2}$ d. per quart) and at 6 annas per seer (about 8d. a quart). Thus, at a little extra cost reliable, pure, and wholesome milk can be obtained without the slightest inconvenience. This milk is a boon wherever procurable and its sale should be encouraged. In addition to officials and soldiers the local British residents are served with it, and Indians who know the benefits of pure milk, and can afford to pay for it, incidentally take advantage of these excellent Government ventures of such importance to public health. The majority of wealthy Indians,

however, look askance at these dairies and consider them badly-conducted financial failures, without any compensating advantage. One gentleman told me that the Government dairy milk is watered and its cream removed for sale, besides its being expensive. I tried to reason with him, but it was useless. It is true that separated milk is mixed with buffalo's milk in order to increase its cream value, but it is sold separately and cheaply as such and is a very useful article of diet for those who cannot afford to buy pure cow's milk. It is impossible, however, to attempt to reason with people who do not understand the advantages of reliable and wholesome milk, produced in accordance with principles of hygiene.

In order to procure pure and wholesome milk one should see that the animal is in good health, and particular attention should be given to the lungs and udders in order to be sure that they are free from Tuberculosis. The cow should be fed on good food and kept in a clean, well-ventilated shippon, or in open clean air. The shippon, or the place where the milking is done, should be kept clean, its atmosphere free from dust, flies and mosquitoes, etc. The animal's udders, the surrounding parts and hindquarters should be free from dung and dirt, and to ensure this they should be washed with soap and water and then dried with a clean cloth. The tail of the animal should be tied up so as to avoid the scattering of dirt by its waving about. The milking utensils should be so made that the interior

may be properly cleaned and there should be no danger of the accumulation of dirt in any corner or angle. They should be well washed with hot water and cleansing material and kept covered until required for milking purposes. Lastly, the milker should be free from any infectious disease. If he is suffering from Pulmonary Tuberculosis (Phthisis) he may easily infect the milk during a fit of coughing. If he has had Diarrhœa, Dysentery, Cholera, or Typhoid and is a carrier of their germs, he may by his dirty hands, infect the milk with dangerous germs and spread the disease in the household or, if he is a purveyor of milk, among his customers. It is thus essential that the milk should be above any suspicion of harbouring dangerous germs. The milker should wash his hands with soap and water, and the milk should be sieved through a sterilised sieve or strained through a clean cloth so that any hairs which have found their way in, may be removed. If the milk is required unboiled, it should be kept covered in a cool place, and in summer on ice. If the milk is sent out for sale, it should be sold in clean bottles with suitable sterilised covers.

In this way do the Military dairies produce milk for their customers. Their cows and buffaloes are well-fed, well-housed and well-groomed, their utensils are properly cleaned and the milk kept in a clean and cool place. Their milkers are examined by the Medical Officer whose duty it is to see that no milker is employed who may infect the milk with disease of any kind.

however, look askance at these dairies and consider them badly-conducted financial failures, without any compensating advantage. One gentleman told me that the Government dairy milk is watered and its cream removed for sale, besides its being expensive. I tried to reason with him, but it was useless. It is true that separated milk is mixed with buffalo's milk in order to increase its cream value, but it is sold separately and cheaply as such and is a very useful article of diet for those who cannot afford to buy pure cow's milk. It is impossible, however, to attempt to reason with people who do not understand the advantages of reliable and wholesome milk, produced in accordance with principles of hygiene.

In order to procure pure and wholesome milk one should see that the animal is in good health, and particular attention should be given to the lungs and udders in order to be sure that they are free from Tuberculosis. The cow should be fed on good food and kept in a clean, well-ventilated shippon, or in open clean air. The shippon, or the place where the milking is done, should be kept clean, its atmosphere free from dust, flies and mosquitoes, etc. The animal's udders, the surrounding parts and hindquarters should be free from dung and dirt, and to ensure this they should be washed with soap and water and then dried with a clean cloth. The tail of the animal should be tied up so as to avoid the scattering of dirt by its waving about. The milking utensils should be so made that the interior

may be properly cleaned and there should be no danger of the accumulation of dirt in any corner or angle. They should be well washed with hot water and cleansing material and kept covered until required for milking purposes. Lastly, the milker should be free from any infectious disease. If he is suffering from Pulmonary Tuberculosis (Phthisis) he may easily infect the milk during a fit of coughing. If he has had Diarrhœa, Dysentery, Cholera, or Typhoid and is a carrier of their germs, he may by his dirty hands, infect the milk with dangerous germs and spread the disease in the household or, if he is a purveyor of milk, among his customers. It is thus essential that the milk should be above any suspicion of harbouring dangerous germs. The milker should wash his hands with soap and water, and the milk should be sieved through a sterilised sieve or strained through a clean cloth so that any hairs which have found their way in, may be removed. If the milk is required unboiled, it should be kept covered in a cool place, and in summer on ice. If the milk is sent out for sale, it should be sold in clean bottles with suitable sterilised covers.

In this way do the Military dairies produce milk for their customers. Their cows and buffaloes are well-fed, well-housed and well-groomed, their utensils are properly cleaned and the milk kept in a clean and cool place. Their milkers are examined by the Medical Officer whose duty it is to see that no milker is employed who may infect the milk with disease of any kind.

Separated, or even diluted milk, if hygienically clean, is good and wholesome, whereas undiluted but dirty milk is dangerous. It is well to recognise that insects and visible dirt can be removed by straining or sieving, but they leave behind them the soluble dirt and pathogenic germs which in a suitable temperature multiply and propagate their species in enormous numbers in a very short time. The discovery of these germs is a most remarkable triumph of modern science, and sanitary science has made great progress in the prevention of sickness and disease among the people who utilise its resources. The production of clean milk is one of the achievements of this science. Clean and wholesome milk is conspicuously absent in the bazars on account of the want of proper control and vigilance on the part of the Sanitary Authorities.

CHAPTER IX

THE TEA AND COFFEE HABIT

A quarter of a century ago the drinking of tea or coffee in the Punjab was confined to a few educated people and the student occasionally took it for the purpose of removing drowsiness at night. Now the practice is very common. In fashionable society, tea parties are the rule and tea is quite a regular meal.

In other parts of India tea drinking has, I think, been common for a very long time even among the poorer classes. This may be true or not, but the fact remains that this habit of tea and coffee drinking is on the increase. It is useful to enquire whether the habit is good or detrimental to health.

Tea and coffee contain an active principle called caffeine and one strong cup of either tea or coffee contains about the same quantity of caffeine. In addition to caffeine, tea also contains tannin and theobromine, and coffee contains a small quantity of fat and chlorogenic acid.

Caffeine is the most important ingredient. It stimulates the heart and removes drowsiness, the mind is clearer and more alert and fatigue is delayed. It also acts on the kidneys as a diuretic.

For an after-dinner speech or during physical or mental exhaustion a cup of tea or coffee may be a stimulating and exhilarating beverage. In certain heart cases with swelling of the legs it provides a useful remedy. When taken in excess it causes insomnia, restlessness, excitability, nervous tremors, headache, etc.

Caffeine very rapidly appears in the infusion of tea-leaves, but the quantity of tannin varies with the time allowed for infusion, and the second cup usually contains a much larger quantity of tannin and a negligible quantity of caffeine. A regular use of tannin causes dyspepsia, due to reduction of the digestive ferment; it also causes constipation. A hot cup of tea in the morning is erroneously regarded as a laxative. This effect is due to increased peristalsis caused by a hot fluid. A cup of hot water would, therefore, be a more useful substitute. Taken with a meal the deleterious effect of tannin is greatly reduced. The fat and the acid found in coffee are liable to cause hyperacidity if coffee is taken regularly.

It is thus apparent, that tea and coffee have no food value. They are merely a luxury and give to life a few moments of pleasure. They may be useful occasionally to remove fatigue and sleepiness but at the other end of the scale, their ill-effects are many and varied when taken in excess, and in the tea or coffee habit it is sometimes just as impossible for the consumer to gauge when the limit has been reached as in the alcoholic habit. Constipation,

Dyspepsia, Anæmia, Neuritis, itching of the skin nervousness, insomnia and many others are the injurious effects which make the life miserable.

Any but an occasional or medicinal use of tea and coffee should be deprecated, and young persons should absolutely avoid these beverages.

CHAPTER X

HOUSES AND HEALTH

The fundamental reason for living in houses is the desire to protect ourselves, from the rigours of climate and the direful effect of the changeability of the weather and other manifestations of nature that have an unwholesome effect on the frail human body and its social well-being, and disturb the daily routine of existence. The range of shade atmospheric temperature from below zero to 120°F., from cold to hot weather, its daily variations between day and night, the presence or absence of atmospheric humidity, the fall of rain, snow and hail, dust-storms, monsoons, and gales, all tend to disturb our physiological mechanism and cause great inconvenience and discomfort and even injury to health. The building of houses thus becomes a necessity for harmonious existence.

Houses are built in all countries and climes, in all kinds of styles and materials suitable to the requirements engendered by numerous circumstances and considerations including among other things, habits, customs, degrees of civilisation, religion, etc. But for comfort, health and the enjoyment of life, it is necessary to provide houses which permit of a maximum amount of sunshine and air consistent with other needs of our existence, which are cool in summer and warm in winter, and which provide protection, from the troubles and vagaries of nature.

Houses should be well-ventilated, airy and well-lit. Floors and walls should be dry, and the drainage should be carefully planned so that all the slop water and other waste matter flows away from the house and is disposed of without causing any nuisance or injury to health. The injunction in the Bible—"Build thy house upon the rock"—is truly scientific, for the house built on rock is salubrious, being easily drained, easily cleaned, dry and healthy. Sandy soil is also wholesome where the subsoil water keeps fairly low. A house built on "made" soil, which has been a dumping ground for refuse, etc., is obviously injurious as it would admit foul air into the house. Clayey soil is cold and holds a considerable amount of water in its sticky mass. It is impossible to prevent damp walls and floors without first laying a damp-proof course just above the level of the soil. Damp-proof courses are made of all kinds of material, *e. g.* coal tar, concrete, glass, metal, etc., and prevent the damp from passing through and rising beyond its surface. Thick cement makes good dry flooring. A floor made of wood is also very good if it is sufficiently raised from the ground and well ventilated underneath. Incidentally I may remark that wooden floors should always be employed in winter camping. They are dry and can be kept clean and provide immunity from insects, reptiles, etc. Bricks, unless made waterproof by glazing, are porous and unsuitable for flooring purposes. Chaff, straw, etc., though drier and cleaner than bare earth, are very unsuitable for winter camping.

Houses built on unsuitable soil without regard to the ordinary principles of sanitation are unhealthy. Some houses are believed to be haunted because their inmates are always ailing from one disease or another; others have been called "cancer houses" because many of the inmates for several generations have died from cancer or malignant disease. Similarly there are houses where tuberculosis has flourished for generations, while rheumatism, bronchitis, asthma and similar ailments have prevailed in others. I well remember the case, over thirty years ago, of a young woman who suffered from bronchitis and asthma which, in spite of all attention and medical treatment, made her life miserable and herself quite elderly in appearance. On careful inquiry and investigation, I came to the conclusion that the house in which she lived was insanitary from various points of view, and damp besides, being built on clayey soil without any provision for preventing the damp from rising. I advised her to remove to a better locality and a more modern house situated on a higher level. This she did and I remained in touch with her for two or three years during which time her asthma and bronchitis ceased and she became a young woman again. Coincidence and other circumstances no doubt lend colour to wild and exaggerated stories of ill-health, premature death and haunted abodes. Nevertheless the fact remains, that a house built without proper regard to ventilation, lighting, drainage, suitability of soil, situation, aspect, etc., is undoubtedly a source not only of a considerable amount of discomfort, but

actual ill-health and suffering. Old-fashioned courtyards, walled in all round, and the underground cellars which are found in old houses, admit neither free ventilation nor sunshine. The living rooms also suffer more or less from the same defect. The drains are built square of uneven surface and unsuitable gradient. Even the newly built areas of the city of Lahore suffer from these defective drains and food refuse, slop water, excreta, etc., are deposited in the interstices, and corners, and on the surface, liquefying into bluish offensive matter which percolates into the walls and floors, while the stinking effluvia penetrates even into the houses.

Every house should be screened with wire-netting, and all ingress to flies, mosquitoes and other winged insects thus completely controlled. The screened doors and windows should not be kept open for any prolonged period, as this would certainly defeat the object for which the wire-netting is used.

Free circulation of air around the house is necessary for the purpose of keeping the air inside fresh and sweet, and for this purpose the practice of building houses on the top of each other, cramped up in a small space, should be condemned. In such houses moist, expired air accumulates in the rooms and alleys, and the houses ventilate their stuffy atmosphere into each other. For the greater part of the year the sun hardly ever pierces into their dark corners and the floors and walls remain damp, adding further moisture to the enclosed air. Winds and storms do not disturb the still air of such congested areas, and offensive drains add still further to their

unwholesomeness. Disease is thus rampant in these localities, and the death rate is remarkably high. For external ventilation therefore, there should be open spaces, around all or part of the house. A broad road or street in front and a small garden or backyard at the back, instead of a courtyard in the centre, or behind, enclosed by high walls, would provide sunshine in the house and a free circulation of fresh air around. Without the provision of the latter, there cannot be proper ventilation of the interior of a house. Thus a garden or an open space about a house has a very salubrious effect on the inmates, for it not only provides free movement in the fresh air, but also the free ventilation of the house.

Bathrooms should be so built that their floors and walls can be washed with disinfectant and kept dry and clean. There should moreover be no accumulation of water or dust, and for this purpose, smooth cement or glazed tiles are the most suitable material.

It is remarkable how even wealthy people build their houses without any regard for sanitary principles, and without providing proper ventilation, lighting, and drainage, and often enough in the midst of a congested slum area.

It will be a happy day for India when our economic conditions are so improved that we are able to live in sanitary houses, as the people of Great Britain and other European countries do, and when, like those countries, we are able to reduce very considerably our miseries, sickness, infectious disease and death rate.

CHAPTER XI

CLOTHES AND HEALTH

Clothes are worn for three reasons (1) for appearance, (2) for comfort, and (3) for health. Appearance and comfort more or less go together, but health is scarcely ever taken into consideration. With the question of appearance is intimately connected the matter of national costume. In India there is no real national costume, for the costume varies with the province, religion and race. It is probably to the credit of the Punjab that it rejoices in a jumble of innumerable fashions and styles of costume. Take first the head-dress, the turban may be of various colours, various lengths, various methods of winding, with or without streamers, and with or without an under-turban or foundation. As to caps there are Christy caps, Gandhi caps, the fez, and other caps of various styles, shapes and materials. The great variety in dressing this part of the body is bewildering, and one hardly knows where to look for a national head-dress. Likewise the rest of the body is clothed in great variations of fashion. The trousers may be tight, of medium width, or almost as wide as long with innumerable artistic folds. Or, instead of trousers, we may wear either a *dhoti* or a *tahmat*, a straight piece of cloth, of various colours, worn skirtwise. In footwear too there are innumerable varieties for those who

can afford any at all. Altogether there is a beautiful freedom and lack of constraint in the mixing of styles, as for example, when Punjabi slippers, *salwar*, shirt, and coat are surmounted by a solar hat! Our ladies too have a nice variety in dress, but usually comfort and health* are sacrificed to appearance and convention, for one can see women wearing voluminous skirts or long *burqas* in the hottest weather, while men are clad in a mere *dhoti* and shirt. All these styles and fashions have so taken hold of the imagination of the people that it is easy to recognise from the clothes the province, race, religion, caste, or station in life, of the wearer.

Clothes should be worn first for the sake of comfort and health, and appearances made to fit in. From the point of view of comfort and health let us first consider the materials from which our clothes are usually made in India, *viz.*, cotton, silk, and wool. Cotton grows abundantly in this country, is the cheapest, and forms the main article of dress; silk, the product of the silk-worm, is expensive and not so durable as cotton; and the wool of the sheep, which is a necessary ingredient of winter clothing in the cold parts of the country, is dear.

As to their respective merits, cotton fibre is non-absorbent and a good conductor of heat; silk is non-absorbent, but a bad conductor, while wool is hygroscopic, absorbing the moisture and condensing the vapour rising from the skin, and giving back the latent heat. It is moreover a very bad

conductor of heat on account of containing animal oil in its substance, and also because of the presence of air entangled in the interspaces, which prevents the dissipation of heat. Wool is considered the best material for under-garments. It is warm and, being a bad conductor of heat, prevents the sudden chilling of the skin. It is, however, irritating to delicate skins, though by irritating and stimulating the capillary circulation, it adds to its value as a warm fabric. Further it absorbs organic vapours and dirt from the body and hence begins to smell quickly and needs frequent washing. Cotton fabrics are considered unsuitable for under-garments for when, after exercise, perspiration is induced, the heat is rapidly dissipated, causing chilling of the body surface. This is no doubt the disadvantage in the case of muslin or smooth cloth, but this disadvantage is counteracted if the yarn is handspun and woven into a cellular material. The cellular air spaces constitute an excellent barrier against the dissipation of heat, and the rough surface, while not so irritating as wool, is a good stimulant of the superficial capillary circulation. Handspun and handwoven cotton or *khaddar* (especially of cellular texture) therefore possesses both the quality of woollen cloth, being warm and preventing chilling of the body surface during perspiration, and that of cotton, being cleanly and free from offensive smell, as it does not absorb organic vapour. Silk possesses some advantages over wool as it is more cleanly and shrinks less. Moreover, it does not irritate the skin.

The outer garments in summer should be white or very light in colour, e.g. pale yellow or straw-coloured, and in winter they should be of a dark shade or black, for this absorbs a considerable amount of heat from the sun.

The object or purpose in wearing clothes is to keep the body at a uniform heat and preserve it from the rigours of cold, and hot weather. The garments should in no way interfere with the free movements of the body or the circulation of the blood. The head-dress should be light and porous, so that it admits of a free circulation of air, especially in summer. The turban is usually heavy, and unless the hair is very long (as worn by the Sikhs) or close cut, it crumples the hair and pulls on the scalp, often making it sore. The turban soaks up perspiration in summer and protects the head from the direct rays of the sun, but does not shelter the forehead or the eyes. It is a necessity for Sikhs, being needed to cover up the long hair, but it serves no useful purpose for others, for it keeps the head too warm in winter so that the wearer is liable to catch cold when it is removed. The Bengali fashion of keeping the head bare is excellent, except in summer when it would be necessary to protect the head either by the use of a parasol or by wearing a light straw or pith hat. A cloth cap is porous and protects the head from the sun, but not the face and eyes. Tight collars should be avoided as they cause injurious pressure on the venous circulation of the neck. In summer a *dhoti* and shirt make excellent loose and light dress, but

in winter a more uniform covering is needed. Cold feet, cracked heels and cold legs, with chilblains and frost bites are common enough among those who habitually wear a *dhoti* during the cold season. They are moreover liable to catch cold very easily if they are at all catarrhal subjects. Thus it is necessary that in the two extremes of life at least, *viz.* in childhood and old age, the clothing should keep the body uniformly warm in winter. The habit of leaving bare the legs and arms of children is very dangerous and pernicious, as they easily fall a prey to cold in consequence of having a brisker circulation and a proportionately larger skin surface than adults. The peculiar Punjabi fashion of wearing a big turban while the legs and feet are left bare or very sparingly covered, appears top-heavy and wholly unscientific and injurious. *Chaplis* or sandals are the best articles for the feet in summer. Ordinary shoes or boots are too warm and cause considerable sweating and bad smell, and the skin between the toes becomes sodden and sore. In winter properly fitting shoes are useful, for they keep the feet warm and clean. Ill-fitting shoes cause all sorts of troubles, bunions, hammer-toes, ingrowing nails, etc. The habit of walking barefoot is fraught with danger from cuts and pricks from sharp stones, nails and thorns, etc. Blood-poisoning or tetanus may follow these slight injuries; or there may be bites from poisonous insects, and in some parts of India, and even some parts of the Punjab, the larvæ of the *ankylostoma* (a small worm) pierce through the skin of the feet or leg and

finally enter the small intestines where they live and attain maturity, causing great anæmia and prolonged suffering to the patient. In Egypt and other parts of the world the larvæ of the schistosoma similarly gain admission into the body making the victim's life miserable.

European trousers are slung from the shoulders and are free from any risk, but the *pyjama* has to be tied tightly round the waist, which causes pressure on the superficial vessels and may in consequence assist in the development of varicose veins, especially in women.

The *sari* of the women is a very graceful garment, but it very considerably hampers active work or walking, running, and play. Although the *salwar* and *kamise* are excellent so far as this is concerned, yet the *dupatta*, which according to convention is an absolutely necessary adjunct, counteracts the usefulness of this costume, for it needs constant care lest it should slip off the head. Add to these the *burqa* and veil which prevent the wearer from inhaling fresh air and compel her to breathe oft-exhaled air, and it will be agreed that from the point of view of health, our women's dress is not free from injurious consequences, and needs improvement.

The force of convention, of old customs and habits, together with the gross ignorance that pervades this continent, and its hopeless poverty all combine to ignore the laws of sanitation and health;

but these will disappear, one hopes, in the near future and we shall be able to evolve a hygienic dress suitable to circumstances and climate, and, in fact, to all the requirements and conditions of life.

CHAPTER XII

DISPOSAL OF EXCRETA & REFUSE

In India, as probably in most poor countries, people have from time immemorial been in the habit of answering the calls of nature in the fields and jungles, in fact in any place which they could use unmolested. No closets worth the name appear to have existed and in times of emergency and sickness the flat roofs of the houses have been used for the purpose. The villages which consist mainly of mud houses cannot be expected to have any arrangement. Were it made on the mud floors they would always be soaked with filth as are the roofs where such accommodation exists. Most of the solid or semi-solid excreta is mixed with ashes and removed daily in open baskets on the heads of the professional sweepers, or conveyed by donkey to the fields or vacant land. The urine, and some of the faeces too, is washed down to the streets below. The construction of old brick houses does not permit of any sanitary accommodation and in most towns no comprehensive scheme exists for the disposal of excreta and the sanitary authorities give no useful counsel in the building of suitable sanitary conveniences, nor can they under the present circumstances.

Therefore do the people go out of their houses morning and evening and the traveller by rail or motor may see them dotting the landscape

in close proximity to the mud houses or under cover of cornfield, bush, and tree.

In the large towns of the Punjab, some kind of convenience usually exists on the roof, either in the shape of a commode, a metal or earthen tray, or it may be only ashes or even the bare floor from whence it is removed daily by sweepers to the neighbouring depots and from there carted to the fields. What better arrangement is there in the bungalows even, where the excreta is kept in covered pails and removed every morning in carts. The people of the towns are also in the habit of going out, only they must go further than those living in villages. The river Ravi on one side of the great city of Lahore and the canal on the other are favourite sites, and early morning pedestrians in search of fresh air and exercise must suffer the sight of even respectable men and women defecating within ten yards of the canal road. The men are absolutely oblivious of the need for decorum and will use the city drains while the skirts of the women almost brush them in passing. Even the servants of the bungalow-dwellers seem to prefer the open air round the corner of their quarters to the convenience provided for them, polluting the ground with sometimes dangerous consequences to their masters.

The primitive method of the disposal of excreta still continues both in town and village. Lying about in such close proximity to houses it emits offensive odours, invites flies and insects and offers

possibilities of infection and pollution of water and food as the trodden earth and floors in and about the house become soaked or covered with decomposing putrid matter. Flies carry the dirt on their legs, wings and mouth to milk, sweets, vegetables, etc., infecting the consumer with such dangerous diseases as Diarrhœa, Cholera, Dysentery, Typhoid and Tuberculosis. Flies also, alighting on the lips of the sleeper may be the means of conveying directly these diseases. In summer when these creatures are plentiful and are found in swarms in houses, they undoubtedly constitute one of the causes of great epidemics. What is the use of washing the hands if flies have been drawing invisible lines of infected excreta all over the food ?

Nothing appears to have been done to remove or abate this terrible condition of affairs either by educational or practical sanitary measures. Books on sanitation advise the European to shun the "dirty native" as much as possible, but however distant these dirty natives are kept, they have to serve as servants and come in close contact as cooks, bearers, etc. It is not uncommon to find the household infected with Dysentery, Typhoid, and Tuberculosis by the servant suffering from the disease. Even the spread of Malaria in the household through the agency of infected anopheles is probably most frequently effected by the servant suffering from chronic Malaria.

The usual method of ensuring safety advocated by our sanitarians, *vis.*, aloofness from the natives

and the avoidance, as far as possible, of social amenities with them, cannot under the circumstances be carried out successfully, for complete segregation is impossible and all attempts have only been partially successful in eradicating infectious disease among Europeans. Whatever success has been achieved is mainly due to the rigid observance of sanitary laws by themselves and their servants and associates.

The education of the people in sanitary matters, the building of sanitary houses, the protection of food and drink from pollution and adulteration, and the scientific methods of the disposal of sewage, are the only means of protecting the community from the inroads of dangerous infectious disease. In India people try to keep clean, abhor dirt, wash their bodies, mouths and hands, and use soap freely whenever they can afford it, but they are ignorant of the dangers of the dirt around them and of the methods of its safe disposal, and of how to protect their food and drink from dangerous pollution by flies, dirt, etc., and unless a vigorous attempt is made to train the people in sanitation and the use of great hygienic measures, no palpable improvement is possible.

It may be interesting to notice how the *læces* and urine lying about in the open gradually lose their identity and dangerous qualities. The moisture begins to evaporate and the organic matter is attacked by flies and other insects, and various purifying organisms, e.g., nitrifying and liquifying bacteria decompose it into Nitrates, Nitrites, Am-

monia and other harmless salts and gases. Nature utilises part of the excreta as manure for the better growth of the vegetation, trees and shrubs.

The problem of sanitation with reference to the disposal of sewage consists in this, that the sewage be converted into innocuous matter without endangering the health of the people in the process of decomposition. In India as everywhere, this problem is bound up with the economic one. There appears to be very little money for sanitation and the Health Officers and Directors of Public Health are helpless. Money properly spent would solve the problem very quickly. I have seen in England a rapid improvement in the sanitary condition of the country and the evolution and expansion of a gigantic sanitary system at a formidable cost, but in India, as matters stand, cheaper and more economical methods will have to be employed for the proper disposal of sewage. Some attempt in this direction should immediately be made. The universal installation of water closets or even pail closets is quite out of the question in the villages under the present economic conditions, but sufficient land should be set apart for the purpose (men and women separate) enclosed by walls and provided with suitable gates. In these areas trough closets should be built of brick and cement, their number varying according to the number of persons they are required to serve. Each latrine block should have a shallow well which would supply water for irrigation and the flushing of the closets. A septic tank should receive the sewage and the effluent should either be discharged on the

surface or underground.

Another method which, though not so nice in appearance, but perhaps equally efficacious and less costly, consists of trench latrines, preferably moveable. In this case dry sand, ashes, or dry soil should be used for covering the excreta. These latrines require supervision in order to ensure cleanliness, but in time the people would become accustomed and disciplined to a clean and decent use of such conveniences. Trees, shrubs and grass could be grown in order to make the land more pleasing to the eye, and suitable paths and ways could be made throughout the area. Sanitary Inspectors and Health Officers should give talks to the school children, pointing out defects and irregularities, so that the latrine areas would be kept clean. There are many other points which require elucidation, but they are technical matters of detail which concern sanitary engineers and officers, and cannot be discussed here.

The main consideration, however, is the adoption of some such constructive plan, and the building of public urinals connected with small septic tanks in the villages and towns in order to prevent the pollution of the fields and land in the vicinity of houses with all kinds of dangerous bacteria, involving the risk of direct and indirect infection of food and drink, and the spread of disagreeable odours which are so noticeable almost everywhere when one goes out walking in the country. Incidentally also the disgusting and immodest exhibitions with which the eyes are daily assailed will disappear, for when

public sanitary conveniences are provided, by-laws may be made and enforced prohibiting the people from committing nuisance and indecency in public.

It is certainly uphill work but a start will have to be made sometime and practical education in sanitation commenced.

Disposal of Refuse and Sweepings, etc.—The refuse in a house usually consists of fruit and vegetable peelings, sugarcane leavings, the husks of cereals and dals, nut-shells, waste paper, rags, broken earthen and glass ware, ashes, etc. Some of these things, e.g., mango, apple, pear, banana and melon skins may, where cows or buffaloes are kept, be given to them, for not only do they provide vitamins and useful salts for them, but the animals themselves devour the skins with relish. Nut-shells, straw, and paper can be burnt, and ashes and all other non-burnable rubbish should be kept in a closed bin until removed for final disposal. The habit of throwing about all kinds of fruit and vegetable peelings, etc. is most unclean, for not only does such refuse look unsightly lying about the house, but it invites also such filthy creatures as flies and ants. No wonder that they are found in our houses in abundance. The habit is so prevalent among all classes of people that even our educated folk, who ought to know better, have not the slightest thought or consideration for the comfort and enjoyment of others, but will leave the canal bank or the country side where they have picnicked, in an absolutely nauseous condition for those who have

the bad luck to follow them.

In the bazars the people walking up and down strew all kinds of rubbish as they go; nor do they stop there, but spit and blow nasal secretions all around, even going the length of micturating in the drains in full view of all and sundry. Add to this the fact that the shopkeepers shake their dirty carpets over the heads of pedestrians and brush out all the dirt and dust of the shop on to the thoroughfare, and there leave it, and it is not surprising that at certain times the air is so laden with dust, germs, and effluvia that it is almost irrespirable, while the shops, especially those where sweetmeats and other foodstuffs are sold, simply swarm with flies and wasps. These are habits which not only make the foreigner who is brought up to a clean, disciplined mode of life, look down upon us, but bring us endless trouble and misery in the shape of disease and death.

It is the duty of the Municipality's Health Department to educate the people by helping them to keep their houses, bazars, and country side clean and neat. Confectioners, grocers, hotel keepers, etc. should keep covered bins for refuse. Bins should also be placed in the parks and most frequented pleasure grounds and the people educated to use these receptacles and forbidden to throw rubbish about in the streets. These bins should be emptied into covered carts and the contents removed outside the city and disposed of by burning or whatever other means is considered most satisfactory. Also

public urinals should be constructed in different parts of the town and their use enforced.

In large cities household refuse is often mixed with excreta and ashes and disposed of on the land or (in coastal towns) at sea. In some places pigs feed on it and in others incineration is employed. The latter method is of course the most hygienic but it destroys the manurial value of the refuse. In some places, therefore, the street sweepings are removed in carts and dumped down on distant fields where they are allowed to decompose for a period of four or five months and when the whole is sufficiently broken down into a homogeneous inoffensive mass, it is used as manure. The collection and disposal of this rubbish is a municipal problem and the municipality should use the most economic, hygienic and if possible, the most profitable methods for its disposal. The Government of Mysore is conducting some experiments in this direction and municipalities should take advantage of the result, and profit by the experience of others.

Before concluding the subject it is necessary to explain how sewage and excreta become innocuous and are finally disposed of by either of the methods described above. The process is similar to the destruction and decomposition in nature which was briefly mentioned in the case of the excreta deposited in the fields and open spaces, but is more active and intensive. There are two kinds of organisms found in nature (aerobic and anaerobic) which under suitable conditions of moisture and temperature continuously

propagate their species and disintegrate dead animal and vegetable matter. The former act in the presence of oxygen and the latter in its absence, and although there may be others which work in either condition, as yet their history has not been properly investigated.

The anaerobic bacteria convert gelatinous and albuminous matter into peptones, and thus solid substances are liquefied into unstable albuminous matter. Septic tanks contain a chamber where conditions suitable for the propagation of these bacteria are artificially produced, and myriads of them are continuously at work in liquifying and disintegrating the organic matter.

The aerobic organisms oxidise the liquified organic matter into nitrites and nitrates, carbonic acid, sulphuretted hydrogen, sulphates and chlorides. The resultant residue which is rich in nitrates, sulphates and chlorides, is further utilised by the agency of other organisms to provide nutrition to plants and other growing vegetables and when the effluent of a septic tank flows into dry aerated soil, conditions favourable to aerobic action are present and the sewage is thus completely purified and utilised by nature without creating a nuisance or causing injury or danger to health.

CHAPTER XIII

Household Pests and Animal Parasites

Household Pests

There are many circumstances which go to make a house fit for habitation. They are the soil, structure, ventilation, lighting, drainage, position and aspect. Besides, the cleanliness of the house, its freedom from dirt and dust are necessary requisites of a good healthy home. Habitually dirty people would even convert a place into a hovel. I shall never forget the experience I acquired before and, still more, after the War, of new houses stinking with dirt because of the carelessness of dirty people, who would not even use the bath for its proper purpose, but stuffed all their dirty old rubbish into it. What one sees in India among wealthy and educated people is found in some of the working-class houses in England, *viz.*, the habit of scattering waste vegetables, fruit skins, pips, etc. all over the place, allowing dirt of all sorts to accumulate on the floors. A dirty house will attract all kinds of insects. In England one can prevent them from gaining an entry into the house by keeping it moderately clean, in India, however, not only rigid cleanliness and meticulous care is necessary, but other measures, *e. g.* the provision of gauze doors and windows on all the outlets of the house, have to be taken in order

to keep the houses free from the various pests that infest Indian homes.

The commonest of these pests are flies, mosquitoes, rats, mice, ants, lizards, spiders, fleas, bugs, centipedes, bees, wasps, and sometimes even serpents. We are thus tormented by a host of biting, annoying, injurious, and even poisonous creatures which should be rigorously prevented from gaining admittance. Some of them can be controlled by the use of a moderate amount of care and scrupulous cleanliness, but there are others which are very persistent and cause a considerable amount of ill-health. I have seen a lizard cooked in the dal, even in a clean household. It is thus necessary for the householder to have some knowledge of the life history of these household pests, of the means of preventing their ingress and even of accomplishing their destruction.

Flies.—There are various kinds of flies, *e.g.* horse-flies, cow-flies (vicious biters), house-flies, sand-flies, etc. There are four stages in the development of the house-fly, *viz.* egg, larva, pupa, and adult fly, and the whole cycle is completed in a short time provided always that the temperature, moisture and food-supply are favourable to the larva. The minimum period of the life cycle is from eight to fourteen days but under abnormal conditions of low temperature and absence of moisture, the development may take from 2 to 2½ months. The female fly becomes sexually mature in 10 to 14 days after it leaves the pupal stage, and one female is capable

of laying several batches in its lifetime, each batch consisting of 120 to 150 eggs. They are laid in decomposing human excreta, cow or horse dung, etc., and in all sorts of vegetable refuse on which the larvæ can feed when hatched. It is easy to understand how, under favourable conditions, a female fly and her offspring can grow in a month or so to a family of countless flies.

Soon after it leaves the pupal stage the fly sets about to find food, and in this respect it is not particular, for anything from typhoid, dysenteric, or cholera fæces to a milk pudding cream or sweets is quite agreeable to its palate. It has also a great liking for human perspiration. That is why it is so fond in summer of crawling about on the face, to the great annoyance of those who like to indulge in an afternoon nap. The fly defecates fifty times a day on anything from our food to the lips of our children. Thus a house-fly can convey infectious matter from the excreta, sputum, nasal excretions, and other dirty rubbish on which it walks, rests and feeds, and which becomes attached to its head, body, legs and wings. In this way the fly spreads unnoticed among men, women and children such dangerous and serious diseases as Cholera, Typhoid, Diarrhœa, Dysentery, Anthrax, Tuberculosis, and others, such as Tropical Sores, Round Worms, etc. Of what use is the custom, so scrupulously adhered to by everyone, of washing the hands before partaking of a meal cooked in clean vessels in a clean manner, if flies coming from a dysenteric stool in a

neighbour's house settle on it, for food thus infected would be the cause of dysentery in the whole household.

The fly is therefore one of the most dangerous pests we have in the house. It should be rigorously excluded from both house and kitchen by the screening of all windows and doors. Mothers should never allow flies to crawl over the face of a child whether sleeping or waking and no sweets should be eaten on which flies have been able to sit or rest. The house and its premises should be kept thoroughly clean. No spitting should be allowed on the floors, nor should decomposing vegetable matter be allowed to accumulate anywhere. In the event, however, of its accumulation being necessary, it should be so covered that flies are unable to gain access to it, or it should be burnt in less than a week. In this way any eggs that may have been laid are prevented from reaching the stage of maturity. This pest, though extremely dangerous to the health and happiness of a household can be easily avoided by scrupulous cleanliness and judicious management.

Mosquitoes.—A fly, being a comparatively big insect, can be easily prevented from entering the house, and is, moreover, not troublesome at night. The mosquito on the other hand, is small, easily gains access to the house, may not be felt alighting on the bare skin, and may bite any time, being especially vicious in the evening and at night. Mosquitoes are of numerous kinds and differ greatly in their habits

and mode of life. Some do not bite human beings; some bite in the open; others in the house only; some are troublesome in the evening and at night while others bite all day; some are found only a short distance from the water in which they are bred, and others spread themselves over a wide area; some produce only one brood of adult insects in the year while others produce two and others again several; some pass the winter in the egg stage, others in the larvæ, and yet others in the adult stage. All of them appear to flourish in warm and moist air. The eggs and larvæ hibernate in winter and estivate in the dry hot season. Hence it is that in the Panjab mosquitoes are most numerous during the monsoons and in the autumn. The male insect lives on flowers, etc., but the female is the great biter and sucks human blood for the nourishment of its eggs. It has a powerful mouth which is used for piercing and sucking. The piercing apparatus consists of two long saw-like processes each having about a dozen teeth, and of two knife-shaped blades each having about three dozen broad teeth. They are called maxillæ and mandibles respectively. As soon as the skin is pierced by these long processes armed with sharp teeth, the lips are applied and the insect sucks the blood vigorously. The mouth contains, in addition, a hair like canal attached above to the salivary gland, and saliva is thus poured into the wound to which is easily transferred any infection contained in the saliva. Human beings are thus infected with young malarial parasites by the female mosquito. The alighting,

piercing of the skin, and sucking of blood remain imperceptible, but soon a smarting and burning is felt in and around the site of the wound, which is hard and swollen.

The mosquito, like the fly, passes through three stages, *viz.*, egg, larva, and pupa, before it becomes an adult mosquito. The eggs are laid about a hundred at a time, some singly, others in layers. They are arranged in rows, stars, and triangles and are of various colours and shapes. The larvæ and pupæ of all mosquitoes are aquatic, the larvæ living on the food which is held in suspension in the water. The pabulum varies and consists of decayed animal and vegetable matter. They also feed on various small organisms. The pupa takes no food: the mouth is completely sealed up and hence its life is short. The female mosquito is ready for fertilisation immediately after it emerges from the pupa.

The breeding place of the mosquito is usually any collection of water, whether pool, pond, flower-pot, saucer, old tin, or cesspool. After feeding the mosquito retires to a dark place to digest its food. In the early morning the female flies to the nearest water to lay her eggs, though she is capable of flying half a mile in case of need.

Prophylaxis—The mosquito has numerous enemies but of them certain kinds of fish are the most important as they eat the eggs, larvæ, and pupæ of the insect. In South America and other countries where the mosquito pest is being vigorously combated, these fish, *e.g.*, millions are introduced into

the ponds and wells, etc., as a protection.

Before going to live in a house infested with mosquitoes, the use of sulphur or Pyrethrum is very useful. If sulphur (2lb per 1,000 cub. ft. of space) is burnt, the mosquitoes are stupefied and fall on the ground, when they can be swept up and burnt. Spraying the dark nooks and corners and other hiding places with weak formalin, oil of citronella, or kerosine is also very effective.

Roads, yards, and gardens should be well-drained, and no collection of water permitted to stand. Houses should be well protected by means of gauze or wire-netting for windows, doors, and other openings. In the evening everyone should retire inside the house and one should sleep either under a net or inside the house from which all mosquitoes have been rigorously excluded.

Folded chinks, flower and plant pots in the verandah and all dark corners, curtains, cupboards shelves, etc., should receive daily attention during the mosquito season when the spray should be freely employed. It may here be pointed out that the custom of collecting all kinds of flower and plant pots in the verandahs and porches is very pernicious, for not only do all sorts of insects crawl about them, but they provide a convenient hiding-place from which the mosquito can pounce on its victim when evening comes.

Ants.—Ants may appear to be insignificant creatures in the temperate zone, but in the tropics

they are a source of great trouble and annoyance. There are many varieties as to size, habitat, etc. Some carry a poisonous apparatus similar to that of bees. The venom contains formic acid, but there must be more than this in the venom of the tropical species although nothing is so far known about it. Ant bites cause pain, a stinging sensation and local inflammation as well as swelling on the site of the bite, but in the case of the bite of large ants even faintness, shivering, and temporary paralysis have been noticed. There is one species of ant which infests beds and bites people when they are asleep, and another which invades fruit and sweets, etc., and it is often difficult to protect eatables from its attentions. It is easy to understand that the invasion of fruit, sweets and other food by swarming ants may possibly be injurious, apart from which the sight of these hideous creatures crawling about in one's food is not pleasant, to say the least of it.

Yet another kind is the "white ant". They go about in search of wood, travelling long distances through tunnels of earth which they build as they advance, destroying wood, books and any other soft articles they may come across.

Preventive and protective measures.—When building a house, all ants' nests should be destroyed by the use of arsenate which is cheap and effective. The use of a damp proof course would prevent ants from making nests in the walls, and the floors should be made of cement: if wood is used it should be creosoted or tarred.

Ants should be carefully excluded by means of scrupulous cleanliness. These are remarkably acute insects and devise all sorts of means to reach their object. Any food that is likely to be attacked by them may be kept on a table, sideboard, or in a fruit case, the legs of which rest in cups containing turpentine or oil of some kind or water, which prevents the ants from crawling up the legs. There is yet another method of protecting the food, fruits, etc. from the inroad of these creatures. A piece of ribbon or narrow cloth should be soaked in one in 1,000 solution of mercury perchloride and when dry, it should be wrapped about an inch deep round the legs of the cupboard, etc., in which the eatables are stored. Thus the use of cups becomes unnecessary. It may however be observed here that mercury perchloride is a corrosive poison after the use of which the hands should be washed with soap and water.

Ants infesting beds may be driven away by the free use of camphor.

Rats.—Rats are the common invaders of our Indian homes. They find their way through the drain holes, doors, and windows, and if unable to gain admission by any of these means, they will gnaw their way through any worn threshold. Rats destroy meat and vegetables and fruit. In the poultry house they eat and destroy the eggs and kill the young poultry, while in the garden they dig up newly-sown peas, beans, and other vegetables.

Life history and facts of general interest.—

There are two kinds of rats—white rats and brown rats. They are very prolific, the usual litter varying from five to fourteen, and breed all the year round. The period of gestation is about 21 days and impregnation may occur within a few hours of the birth of a litter. They begin to breed when only three or four months old and repeat the process five or six times in the year. This may occur several years in succession. Thus one pair and its descendants may produce as many as 1,130 rats in a year.

Unless there is a shortage of food, the rat eats only the best. If it likes the flavour of anything it will eat the greater part, but always leaves a piece at each end. If it does not like it, it drops it after biting. In this way the rat can destroy a great amount of food.

Rats have been known to transmit infectious jaundice to human beings, and plague spreads very rapidly among them and is transmitted to the human population through the agency of rat-fleas, causing alarming epidemics. The rat is a vicious biter. It will bite a person in bed, or even jump up to bite an arm hanging from the bed. Rat-bite may cause a dangerous fever, which may last off and on for years. Rats are also carriers of other diseases and contaminate food and water supplies. They act as the primary host of tapeworms which are conveyed from the rat to the pig, and to man through the medium of imperfectly cooked pork.

They spread foot and mouth disease among cattle and convey a virulent form of equine influenza, mange, and ringworm, from one stable to another besides conveying distemper, from one kennel to another.

Thus of all pests, rats when they are well-established, constitute the deadliest peril to the health and welfare of a community. Mud houses, brick houses and beautiful bungalows, whether old or new form an equally happy hunting ground for this vermin if it is allowed to remain undisturbed. As rats are not visible during the day, the householder does not realise the deadly menace that they can be and are to the inhabitants.

It is therefore highly important that rigorous measures should be taken to prevent rats from establishing themselves in or near any human habitation, and to destroy them if any already exist. After they have been systematically exterminated by poisoning, trapping, flooding, etc., the house should be put in order, and all unnecessary holes, both inside and outside the building, should be closed. Thresholds, doors, and doorposts should receive careful attention, so that there are no opportunities for the rats to gain an entrance. The openings for gutter drains should have a grating or gauze screen. Careful watch should be kept over the food supply, and all food and fodder should be stored in rat-proof receptacles, and once the rats have all been exterminated they should never be allowed to invade the premises again. After the

rat is killed it should be burned, or, after soaking it in disinfectant fluid for half an hour, it may be buried.

Mice.—Mice, like rats, are very commonly found in houses. Although they are not so destructive as rats, and are not known to be so dangerous, they are a great nuisance and cause considerable damage to food and clothing. Like rats they are very prolific, breeding five or six times a year, each litter consisting of from five to eight, or even more, young ones. They also harbour fleas.

Mice can be easily trapped, though here and there trap-shy mice are found which resist capture for a long time. After killing they should be burnt before the fleas have time to leave the dead host.

Fleas.—These tiny creatures are of innumerable kinds. They are found on dogs, cats, lizards, rats, etc. They attack man as well, and some fleas will change their host, leaving for example the rat and preying upon man. They bite at all times of the day or night, and have come into prominence on account of the fact that they transmit plague from the rat to man and *vice versa*. They also carry blood parasites and even serve as intermediary hosts for the tapeworm of dogs. Thus besides the irritation caused by biting, fleas may also transmit dangerous diseases to man.

Life history and other important facts.—The flea breeds all the year round. It lays 1 to 5 eggs in the crevices of floors or carpets, or in the hair of the rat and they fall during its

movements. Thus it is that empty houses which are infested with rats are alive with fleas. The egg, under favourable circumstances, hatches into the larva in two days. The larva, at first active, becomes sluggish, ceases to eat, and spins a cocoon in about a week. From this cocoon the flea emerges in from one to two weeks. Thus the development takes about three or four weeks. The young flea can do without food for a week, and lies in wait for a favourable opportunity of obtaining a supply of blood.

The average duration of the life of a flea on a rat is 41 days, and on man 27 days. Much moisture and excessive heat (*vis.* 80 F.) are unfavourable to reproduction. That is why epidemics of plague always die down in hot weather.

When a flea sucks the blood of an infected rat, it may imbibe into its stomach as many as 500 plague germs and there they multiply enormously.

Fleas are commonly found in the houses in hill stations, as they are empty during the winter and are, in a large majority of cases, dirty, ill-ventilated, and badly-lighted. They thrive in crowded, filthy surroundings and are rarely found in well-swept, clean houses which are free from rats and mice. They may be destroyed by sprinkling the floor with Insect Powder. (*Pyrethrum Roseum*). The fleas are stupefied in about half-an-hour, when the floor may be swept of the dust and dirt containing them and the sweepings burnt to prevent their recovery. Turpentine, carbolic acid and other

germicidal powders are useful in the destruction of fleas.

Bugs.—Bugs are blood-sucking creatures, which are found almost all over the world. They are believed to spread all sorts of diseases *e.g.* typhus fever, plague, and kala-azar. The bed-bug was well-known to the ancient people of Asia and also to the Romans, who called it *cimex*. It appears to have reached England from the East about 1500 A. D.

Bed-bugs live in the cracks of floors and walls, in coir and straw matting, in furniture, and in the crevices of the bedstead during the day, and sally forth at night in search of their prey. The male and the female both suck blood and live altogether on it, emigrating from house to house. The female bug lays about 50 eggs three or four times a year. These hatch in about a week and the larvæ moult five times at intervals of about a week before they attain maturity. Bugs emit a peculiar odour on account of the oily fluid which they secrete. They are found in dirty, dark, and dingy houses and their bite is painful and itchy, and leaves a swelling.

The only preventive measure is cleanliness, for they cannot find a footing in a house which is kept thoroughly clean in all its nooks and corners. Acetic acid poured into the joints of the bedstead is said to kill them very quickly, but if the whole house is infested it is then necessary to fumigate it with sulphur and keep it closed for a few hours so that all the bugs are destroyed before the sulphur

is allowed to escape from the house.

It will therefore be seen that man, especially tropical man, is surrounded by an innumerable variety of pests which make his life miserable and even transmit to him serious diseases unless his house is well protected and kept thoroughly clean. All kinds of creatures, from minute organisms to rats and cobras, are constantly going about in search of food and will enter any house that may come in their way, where, if they are left undisturbed, they will establish themselves and propagate their species. If, however, the house is made uninhabitable for them by scrupulous cleanliness, they can be kept at bay. Houses in the tropics should therefore be built with even greater care than in temperate regions, and no quarter should be given to any creature however insignificant or innocent it may appear to be, for scarcely any creature can be considered a suitable companion for human beings. Even dogs, cats, cows, buffaloes, and pet birds, should be housed at some distance from the house in a hygienic manner, for they harbour fleas, worms, ticks, and pathogenic germs which may cause great discomfort and ill-health to the household.

Animal parasites in man

It is not necessary to describe in detail the animal parasites that are found in man, but it is important to know that there are a large number of worms which have their being in man, causing a great deal of ill-health. These creatures enter the body, some by the mouth and others through the skin. Most of them

live in the intestines but there are others that live in the muscle, liver, bladder, eyes, brain, lungs, spleen, etc., causing a great deal of sickness. In some cases it requires very careful treatment in order to kill them or to expel them from the body. The diagnosis is often enough made accidentally when the patient discovers the worms in his fæces, but the presence of certain symptoms will draw the doctor's attention to the possibility of their presence. A microscopic examination of stools or urine (or both) or of the blood, often clinches the diagnosis.

In order to understand the preventive measures that should be carried into operation, the life history of three or four of the commonest worms will be described.

Thread Worms.—These worms are very commonly found in children and usually inhabit the large intestine. They may be seen in the fæces, in which also ova may be revealed on examination by microscope. Drinking water and vegetables may be easily infected. Even the hand of the child may re-infect him as well as others playing or sleeping with him. Thus the greatest care should be taken to keep drinking water free from the infection of this worm. Green vegetables should always be well washed and the infected child should be kept scrupulously clean, while the kissing of hands and face should be discouraged.

Round Worm.—This is probably the commonest worm found in the small intestines of man. It may also be found in the stomach, gall-bladder

etc. It is 6 to 9 inches long and eggs are found on microscopic examination of the faecal matter. Water and vegetables are infected with the eggs of the worm, developing into worms in man. The preventive measures are similar to those employed in the case of thread-worms. It may, however, be noted that thread-worms are usually found in children and, as they exist in the large intestine, are often seen in the faeces, but round worms are found chiefly, in the small intestine and are not often seen in the faeces. Diagnosis can be made more easily in the former case than in the latter.

Tape Worms.—These are of great variety. One of them, which goes by the name of *Tania Solium* is found wherever the pig and man live near each other, for during part of its life it exists in the muscle of the pig and during the other part, in the intestine of man. In like manner another tapeworm, called *Tania Mediocanellate*, leads part of its life in cattle and the other in the intestine of man. These worms, when fully developed, are from five to six yards long. They look like long ribbons. The ova escape in the faeces and are apt to be eaten by pigs or cattle, as the case may be. The animals may also be infected by contaminated water or food. The ova develop into small curled-up worms in the flesh of this host, and when the flesh is eaten in an under-cooked condition, the tapeworm assumes the adult form and may live for many years in the human intestine.

It will therefore be seen how important it is to

protect the food of cattle from contamination with human fæces, and to prevent pigs from being infected by fæcal matter : also to cook the flesh of these animals so thoroughly that it will be quite impossible for it to convey further infection.

Very careful vigilance is needed to protect man from these and numerous other worms which infest him, and it behoves everyone to protect all food and drink from this dangerous infection.

CHAPTER XIV

EXERCISE AND SLEEP.

Physical Exercise.—For the preservation of health, exercise of the muscles is an absolute necessity. From the time of birth, a child continuously moves his limbs during wakeful hours. He even exercises the muscles of his neck, face, mouth, hands and feet. He continues his exercises right up to the time when social restrictions are placed on his movements, and he is gradually introduced into the routine of our social system.

The occupations of many artisans and other workers involve a considerable amount of useful exercise in the open air. They naturally enjoy a healthy and vigorous life. There are others who understand the advantages of regular exercise and who continue to carry it out throughout life. A very large number, however, has neither the opportunity nor the desire to indulge in exercise, and these fall an easy prey to all kinds of diseases.

Exercise should be taken vigorously during adolescence and continued to about the age of 42. Swimming, running, cricket, tennis, cycling, riding and gymnastic exercises, etc., are excellent for this period. Physical exercise creates a healthy appetite, gives agility, activity and suppleness to the muscles, helps to develop a shapely and symmetrical body and gives a feeling of self-reliance, fearlessness and

happy well-being. Dyspepsia, loss of appetite, and indigestion caused by injudicious dietary and over-eating can easily be cured by well-regulated exercise.

After the age of 45 physical exercise should not be so vigorous. Swimming, cycling, tennis, riding may still be enjoyed for 10 or 15 years in moderation, but running and the more strenuous exercises should be avoided. Walking is an excellent exercise for all ages, but is especially beneficial in middle and old age.

A lack of exercise is usually noticed among businessmen, and constipation with its concomitant disease, corpulence and shortness of breath are the natural consequences. They suffer from various kinds of diseases in youth, and in middle age develop such serious diseases as diabetes, Bright's disease, gall-stones, renal stones, etc.

Among girls and women of the middle class, exercise is the exception rather than the rule, especially in cities. It is a common sight to see pale, thin girls and young women walking slowly while the hands and arms are engaged in supporting the upper garment. They are not able to lift their feet in walking, but scrape the ground with their heel-less shoes. Is it any wonder that these unfortunate girls never enjoy child life, nor do they experience the joys of strong and vigorous health. They develop such diseases as Tuberculosis and if they survive serious diseases, they look old at 40, or even under.

Unfortunately the dress of our women is quite unsuitable for vigorous exercise. This is probably one reason why much attention is not given to this matter even in well-conducted girls' schools and colleges. In the West, special dresses are worn to suit various kinds of exercise and it is essential that some suitable dress should be devised for our girls and women. The *Sarhi*, Indian skirt and *dupatta* are absolutely unsuitable for the purpose. The *dupatta* must be discarded. The trousers (*suthan*) and a straight shirt or jumper reaching to within four or five inches of the knee would be suitable for running, jumping, tennis and for many gymnastic exercises. The *dupatta* is useless even for work. How, for instance, can a girl wearing a *dupatta* work in a Chemical or Bacteriological laboratory? She would be soiling it with acids and stains of various kinds, breaking tubes and burettes, etc., to say nothing of the danger of catching fire from the Bunsen burner.

The fact of the matter is, that our society has not paid sufficient attention to the education and especially, the physical condition of our girls and women, and I think it is time that they were given suitable physical training and habits of vigorous exercise, so that they might vie with their brothers in acquiring self-reliance, courage, and the sound health which they sorely need.

Sleep.—There are some herbivora and rodents who scarcely sleep at all, while others habitually sleep all through the winter, but most animals, like human

beings, sleep at night. For the sake of experiment some have been prevented from falling asleep and they have developed weakness and exhaustion which, if continuous, has even caused death. It is on record that three boys once boasted that they could keep awake for a week and determined to carry out their boast. One of them broke down after four days, the other after five days and the third died on the seventh day. One may fast for days with impunity and even with benefit to health, but the want of sleep is very injurious to health, bringing about sluggishness, mental confusion, loss of memory, loss of appetite, dyspepsia, hallucinations, dullness of perception, and even insanity. Continuous sleeplessness, as I said above, may prove fatal. The forced insomnia of intelligent and diligent students working for examination has often brought about mental confusion and disappointing results. The deleterious effect of insomnia has been recognised by the physicians of all times. It is similarly dangerous in various diseases, *e. g.*, Pneumonia and Typhoid. In some cases of Sleepy sickness the patient has been known to keep awake in the later stage and die from wakefulness. I knew a boy who, after successfully running through this disease, developed sleeplessness. He would run about at night and keep his mother awake by all sorts of mischievous pranks, and it was with very great difficulty that his insomnia was at last overcome.

As people appreciate the delights of health after an acute illness, so do they value the benefits of sleep when it is actually lost. Invigorating and restora-

tive, it is the greatest boon in sickness. It is the delight of parent and doctor alike to see a child in sound sleep when it is recovering from a serious illness. After a day's mental or physical fatigue sleep is the most refreshing tonic and when one is tired it is often as profound as it is irresistible. The quality of sleep is also very important and a short, restful, and deep sleep is far more beneficial than a restless sleep of much longer duration.

Generally speaking, the necessity for sleep varies indirectly with the age. A healthy, growing infant sleeps practically continuously, waking at meal times and going to sleep again after the meal. With the advance in age sleep is gradually lessened in the daytime. Mothers who keep their children awake late at night, do it to the detriment of the health of the child, for nervous disorders of various kinds result from this irregular habit. For adolescents and adults seven or eight hours' sound sleep at night is all that is required.

During the vigorous, working period of life one long sleep of six or seven hours at night is the best. Second sleeps are fruitful of undesirable dreams and sluggishness. A short sleep after the midday meal is beneficial for digestion and often refreshing, but in a vigorous and healthy young person, the habit of sleeping during the daytime (except in very hot weather) may bring about sluggishness both of mind and body. Unless the daytime sleep refreshes, it should be avoided.

As age advances and before the faculties begin

to fail, it is a common experience to have the night's rest interrupted by short wakeful periods and the sleep is less profound than in the more vigorous period of life. At the onset of senility short sleeps are common in the daytime.

Great leaders have very little sleep, four or five hours often proving sufficient. The great excitement and emotion that social and political reformers experience causes great mental unrest. The intelligence is intensely vivid and the memory bright. Fact after fact is marshalled up before the mental vision, the emotions are stirred to a height of frenzy, and the mind is in a fever of excitement. Sleep is thus impossible for hours at a time, because the mind is too active for it. It is well-known that such men are refreshed by a very little sleep, but rest is often enforced by breakdowns of one kind or another. There is a remarkable contrast between an eager, impatient leader and a patient mental or manual worker. The latter leads a quiet, resigned life of drift, while the former makes history. A regular, well-conducted and disciplined life is the ideal life for sleep, which comes and goes in clockwork fashion; but it is rarely possible. Fresh air, regular exercise, regular and well-chosen meals, absence of excitement, suitable recreation and careful distraction from mental work in the daily routine, constitute the best antidote to insomnia. Often enough those who suffer from insomnia need blame no one but themselves. They have a terrible dread of drugs and later a dread of the inability to sleep develops. The nervous system becomes exhausted and the mind more and more excit-

ed. Sleeplessness, an exhausted nervous system and lowered vitality, and an excited mind with terrible dread and anxiety produce a vicious circle which is difficult to break without the judicious use of drugs in the hands of a competent physician, but once the spell is broken, the recovery is rapid and complete.

It must be clearly realised that a well-controlled and disciplined life is the most reliable prevention of sleeplessness and should be aimed at with care and diligence.

CHAPTER XV

THE BURNING PLAINS OF THE FIVE RIVERS

For nine months of every year in the plains of the Punjab the maximum shade temperature remains above 80° F., and, during this period, for no less than five months it is above 100, ranging between 100 and 118. During the three months of winter it comes down to about 50, while the minimum shade temperature falls to freezing point.

Now for the purpose of taking a hot bath we raise the temperature of the water to about 100° and as it gradually rises towards 110° it becomes unpleasantly hot and unbearable. Similarly a cold bath at a very low temperature becomes unpleasant and cannot with impunity be borne for any length of time. The normal temperature of the body is 98.4° and this temperature is kept up by the heat generated by the innumerable chemical processes of combination and decomposition which are going on every moment of the day and night. Thus the body is kept uniformly warm by the heat produced when the stomach churns up the food during digestion, or when the heart pumps the blood through the system, or even when a person runs, sits or lies down. The harmful effect of the cold atmosphere in winter, in removing the body heat is nullified by wearing woollen or other warm

clothing, which prevents the heat from being dissipated, and by the control of the circulation in the skin, whereby the heat loss through the sweat glands, etc., is reduced to a minimum. The temperature of the body is thus kept constant at 98.4° . Exercise, active habits, the intake of more fats and carbohydrates, *e.g.*, butter, *ghi*, sugar, dates, walnuts, coconuts, almonds, raisins, etc., stimulate the production of heat, while the wearing of warm clothing, the use of stoves, hot water bottles, open fires in fireplaces, etc., preserve the heat of the body. But the regulation of heat becomes exceedingly difficult when the temperature of the atmosphere ranges between the body temperature and 118° , as it does in the Punjab during almost half the year, especially if the air is laden with moisture. In the normal course of things, when the atmosphere is hot or when a person is taking active exercise, the heat increases in the body and the temperature tends also to increase. The cooling mechanism is at once set in motion, the blood vessels of the skin are dilated and its capillary circulation becomes vigorous. The sweat glands pour out hot fluid which, evaporating, removes a considerable amount of latent heat, thus cooling the skin surface. There is, however, a limit to this method of keeping excessive heat under control, and the limit is reached in two circumstances. In the first case this happens among manual workers, agricultural labourers, bricklayers, gardeners, masons, etc., who, year in and year out, spend their time working out of doors under the broiling sun. In the second case the heat may

not be excessive, but the moisture in the air prevents the perspiration from evaporating freely and thus the dissipation of heat is checked. About twenty years ago, in England, a Royal Commission (I believe through the agitation of the Weavers' Unions) held an enquiry into the health of the weavers during their working hours. It was believed that the introduction of steam into the weaving sheds, for the purpose of creating ideal weaving conditions, was injurious to health. In this investigation I made a series of observations during the summer months and examined the weavers at their work on the days when the wet bulb thermometer stood at about 85° or over. I found that among those examined, there was a varying rise of temperature and in the case of one strong, healthy young woman the temperature used to rise to 101° .

Many millions of men, women, and children who spend the monsoon days in the plains, experience the clammy sweat sticking to body and clothes in the warm moist air. Fanning produces no cool or refreshing sensation, nor do cold baths even have any lasting effect. Those who pass through the Red Sea have a taste of the effect of moist heat during the two or three days' voyage, when one may take a bath, even with an electric fan whizzing overhead, without being in the slightest degree refreshed, while the hot perspiration boils out through myriads of pores no sooner the bather is out of the bath. The heat-regulating mechanism is thus easily upset, causing the temperature to rise. This rise of temperature, however slight, cannot but

have a deleterious effect on the constitution. It will be seen that it is far easier to protect oneself from unpleasant cold than from a roasting, boiling atmosphere. Imagine millions of the workers of the Punjab, ill-fed and ill-clad, working under the pitiless sun of summer (when even the shade temperature approaches 120° F.) trying to earn a pittance, not merely by the sweat of the brow, but by the molten fat of the body. No wonder that in case of sickness the temperature tends to rise higher in summer. It is a matter of ordinary observation to find the temperature in a case of Malarial fever rising to 105 or 107, and, in a case of Tuberculosis, jumping up a degree or two at the advent of summer. Neurotic patients also often lose their heat equilibrium with the slightest rise or fall of the emotions.

In addition to fevers, this excessive heat of the Punjab causes collapse and exhaustion. This was witnessed during the Martial Law days of 1919 when the students of Lahore were compelled to march four miles in the blazing sun for roll call. They used to faint, suffering from heat exhaustion, with shallow breathing and clammy perspiration. This phenomenon is common enough among our ill-fed workers, though the statistics are available only of well-fed British soldiers who have suffered from heat exhaustion during some forced marches under the sun. Heat in these cases causes giddiness and nausea; the patient is bathed in clammy perspiration and may collapse into unconsciousness.

By far the worst condition is the heat stroke which is ushered in by a sudden rise of temperature to 104° , 107° , and even to 114° F., while the skin is dry, flushed and burning and the patient becomes unconscious, delirious or comatose. The pulse is rapid and later irregular. Debilitated and emaciated outdoor workers are easily overpowered, while children are more liable to heat or sunstroke than adults. Poverty is probably the greatest predisposing cause among the workers, while among rich Indians and the European population it is the use of alcohol. In the case of workers, most of the cases of death from heatstroke are undiagnosed and untreated, and when seen at the last moment by a doctor, the death is usually ascribed to malarial fever, meningitis, or some other fever of malignant form.

The prevention of injury to health from excessive heat consists in the avoidance of alcohol, the partaking of good nourishing food and plenty of fruit so that the constitution is in a fit condition and able to bear the rigours of heat. The clothing should be light, white, or some pale colour. Black and blue absorb heat and are very injurious. The head, face, and nape of the neck should be well protected. The light pith hats, white outside and green inside, with well-ventilated crown, are devised specially with this object. In summer, work should commence early and finish before noon, but this is only possible if labour is properly organised, and in India, where the outdoor workers possess no union

organisation of their own and where millions of educated and uneducated workless wander about in search of bread, the control of working hours per day, with the object of the preservation of health, is hardly possible or thinkable.

CHAPTER XVI

A PUBLIC HEALTH PROBLEM

Plantation of trees

I confess I have not travelled much in this province of ours. I have only made half a dozen journeys towards Delhi, one to Rawalpindi, and one to Jhang, and most of them have been undertaken during the night and in the hot season ; but I have managed to have a glimpse of the Punjab's uninteresting plains, whose monotony and ugliness are only relieved by an occasional clump of trees surrounding a well, by the wide expanse of a mighty river, or by the smooth stretch of a canal and its intersecting canaliculi. To add to the dreariness of the landscape, burning winds sweep across it and the mental vision of the traveller is scorched and dulled. Scorching winds have their use in an overcrowded city like Lahore, where they replace the stagnant bacteria-laden atmosphere of the dark alleys and houses by clean, warm air killing all mosquitoes, fleas and other insects. From a public health point of view these hot winds play a great role, ventilating the houses and surroundings, removing malaria, plague, and some air-borne diseases and finally destroying many insects that are harmful to fruit and vegetables. They are, however, very distressing to the people. Both physical and mental activity and energy are considerably lowered and

not only do such diseases as heat-stroke, heat-intoxication, dyspepsia, diarrhoea, dysentery, etc., make their appearance, but the suffering from other diseases is greatly exaggerated.

Those who can afford, escape from the discomforts and dangers of heat by taking refuge in some hill station. It is the working classes and the peasants who have to bear the rigours of the pitiless rays of the sun during summer. This is therefore a problem of first rate importance to sanitarians. Is it possible to reduce even by a few degrees the burning heat of the plains in summer? I believe it is, and also, incidentally, to relieve the dismal monotony of the landscape.

I have visited only two hill stations—a small portion of Kashmir and Dalhousie. Nature has covered the hills with oak, pine, and other forests. In hot dry weather their cool shade protects the pedestrian from the direct rays of the sun, providing pleasant and comfortable walks for all and sundry. Forests and fruit groves besides providing shade, attracting rain clouds, and supplying a very useful barrier to hot winds, add to the wealth of the country in firewood, charcoal, timber, and fruit. Afforestation has immense possibilities for the departments of Public Health and Agriculture. This province, which is traversed by five great rivers and intersected by canals and canaliculi throughout its length and breadth, is capable of modifying the weather conditions of the country by the cultivation of such trees as peepul, banyan, shisham

etc., which are shady; leguminous plants such as Acacia (kikar), Indian Laburnum (Amaltash), Albizzia (Siris), and Bauhinea (Kachnar) which, besides providing shade, afford protection against malaria; and fruit trees such as lime, lemon, orange, pear, and mango. These could be planted along the boundaries of the land, around ponds, and along the small watercourses, while the canal department might similarly plant trees of various kinds along the miles and miles of canal banks. The Government might enact laws and educate the people to the usefulness of tree planting, providing young plants at cheap rates. In this way could the Punjab grow many varieties of trees which are both shady and useful, making the landscape interesting and pleasant to the eye of the weary traveller and giving enjoyable shade and a cooler atmosphere to the toiling peasant. The rigours of the hot winds would be considerably reduced and the comfort and well-being of the people increased. This is not a Utopian scheme, for I feel sure that if the work were taken in hand in real earnest it would be bound, like all other measures of public health and sanitation, to bring health, well-being and prosperity to succeeding generations.

CHAPTER XVII

SIMPLE MEASURES FOR THE PRESERVATION OF HEALTH

Cleanly and dirty habits

Everyone likes to keep well, to enjoy life, and to live long. Everyone, also, likes to see his family and friends well and happy. Illness, however slight, makes one miserable and unhappy. A cursory investigation in any community would disclose indescribable misery and wretchedness from sickness, much of which is due to poverty, ignorance, and consequent unhygienic conditions. It is, however, remarkable that want of cleanliness in a house is the cause of a considerable amount of ill-health. Such dreaded diseases as Diarrhoea, Typhoid Fever, Cholera, Dysentery, and even Tuberculosis, may be avoided by simple attention to cleanliness.

Take, for instance, the cleanliness of the family cook and his kitchen. The cook should bathe daily in clean water and wear clean clothes. After doing anything, no matter how trivial the act may be, making a bed, smoking, micturating, etc., his first care should be to wash his hands with soap and water. His kitchen should be clean. The metal utensils should be cleansed with kitchen ashes, sand, or earth, heated or burnt and safely kept in a clean, dry place. China dishes should be washed with soap and water and dried with a clean cloth, and

all the clothes soiled during the cooking should be washed daily or as often as they become dirty. No shoes or dirty feet should be allowed in the kitchen for they are liable to bring in disease-infected dirt on the soles. The washing of utensils with dirty earth, or canal or river water is never safe. The sweeper should not be allowed to raise a dust in the vicinity of the kitchen under any consideration, nor should spitting be permitted anywhere near.

If there is the slightest suspicion about the purity of the water, it should be boiled before it is used for drinking. Unfortunately village wells are often polluted, and it is never wise to drink such water unboiled. In large towns the municipalities usually provide water through their pipes, and are responsible for keeping the supply pure. It is, however, often necessary to store the water in earthenware vessels in order to keep it cool in summer. These vessels should have a well-fitting lid, and they should be kept in a clean, dustless place, the water being changed daily, one vessel being kept empty for 24 hours while the other is used. Thus any germs finding their way into the water would be destroyed when the vessel is empty and dry. As a further precaution the earthenware vessels should be frequently renewed, thus avoiding danger from the accumulation of dirt or germs.

Vegetables and fruit bought from shops are often handled by dirty hands and washed in dirty canal or well water. I have seen cucumbers, etc., washed in canal

water, and vegetables for sale frequently sprinkled in summer with dirty water from skins, while dust, containing all sorts of micro-organisms, settles down on them from the dusty bazars. Vegetables and fruit may thus be the cause of cholera, tuberculosis, enteric fever, and worms. In order to prevent these diseases, vegetables and fruit should be thoroughly washed in clean running water, or preferably, first soaked for a quarter of an hour in a weak solution of permanganate of potash and then rinsed in fresh clean water. There is of course not so much danger in the case of boiled or cooked vegetables, as all pathogenic organisms die in the process of heating or boiling.

Insects, such as flies, are dangerous pests, for they settle on all sorts of dirty matter and thus convey infection to food. They may easily cause the above-mentioned diseases if they have been in contact with the excreta of sick people or the sputum of persons suffering from tuberculosis. Flies should therefore be rigorously excluded from the kitchen and dining-room. This can easily be done by the use of chinks or gauze doors, and by scrupulous cleanliness. Flies breed in human excreta, horse, goat, and cow dung, as well as in other rubbish. One fly lays 120 to 150 eggs which hatch and mature into so many flies in 8 to 14 days, ready to begin the process again. Attention to cleanliness, therefore, and to the destruction of breeding places in the vicinity of houses is very necessary. Cows, buffaloes, and other domestic animals are often kept in the vestibules or inside

the courtyards of even well-to-do houses. The floors are never cleaned and the animals hardly ever properly washed, and these places are the hot-beds of flies, which are not only annoying pests but a danger to life in many ways. Such animals should not be kept either in or near the house.

In tropical countries heavy tapestries and curtains and huge carpets fitting the floors of large rooms are a nuisance. Tapestry and curtains are the hiding-places of mosquitoes and other insects, while carpets which are usually laid over mats and durries, are frequently the hiding and breeding-places not only of insects but of poisonous reptiles. They are cumbersome and, once laid, are allowed to remain down for years. When cleaned with a stiff brush the dust blows about in the room, settling down on the curtains and walls. Thus it is that dust brought into the house by shoes and bare feet finds its way into the throat and lungs of the occupants of the house and causes bronchitis, tuberculosis, and nasal and throat affections. Carpets should either be cleaned by vacuum cleaners or should be taken out of the house to some distance and shaken: cement floors should be washed with a wet cloth. If a brush has to be used to remove the dust from a floor, it should be a soft one and every effort should be made to prevent the dust from rising in the room.

It is evident that scrupulous cleanliness and the prevention of flies from gaining entrance into the kitchen and house, and lastly, the avoidance of dust

in the living rooms, are most important measures of public health which can easily be carried out in every household and can thus prevent a large number of dangerous diseases which even educated people, ignorant of these simple commonsense matters, contract in their own homes. Careful attention to them would certainly remove a considerable amount of ill-health of which no one desires to be the victim.

Dirty and dangerous habits.

Standards of cleanliness vary in various countries and among different races. As regards personal cleanliness we have inherited excellent rules of conduct, but we misuse every one of them. It is enjoined on us to keep our body clean: therefore do we bathe every morning on the parapet of the well, polluting its water with our swillings, or, in our zeal for cleanliness, we may bathe even in dirty ponds, tanks, and canals into which sewage flows. It is undoubtedly a very good custom to wash the hands before and after meals and to clean the mouth well, but surely the dirty water of canal, pond, or ditch does not exactly meet the case! I have seen, not once nor twice but dozens of times, one man assiduously cleaning his mouth and teeth with the water of the canal, while a little higher up another fellow was just as assiduously blowing his nose into it. I remember also having some little difficulty in persuading one of my servants that it was much better to use the water of the tap for his mouth washing than the water of the canal which flows at the end of the garden and in which the neighbour's "mehtar"

washes articles which can by no stretch of imagination be called clean!

After defecation the parts are washed with water, but what of the hands thus soiled? To rub them with dirty earth and wash them in any ditch or pond water that happens to be handy, will certainly not clean them. Our brass utensils are similarly rubbed and scrubbed with earth just picked up from anywhere. I have seen servants doing this under the nose of even well-educated masters, who evidently lack the imagination to see that in doing so they are defeating their object. A bucket is scrubbed with the earth surrounding it (trampled by all kinds of feet and containing Heaven knows what varieties of filth) lowered into the water, washed by repeated jerks of the rope, and then drawn up full of water ready for drinking! Surely it would be better not to clean at all than to do it with dirty earth and dirty the water.

For the purpose of cleanliness, soap and clean water are the best, but dry clean earth or ashes make a very good substitute for soap. Our good, clean habits have been converted into dirty ones, and no one appears to realise that dirty hands, dirty water, and polluted earth are the causes of spreading dysentery, diarrhœa, cholera and typhoid. When people cook and handle food either for themselves or for others, when they prepare sweets, and milk the cow's dirty udders into dirty buckets, etc., all in such a careless haphazard fashion, is it surprising that these dangerous diseases flare up wherever there are

fairs or large congregations of people, and that epidemics continue to crop up in sporadic form all over the country.

To some the idea of having a water closet in the house is abhorrent—they prefer to have commodes and give the job of cleaning them to the sweeper! They will not bathe in a tubful of clean water or wash their face in a basin because they consider it a dirty habit and yet dirty canal water, etc. is not taboo. To answer the call of nature they prefer to go out, away from their own dwelling-place, but never stop to consider that they may be causing a nuisance to others. They will squat anywhere, and the spare lands near the villages and towns reek with disgusting odours. The sight of men (often educated ones) dotted about all over the countryside when one goes for a walk in the morning, or even in the streets during the day, in full view of all and sundry, is nauseating in the last degree. No wonder our womenfolk feel it necessary to veil their faces!

We are terribly keen on keeping the nose and throat clean, even if it is at the expense of the cleanliness of the walls and floors of our home. It is a common thing for people to spit and blow their noses in the street, or the house. A European lady once told me of an Indian knight (once a member of the Viceroy's Executive Council) who, while sitting in her drawing-room, punctuated his remarks by expectorating into the *gas-fire*, nor were his shots particularly accurate either!

Some years ago I was travelling in a second-class compartment with four or five other passengers. In the morning, one of them had a bucketful of water brought by his servant. This he proceeded to pour over his *dhoti*-clad body on to the carriage floor. Then he changed his wet *dhoti* and seated himself on a seat by the window, Buddha fashion, in preparation for his prayers. These he interspersed by frequent blowings of the nose on to the window pane on his right and by spitting on to the floor on his left, so that by the time the prayers were finished—and they lasted more than an hour—the window was covered by nasal excretions, while the floor was decorated by his expectorations. Even educated people will spit around as they sit, never realising the dangers which may be conveyed to others by the flies which they thus attract. It is sad to observe how people, inheriting the cleanest code of life, have adopted habits which are not only dirty, but dangerous from the point of view of public health. Our milk, fruit, and vegetables are literally dirty and our food and sweets are prepared and kept carelessly, and it is no wonder that a European hesitates to enter our homes even for a cup of tea. If he does come we have to clean our house and dress our servants in clean clothes or engage temporary ones from some European-managed hotel. The European dreads infectious disease, and looks after his health as far as possible, so it is not surprising that he will only enter into social amenities on his own terms.

Let us now consider the European standard of cleanliness. In the West evolution has been slow and progressive on scientific lines. Not many years ago personal cleanliness consisted in washing the face, neck, and hands and having the hair well brushed and combed, and, before the advent of properly constructed sanitary conveniences, the pollution, and soiling of the countryside was as common there as here. In some countries, even now, people in country districts use the land as a common sanitary convenience, freely and openly, in full view of the passers-by, and there also epidemics of cholera, typhoid and other dirt diseases are still prevalent.

With the improvement in economic conditions, sanitary development has proceeded apace. During the early days of my stay in England the morning bath was an exception rather than a rule, and the weekly bath was considered sufficient for the general cleanliness of the body. Even now the weekly bath of the children in a tub is all that is customary among the working people. It is not the practice to wash the hands before and after meals nor is the mouth washed after meals. The cleaning of the teeth with a brush is not common even now among this class. After defecation paper is universally used for purposes of cleanliness, and it is easy to understand that if the bath were not taken daily, the hands and the shirt would be frequently soiled unless one were scrupulously careful.

In my Annual Report for the year 1913, pre-

sented to the council whose Medical Officer I was, I wrote:—"Apart from these verminous conditions, very little attention is paid to the cleanliness of the body, even by those who should know better. The washing of face, hands and neck is all that is usually done, and frequently a person with a scrupulously clean face and hands, hides a dirty body under a clean and stylish dress. This is equally true of both sexes and among even better-class artisans.

No wonder that a large number of dirty children are found in our schools. The advantages of cleanliness of the body and of bathing are never realised by the parents. They have no baths in their houses and even if the houses were provided with bathrooms, the latter would probably be used for storing articles of lumber.

The scholars are unable to acquire the habit of bathing from their parents who do not themselves understand its advantages, or from the teachers who have neither facilities nor time to inculcate ideas of cleanliness, and it is not fair for clean scholars to be mixed up with dirty ones and bring infection of various kinds to their clean homes."

Conditions are of course much better now. Thanks to the provision of public baths, the installation of baths in the houses of working men, the labour of those connected with Maternity and Child Welfare Centres, school medical officers and nurses, baths are taken much more regularly and frequently. The care of the mouth and teeth, which used to be badly neglected, causing foul

breath and disease of the teeth and gums, is now undertaken by the School Medical and Dental Department; and the children are now being trained in the scientific method of cleaning the mouth.

With regard to general cleanliness, etc., after making an inspection of cowsheds, I wrote in my Annual Report for 1909:—"While there are clean, airy, well-lighted cowsheds, provided with impervious flooring and good drainage, there are others which are filthy, ill-ventilated, ill-lit, with broken up and defective floors soaked with stinking semi-solid filth and without a properly constructed drain.

In some cases I have watched the process of milking. Clean cowsheds have generally cleanly milkers. In others in a foul-smelling, dust-laden atmosphere, I have seen hands, covered with dark green filth, engaged in milking cows whose udders and hind quarters were covered with a thick layer of dirt easily displaced by the swinging of the tail and the movements of the milker; the milking stools kits and other utensils being also dirty. I have seen the sieved milk full of innumerable dark particles of various sizes. It is evident that a good deal of difficulty will be experienced in order to enforce your Regulations made under the Dairies, Cowsheds, and Milkshops Order, 1885."

The fact of the matter is that sanitary laws have been administered more and more vigorously by the councils, and the latter have been kept well up to their duties by the Ministry of Health. The supervision of bakeries, slaughter-houses, cow-

sheds dairies, the buildings of sanitary houses, of clean, impervious, dustless roads, and of the disposal of sewage, etc., has been carried out by the Health Departments of the councils of towns, cities, urban and rural districts. Such measures as the prohibition of spitting in buses, trams, trains and other public places, the compulsory notification and treatment of infectious cases in the Isolation hospitals, the provision of the great national scheme for the treatment of Tuberculosis, and scores of others, have improved the standard of cleanliness considerably. Thus, while in India typhoid, dysentery, diarrhoea and cholera are present everywhere, in England they are almost extinct, and tuberculosis, which does not show any signs of decreasing in India, has been rapidly declining in England. In America also, as an American doctor told me not long ago, tuberculosis is now well in hand, that is to say not only are the cases decreasing every year, but cures are more and more frequent.

It will be seen that we shall have to acquire cleanly habits in order to escape from dangerous infectious diseases. There is no royal road to health, no other road in fact than the pursuit of the laws of public health and the shedding of unclean habits.

CHAPTER XVIII

INFANT FEEDING—I

So many children, among all classes of people, are under-fed and badly fed, and such a large number of them (about one-third of the number born) die before they complete the first year of their existence, that it is necessary to investigate the causation of this state of affairs. They are usually small, with bony arms and legs, with abdomen tense and bulging, and cheeks pale and sunken; they are peevish and restless. In India, mothers, if at all possible, feed their babies on breast milk and even continue to do so for two or more years. Children fed on mother's milk should be vigorous and strong. They should be plump with shapely and muscular arms and legs, chest and abdomen proportionately developed and face full, healthy, and bright. One certainly does not expect the children of our millions of starving mothers to be well nourished and well-built, but mothers more fortunately situated should show better results; and to be able to do so, it is necessary that they should understand the proper method of feeding their children.

Breast-feeding, considered from all points of view, is the best method of feeding, and the unlucky child who, for some reason or other, is unable to have its mother's milk, starts life with a severe handicap, for it is impossible to find a perfect substitute for

mother's milk. Mothers must bear in mind that the deprivation of the infant of healthy mother's milk is a great calamity, which may prove dangerous to life and cause permanent injury to health. They should do their utmost to get over imaginary or real difficulties and troubles in the way of breast-feeding, and bring up their children on their own milk.

The flow of milk from the breast does not usually commence with the birth of the child, and two or three days may elapse before it sets in properly. Nevertheless the baby should be put to the breast about every 4 hours, as the very operation of sucking stimulates the breast to action. It is hardly necessary to remind the mother of the most elementary rule of hygiene, *vis.* the cleanliness of the nipples, which are often cracked, sore, or septic, in which case they should be properly treated. Even when the nipples are otherwise healthy, the openings of the glands may be blocked by dry, decomposing discharge which should be cleaned out with soap and water or, preferably, by gently wiping with a soft cloth damped with methylated spirit. The latter quickly removes all dirt and sterilises the parts. The first milk or colostrum, is very useful to the baby, for it is nature's own aperient which clears the intestines of the decomposing refuse which accumulates while the intestines are dormant or inactive *in utero*. A little sterilized or boiled water, administered two or three times a day before the milk appears, is very beneficial.

Here a note of warning may be sounded against the injurious and mischievous custom of dosing the

poor innocent baby with castor oil on the slightest pretext. If the mite is slightly constipated, if it has been restless for some cause or other, if it cries for some reason, if it has taken cold, or has fever or diarrhœa, it is to castor oil that the mother, and I am sorry to say even the medical man, would fly for assistance. Castor oil is to-day probably the most commonly used remedy for babies, who are often given a dose on the very first day of birth, either by the midwife or by the order of the doctor. While it is unnecessary to argue with my colleagues on the baneful effects of its injudicious use, as text books are full of its praise and they have learned in the medical schools to form a high opinion of this drug, the layman will probably understand the reason for my protest against its abuse. The haphazard administration of castor oil, which is in vogue now-a-days, imparts the castor oil habit to the intestines which, beginning in early childhood at the hand of the mother, continues throughout life, when all sorts of drugs are used for the relief of the constipation with which the majority of civilised men are afflicted. It causes active peristalsis, or unnatural movement in the intestines, which are delicate and tender, thus giving avoidable pain and uneasiness. Human babies, like the animal young, if brought up naturally, should thrive and grow up without the assistance of this oil. It can be confidently said that the use of castor oil is not only unnecessary, but positively harmful, and its present-day abuse causes permanent injury to the intestines. Constipation is rare among infants brought up on breast milk by

healthily and careful mothers for their breast milk is wholesome, rich, and vitaminous, and prevents scurvy, constipation, and malnutrition. No laxative is thus usually necessary, but occasionally the administration of fresh fruit juice may be useful, and in my experience it has invariably succeeded wherever a laxative effect has been required.

The mother should begin, almost from the birth of the baby, to instil in it the habit of discipline and regular life. A good mother will train her baby to answer the call of nature twice a day, by holding it out night and morning. She will often know if there is going to be a motion at mid-day, for breast-fed babies often have liquid or semi-liquid motions two or three times a day.

The mother should bear in mind that the health of her baby depends upon her own health. If she is in good health, cheerful and strong, free from headache, constipation, etc., her milk will be pure, rich, and invigorating. She should therefore take wholesome food, sufficient exercise and sleep. Fresh fruit, green vegetables, and nuts rich in vitamins, milk, and cooked vegetables should form an essential part of the daily diet. She would do well to avoid tea, coffee, alcohol, tobacco, etc. Late hours and a gay life are incompatible with good motherhood.

Feeding should consist of regular four-hourly feeds; 6 A.M., 10 A.M., 2 P.M., 6 P.M., and 10 P.M. are usually most suitable and convenient. The child should be trained to wake up at meal times by being wakened whenever it is inclined to oversleep.

Suckling should be commenced punctually and should take about fifteen to twenty minutes. Some babies suck quickly, but this should be discouraged, as gulping will cause flatulence, pain, uneasiness, sickness, or even diarrhoea. Some babies may require three-hourly feeds.

Irregular feeding is more harmful to children than even irregular meals are to their elders. The child forms the habit of overfeeding when it is very hungry, and of unnecessary, and hence injurious, feeding when it is not hungry. The mother is unable to know whether her baby is crying on account of hunger, some uneasiness in the abdomen, or pain in the head or stomach. To feed the child who is crying from uneasiness or pain, merely aggravates his misery. Various ailments, simple, but annoying to the mother and hurtful to the baby, become the rule. If the child thrives, it does so fitfully, and often, under the guidance of immature judgment or thoughtless counsel, both the child and the mother lead a miserable existence on account of the constant crying of the former, and the sleeplessness and worry of the latter.

A properly fed and well disciplined baby will often sleep from feed to feed, learning to wake up in time for the next one. When awake it is smiling and happy, and will sleep most of the night without accessory feeding.

The mother should thus feed her baby for seven or eight months, when some of the teeth will appear,

This is nature's signal to prepare to cease suckling and for this purpose she should first give up all except the morning and evening feed, *viz.* 6 A.M. and 10 P.M. The other feeds should consist of clean cow's milk at first diluted with $\frac{1}{4}$ the quantity of sterilized or boiled water and suitably sweetened. The quantity of each feed varies from eight ounces upwards, according to the age of the child, who should certainly be completely weaned by the time it is 10 months old. Fruit juices should be given as supplying vitamins and laxative principles, and with advancing age solid food should be added and the number of meals suitably reduced, but regularity of meals should be insisted upon.

A baby thus carefully and intelligently brought up in the first year of its life, will be plump, healthy, strong, and cheerful, and will be better fitted to get over the troublesome period of dentition, being a source of joy to the parents, and pride and glory to the mother.

CHAPTER XIX

INFANT FEEDING—II

Mother's milk is manufactured by Nature, from the mother's blood, and contains all the ingredients required for the nourishment of the baby. These ingredients depend to a certain extent on the kind of food the mother takes. Should she be poor and starving, or underfed, should she have nothing but *dal* and *chapatis*, her milk would naturally be poor, and deficient in fat and vitamins. If she takes some ghee with her food, the milk will still be deficient in some vitamins. Babies fed on such milk are poorly developed and suffer from all sorts of ailments, *e.g.*, enlarged stomach, distended abdomen, emaciation, rickets, scurvy, constipation, sore eyes, running nose, bronchial catarrh, etc., and lead a miserable life until some fortunate circumstance either carries them off or helps to build up a decent constitution. Should the mother be healthy and better circumstanced, and feed herself properly by taking, besides other food, green vegetables and fruit, she will provide ideal milk for her babe. Unfortunately, however, it is not always possible for a baby to have mother's milk. Sometimes it is the mother who does not want to be bothered with suckling, preferring to entrust the unfortunate child to the care of an ayah or wet-nurse, herself "enjoying life" the while. Then, a

mother may lose her milk or, from mal-development of the breast or some other cause, may have no milk; or the mother's illness or death may prevent the infant's having its natural nourishment. In these and similar cases the baby has to be fed by artificial means. Cow's, goat's, or ass's milk is then in requisition. Goat's milk, or ass's milk, (especially the former) come very near to mother's milk in ingredients, and may be given wherever feasible. It must, however, be borne in mind that it is necessary to feed the animal on good food and fresh, green fodder in order to procure satisfactory milk for the baby. Dried milks are very much advertised and their number is legion. They are credited with better and more wholesome properties and are said to contain all the nourishing matter together with the correct quantity of vitamins. They are certainly as a rule produced under hygienic conditions, prepared by the most reliable scientific methods and kept hermetically sealed in bottles or tins.

Dried milk is prepared thousands of miles away, passes through a variety of temperatures during transit and storage, and months (probably years) elapse before it is consumed. Being organic matter it is bound to deteriorate in quality and can never take the place of fresh animal milk. It makes, however, a good substitute if good and fresh cow's milk is not procurable, but as the latter is found almost everywhere, only this milk will be considered in these notes.

It must also be remembered that the baby which is artificially fed needs a substitute not only for mother's milk, but for the mother's breast as well, *vis.*, a bottle with a teat. Nature keeps the mother's milk fresh and sterilised, and the nipple is soft full, and non-collapsible, and allows a suitable flow when the baby sucks. The bottle should therefore possess similar characteristics. It should be graduated and made of good glass and should hold milk sufficient in quantity for one feed. It should be easily cleanable in all its nooks and corners with brush, soda, and other suitable material. The teat should also be easily cleanable, capable of being turned inside out, and of a suitable size and consistency, allowing the milk to flow slowly. After the feed, the bottle and teat become smeared with milk which decomposes very easily and is liable to become infected with all sorts of microbes. The bottle should first be washed and brushed with cold water, after which it should be thoroughly washed with hot water and soda, rinsed well first with hot and then with cold water, and finally placed in cold, sterilised water ready for use. The teat should be similarly cleansed of all curds, etc., but without the use of soda. It may then be boiled or sterilised, but the latter procedure is not necessary if sufficient care has been taken in cleansing it with boiled hot water.

For the benefit of parents who feed their baby with intelligent care, it is well to give the following average chemical composition of both human and

cow's milk :—

	Human milk		Cow's milk
Water	... 87.5	...	87.3
Fat	... 3.5	...	3.6 to 4.
Protein	... 1.3	...	3.8
Milk sugar	... 6.5	...	4.5
Mineral matter	... .27	...	.7

It may be noted that cow's milk contains almost 3 times the quantity of protein, but less sugar than mother's milk, the fat content of both being about the same. To reduce the quantity of protein, water will have to be added; thus fat and sugar will be proportionately reduced. To the diluted cow's milk sugar and fat will have to be added in order to bring it to the level of human milk. Good cow's milk, however, contains a larger amount of cream and would not usually require the addition of cream when diluted. Moreover a baby's stomach is a remarkable organism and easily adapts itself to cow's milk prepared with reasonable care. Discipline and regularity in feeding in the case of an artificially fed child is of even more importance than in the case of a breast-fed baby, as are also keen observation and intelligent interpretation of the infant's cries on the part of the mother. It should be remembered that in the case of the artificially-fed child the bowels are moved usually only once a day, and if the child is constipated it shows that it has either been fed on milk which needs improvement in quality by a decrease in the quantity of water added, or fed too rapidly, causing vomiting and constipation.

It is necessary, of course, to modify the quality and quantity of milk, as the child grows. Care should be taken to have clean milk from clean udders, milked by clean hands into a clean utensil, and kept in a clean vessel. As danger of pollution and infection is too great in India, the milk should be boiled for two minutes and then kept in a cool place, well covered and protected from any pollution.

The number of feeds that a baby should take, holds good in this case as in that of a breast-fed baby, and if all instructions are carried out the mother will note that if the milk given is too little, the baby will show hunger by a certain cry of dissatisfaction, while it will leave the breast, when the stomach is full. If, however, the mother presses and the foolish baby happens to take more than the stomach can hold, it will either vomit part of it back or cry with pain and distress.

During the first week the feed should consist of from one to two ounces of diluted milk, which is prepared by adding one part of milk to two of boiled water. Up to the age of three months the strength of the milk should be gradually increased from one to two, to equal parts of milk and water, and the quantity from one ounce to four and-a-half ounces per feed. When baby is about 6 weeks old, the dilution is 2 to 3 of water and the quantity 3 ounces. When baby cries with hunger immediately after a feed or becomes constipated, though all care and precautions are taken in the feeding, it is evident that stronger milk is required, and dilution should

accordingly be decreased. It will then be found that the child is more satisfied, sleeps comfortably and that the constipation is relieved. If the baby reaches the age of 3 months without any trouble, later feeding is much easier. Some babies have been known to take full cow's milk at the age of 3 months and to thrive well on it. Some medical men hold, even, that the human child is capable of taking undiluted cow's milk from the very beginning, but this may only be resorted to if the baby shows a natural desire for richer milk, and under no circumstances should the quantity of the feed be increased beyond the capacity of the stomach.

At the age of 4 months baby requires 5 ounces; at 5 months 6 ounces; and at 6 to 7 months $6\frac{1}{2}$ to $7\frac{1}{2}$ ounces of milk. The strength of the milk should be increased from equal parts of milk and water to two parts milk to one of water from four to five months; then three to one or even full at 6 months. If it has been necessary to boil the milk, some sweet fruit juice (water melon, apple, pear, sweet pomegranate, grapes, sweet lemons, or any other juicy fruit) should be given twice a day. This juice supplies the deficiency in vitamins in boiled milk, and is a useful laxative.

It may be observed that great diligence, care, and thought are necessary in feeding a child artificially, but it need be in no respect behind its breast-fed brother or sister in the matter of development. It is very necessary that parents who desire to de-

rive the greatest advantage from these notes should thoroughly grasp the subject, for the trouble taken in its bringing up will be amply repaid by the smiling face, thriving limbs, and happy sleep of their baby.

CHAPTER XX

SOME TROUBLES AND DISEASES OF CHILD LIFE—I

The reader who has carefully followed my remarks on infant feeding will realise how important for the health, growth and well-being of children is careful feeding and nursing, and what a great amount of simple knowledge and commonsense is necessary for their proper up-bringing. It is very rare indeed that a properly fed and brought up child needs any medicine, nor is the administration of drugs very often necessary in ordinary disease. How necessary it is for a family doctor to be competent in the subject of infant feeding is very evident. It is he who should guide the ignorant mother—and it is rare indeed to find a mother who has even the most rudimentary ideas on the matter—and impart to her a knowledge of this important subject in a practical and homely manner. It is he who should take pains in helping her to tide over the difficulties confronting her during the first week or so of her confinement. There may be sore nipples, delay in the commencement of lactation, the inability of the infant to take to sucking, or the temporary illness of the mother. These and many other simple troubles are warded off by thoughtful advice and patient and practical assistance.

In India, millions of children are born in homes where the advice of a competent medical man or mid-wife is quite out of the question, and consequently the suffering and death among them is appalling. There are, however, a few fortunate ones, born in wealthy and educated families (including Europeans, Christians, etc.) who can afford to employ a midwife or a doctor to act as friend and guide. The number of really competent mid-wives and women doctors is very small, and as male doctors are hardly ever employed at child birth, they have no opportunity of studying the proper bringing up of children. The result is that the children of all classes of society hardly ever receive competent and efficient professional assistance, and I hope I am not unduly disparaging the profession when I say that medical men automatically fall back upon drug treatment, which, in a large majority of cases, is not only useless, but positively injurious to the child, though satisfying the credulous parent.

Here, where the careful registration of births and deaths is not carried out, it is impossible to make a definite statement of the number of deaths and the death-rate among children, or to allocate the proportion of diseases from which they suffer, but in order to give some approximate idea, I would first invite the reader to take note of some statistics collected during my period of office as Medical Officer of Health for 20 years in an English town where the working class mother often works in the factory in order to earn her living or to supplement

the family income, and thus has to leave her child to the care of some friend or some old woman who does it as a means of livelihood. I may note in passing that in a number of factories and workplaces the proprietors provide crèches and employ nurses to look after the child while the mother is working, the latter being allowed to leave her work for the time needed for feeding the baby. When this practice grows and is adopted by act of Parliament the number of breast-fed babies will automatically increase. So far, however, the death-rate of infants in this district is higher than the average in England and Wales. My statistics cover a period of 19 years (1907 to 1925) and the death rate which was 194 per 1000 births in the year 1907, was exactly half (*viz.* 97) in 1925. This decrease, which was gradual, was due to many causes, such as better housing conditions, better sanitation and sanitary supervision (including milk and water supply), the employment of none but qualified midwives by law, the propagation of education in the feeding and nursing of children by lectures, cinemas, etc., the establishment of crèches for the care of infants of working mothers, the provision of free milk to poor children, and voluntary and Municipal Child Welfare work.

It was observed that thirty-one per cent. of the total number of deaths were due to diseases which result from irregular, indifferent or ignorant feeding with too poor, too rich, or dirty milk, or some unsuitable food. These diseases were diarrhœa,

gastritis, enteritis, starvation, debility, marasmus. Congenital defects claimed 9 per cent. infectious diseases 14 per cent. premature birth 15 per cent. bronchitis and pneumonia 17 per cent. overlying by the mother 1 per cent. and the remaining 13 per cent. The death-rate from bronchitis and pneumonia remained the same, the death-rate from congenital defects was practically doubled and there was only a slight decrease in the death-rate from premature birth.

Let us now turn our attention to deaths and diseases among our own infants in India. The infant death-rate in India is estimated at between 300 and 500 per thousand births. In other words, while, in the district cited above, out of every 10 babies born barely one dies before it reaches the age of twelve months, we lose, during the same period, in India, from 3 to 5 out of every ten born. What are then the causes of these deaths?

The first and the most important cause, to my mind, here as in other countries, is the variety of diseases which, for want of a better name, may be called "food" diseases, and among these a very large number of deaths will be included which are brought about not only by natural starvation, *viz.*, starvation as the result of ignorant feeding where the mother under-feeds the infant through her own ignorance or on the advice of some neighbour or relative; or overfeeds to such an extent that each feed is vomited back, but starvation due to feeding on the milk of a starving or underfed mother. This latter plays a

very important part in the deaths of our infants. Deaths from bronchitis, pneumonia, rickets and other avitaminous diseases come next. Among infectious diseases measles, whooping cough, small pox, dysentery, and tuberculosis probably claim a very large share of the death toll. As far as tuberculosis is concerned, the child who takes a good deal of milk, (even if not in early childhood), is faced with the calamity of double infection, from infected cow's milk on the one hand and the infected parent, relative or friend on the other, who by kissing and by close proximity during embrace and by the habit of sleeping and breathing under the same sheet or quilt, quickly impart the disease to him. All these diseases directly or indirectly, are responsible for the large number of deaths occurring among infants.

There are, in addition, many diseases and grave troubles and symptoms which beset a child in the early days of its existence and cause great misery to itself and its mother, some of the commonest of which will be dealt with here.

CHAPTER XXI

SOME TROUBLES AND DISEASES OF CHILD LIFE—II

Let us now consider some common but troublesome symptoms and diseases which are the bane of child life, for it is these which, if not attended to, lead to disastrous consequences, but which, if intelligently treated, yield to simple measures. The first and foremost of these is *crying*. At birth it is the infant's breath of life, a sharp and almost continuous cry being the sign of a live birth. How intently and anxiously does the mother listen for the first cry of her newly-born babe, and on hearing it how her face beams with relief and joy. Nature invokes crying for the purpose of expanding and aerating the lungs. In infancy there are two kinds of cry—the cry of pain and the cry of hunger; and the cry of pain may arise from different causes. Take for instance the cry caused by pain in the ear. This cry is accompanied by sleeplessness and movement of the head from side to side, and by a rubbing of the affected ear with hand or fist. The pain is due to inflammation of the ear or the eustachian tube, with considerable rise of temperature, and relief is instantaneous when a discharge appears from the ear or when the inflammation subsides. If the trouble is recognised, a warm linseed, boiled potato, or bread poultice,

or a boric fomentation, should be applied every three hours, this usually affords speedy relief. This pain portends adenoids and enlarged tonsils, a common but serious affection requiring the attention of a medical man. Then there is crying due to abdominal pain caused by flatulence, or inflammation of the stomach or bowels, bringing about diarrhoea and even dysentery. Of these, flatulence is the commonest cause of pain and crying. The child cries tearfully and pitifully according to the severity of the pain, drawing its legs up and down in an effort to secure relief. If it is simple flatulence, the discharge of wind by the mouth or per rectum eases the condition, but inflammation takes longer and should be treated by fasting, drinks of warm water and the application of warmth to the abdomen. Dysentery is of course, a very serious affection and should never be neglected, and the case should be placed in the hands of the doctor. The causes of flatulence and enteritis, etc., are (a) too rapid feeding, (b) feeding haphazardly or at irregular hours, (c) feeding with too rich milk, or (d) too poor, (e) dirty or infected milk, (f) using dirty bottles. The prevention of this trouble is simple. The infant should be fed slowly at regular intervals and, if artificially fed with humanised milk, in clean bottles. If flatulence does occur and the infant cries with pain, drinks of warm water together with warmth applied to the abdomen are very soothing. To this treatment the administration of caraway-seed water may be added. Caraway-seed water can be easily prepared at home and can be given in small teaspoon-

fuls. It is one of the safest and best drugs to administer in this trouble. Patent medicines, *e. g.*, gripe water, though sometimes giving temporary relief, should be discouraged, as often enough they contain bromides and even opiates.

The other form of crying, which is due to the pangs of hunger, is at first tearless, but if the hunger is unappeased tears and great restlessness appear, the crying becomes incessant. This kind of crying may even be caused by itching or some simple discomfort, which may keep the child irritable and awake at night and thus, through ignorance, bring other ailments in its train. The mother or the medical attendant should learn to study and differentiate these important signals or signs of the child's distress, and treat the case according to the circumstances. It is obvious that if the signal is not carefully studied, wrong treatment will not only not relieve the trouble, but will make it worse. For instance, what can a mother expect if she gives the child milk when it is crying with pain which is due to flatulence or inflammation caused by overfeeding. The child's distress will naturally grow worse. Or, conversely, drinks of warm water will serve no purpose if the child is hungry. How important it is for all who have the care of infants in hand to study their habits, characteristics and language, so as to bring them up properly, saving them from the numerous pitfalls into which they might easily fall.

Constipation is another trouble which is very common in infants. It may be remembered that

breast-fed babies are generally loose in the bowels, being moved two or three times a day, but it is not so in the case of artificially-fed infants. It is however necessary that a baby should have a free motion at least once a day. The cause of constipation is usually feeding with poor milk. It may be mother's milk or cow's milk. If the mother's milk is poor and watery and the child takes it in a large quantity, it vomits and is also constipated. It should be clearly understood that constipation is a disease of the alimentary system and, except in rare cases when it is a symptom of some grave disease, it is due to thoughtless feeding. The attention of the mother should be directed to the feeding of the child in order to discover the cause of the constipation, and it will be found that probably the mother has been feeding irregularly or too frequently, or that her milk is not satisfying to the child. Likewise, in the case of the artificially-fed child, similar circumstances produce similar results. In some cases, especially when artificial feeding is resorted to, fruit juices may have to be administered in order to relieve this condition. Syrup of rhubarb may, in rare cases, be given as a temporary measure, but castor oil, as I said before, should be withheld if at all possible.

Vomiting is a condition often found in infants who overfill the stomach with milk. It may also be due to reflex irritation during teething, but, when it is due to inflammation of the stomach or bowels, it is usually the result of unclean feeding and is often

accompanied by diarrhoea. Thus the prevention and treatment of this condition again resolves itself into a commonsense method of feeding.

Diarrhoea in children in its simplest form is again the result of bad feeding, over-feeding, irregular feeding, dirty feeding, or feeding with unsuitable food. The diarrhoea which is due to the irritation of teething gradually passes off without any ill effect.

When however, diarrhoea, constipation, or vomiting, are symptoms of a serious disease, simple remedies are of no avail. In tuberculosis of the abdomen all three symptoms may occur at one time or another and continue to harass the child for months: similarly other serious diseases in acute or chronic form may have these symptoms, but in such cases their treatment is a secondary matter, the principal disease being the one which should occupy the attention in the treatment of the patient.

Sore eyes.—If this condition appears within two or three days of birth, a doctor should be consulted at once, for in some cases inattention to this results in blindness. Otherwise cleanliness of the eyes and bathing with simple warm boric lotion is all that is necessary. It may be noted here that in India, dirt and infection play a great havoc with the eyes of our poor children. They bring about granular lids, opacities, chronic running and sore eyes and even blindness. It behoves all mothers to keep the child's eyes clean by washing the face with soap and water, by bathing the eyes with warm salt and

water or boric lotion and to protect them from infection or contact with others suffering from sore, red or running eyes and from the crawling dirty flies; and lastly under no circumstances they should pencil the delicate eyes with dirty *surma* by means of a hard and dirty rod. The pencil or rod in unscrupulous and ignorant hands is in my opinion the cause of many preventable eye troubles from which our children suffer.

Icterus or *Jaundice* of the newly-born occurs in nearly one-third of the live-born children. It can be easily detected by looking at the white of the eye which appears slightly yellow. The discoloration is never deep in these cases. It appears about the second or third day and the urine becomes very yellow, but the motions are whitish and colourless. This jaundice disappears in two or three weeks' time without leaving any ill effects. There is another jaundice of a serious nature which is rare. Here the discoloration deepens rapidly all over the body and the child vomits, rapidly loses vitality, and succumbs within a week or so. For this no treatment has been found to be of any avail.

Convulsions.—These peculiar fits are often enough due to irregular feeding, constipation, intestinal worms, or the irritation of teething. They may occur in such infectious diseases as measles, smallpox, etc. In a large majority of cases attention to feeding is necessary and when the fit starts the infant should at once be put into a warm bath to which some mustard has been added, while a cold

sponge should be applied to the head. Usually this terrifying malady disappears as rapidly as it comes, but if it persists no quack remedies should be tried but the services of the family doctor should be immediately requisitioned.

There are many other diseases to which infants are liable, the consideration of which is beyond the scope of these notes. There are, for instance, congenital diseases and defects including syphilis and gonorrhœa. These are serious and often require the early attention of a competent medical man. There are also infectious diseases, *e.g.* whooping cough, measles, cholera, dysentery, etc., which are contracted by the little one through association with some sufferer. These diseases again are of a very serious nature and prevention being better than cure, every attempt should be made for the protection of the child and the prevention of contact with sick persons. Many a life is lost through the thoughtless admission of healthy children to the presence of such patients. Intelligent parents should never allow this promiscuous mixing.

Tuberculosis, a chronic and grave disease appears in four forms among children, *vis.*, tuberculosis of the lungs, abdomen and meninges (or inflammation of the membranes covering the brain), and lastly general tuberculosis, when it is present in a chronic or acute form in abdomen, lungs and other viscera. In India a considerable number of children are doubly infected in their own homes, *vis.*, from infected parents and friends, and from infected milk, falling

thus an easy prey to the fell disease; beside which, children may contract the disease from their habit of putting into the mouth all sorts of things, including earth which may bear infected sputum. Thus the avenues of infection in the case of children are many and various, and it behoves parents to exercise great care. They would thus save their little ones from almost certain death.

Tuberculosis is found in children in England, but the number of tuberculous children is very small when compared with the number in India. For example, the infantile mortality from tuberculosis in the English town mentioned before, is 3 per 1,000 births, or about 2 per cent. of the total number of infant deaths. Among our children the incidence of this disease is considerably higher. It is very common indeed to see children suffering from abdominal tuberculosis, a chronic kind of ailment where the poor little mite gradually shrivels up to a literal skeleton. Infection of the glandular system and also of the lungs is equally common and tuberculosis of the brain covering or meningitis, being an extension of infection from the lungs or abdomen must necessarily be very frequent.

These diseases some of which are of a chronic nature, remain undiagnosed, as they are frequently treated by quacks, or impecunious but overworked medical men having neither the time nor the patience to investigate carefully cases which are both unremunerative and hopeless. We have therefore very meagre statistics in this country. Considered at a

very low estimate, in India no less than 3 million infants die annually, before they are a year old, and a very considerable number of them, I have no doubt, die of tuberculosis in one form or another. Our hospitals are unfortunately busy showing a daily record of patients seen and it is no concern of theirs to consider the convenience of the patients who must parade daily to swell the number. Thus doctors, clerks, and dispensers are kept on unnecessary routine work, and money and time is wasted, efficiency is sacrificed for show and no arrangements are made for scientific diagnosis or the keeping of accurate records, otherwise some startling and instructive vital statistics could be presented in order to show how much misery, disease, starvation and death prevail among the dumb population of our country.

Thrush.—This disease very commonly affects debilitated children especially those whose mode of feeding has been changed from breast to artificial feeding and is usually due to dirty bottle, teat or milk or in fact to dirty feeding. It is usually met with in infants during the first two months of life. It is inflammation of the mouth and commences as white spots on the tip of the tongue and inside the lips. These often coalesce and form patches. These spots or patches are raised and painless and the mouth is generally dry. They are often accompanied by diarrhoea. The only method of preventing this disease is scrupulous cleanliness of the feeding utensils and the mouth of the baby.

When the disease is developed the feeding bottles should be boiled and attention should be directed to proper feeding. Gentle swabbing of the patches with cotton wool soaked in boroglycerine or 1 per 1,000 solution of permanganate of potassium may be done and if the diarrhoea has developed, medical advice would be necessary.

CHAPTER XXII

TROUBLES AND DISEASES OF CHILD-LIFE—III

Among children's diseases, *adenoids* and *enlarged tonsils* are very troublesome maladies. Adenoids, or adenoid growths are found as masses of lymphoid tissue in the centre of the roof of the post-nares, or as sheets spread over the roof and posterior wall of the naso-pharynx. Enlarged tonsils are often unhealthy and are seldom found unassociated with adenoids. These growths, as has been stated previously, if not often dangerous to life, in a majority of cases give rise to serious defects which may shorten life. They may cause chronic nasal catarrh or other diseases of the nose, ear-aches, deafness, dumbness, abscess in the ear, abscess in the mastoid bone and even in the brain. They cause chronic bronchitis, pneumonia, or asthma, with consequent ill-health and defective development of the body. Adenoids usually disappear with the growth of the child and sometimes may even leave him in fairly good health, but they should never be lightly dealt with or thoughtlessly passed over, for, in a very large majority of cases, although the child escapes death, he is left with some chronic ailment or defect which makes his existence miserable and hampers him in the struggle for life. The child who suffers from adenoids is a mouth-breather and often a poor

sleeper, and even when apparently well, he may grow up thoughtless, dull, peevish, whining, and nervous in temperament, and weakly and stunted in growth. In most of these cases the only treatment is the removal of the adenoids and tonsils at a suitable age and time, by a competent operator. The result is often very rapid and startling, for the child loses his dullness and peevishness and becomes alert and bright, and growing stronger, his appetite returns, he enjoys his games, and his sleep is restful. If deafness was the trouble, his hearing becomes normal, ear-aches trouble him no more, bronchitis does not return, and colds, which previously lasted for weeks at a time, now disappear quickly. Altogether the child is a changed person. The improvement is of course not always so phenomenal, but it does occur in a majority of cases, and disappointing results are rare.

Persistent nasal catarrh is also common in children. Its causes are many, of which the adenoid growth is probably the commonest but there are many cases where no cause can be found, and often even one finds persistent nasal discharge in children whose tonsils and adenoids have been removed more than once. In these cases the nasal cavity is narrow and the child adopts the habit of mouth breathing. The anterior nares is red and the upper lip is usually red and sore with the continuous soaking of the skin below the nose. This condition requires careful and diligent treatment and it is necessary to train the child to breathe through the nasal passage.

Rickets frequently attacks the children of city dwellers in India. In the city in summer they are kept in the dark alleys for the sake of coolness; and in dark, dingy, and unventilated houses in winter for protection from cold. The child attacked by rickets begins to feel sore all over the body, and when an attempt is made to move it, it cries and prefers to lie still. There is also profuse sweating of the body, the child is pot-bellied, its legs and arms are thin, and its head appears large in proportion to its body. The anterior fontanelle also is very late in closing, the bones of the body undergo changes and the legs are bent and twisted from the weight of the body. The chest development too becomes restricted on account of pathological changes in the ribs.

Rickets is a disease brought about by food deficient in vitamin D. The mother who does not take milk, who lives in purdah within the four walls of her house, and who, when she does go out, is swathed from head to foot in enveloping robes, cannot be expected to derive any benefit from the brilliant sunshine which sheds ultraviolet rays all round for the healthy development and growth of animals and vegetables. Her milk is thus devoid of this important vitamin, as is also the boiled milk of an ill-nourished cow. Convulsions, bronchitis, stunted growth, crooked limbs, and deformity of the pelvis have far-reaching and serious consequences in the life of the child.

The prevention of this disease lies in a natural mode of life for both mother and child. Plenty of

fresh air, sunshine, and suitable food will not only prevent but, in a large majority of cases, cure the malady.

Scurvy, another disease similar to rickets, is caused by the deficiency of vitamin C, which is found freely in such fruits as lemon, orange, tomatoes, etc. The legs become tender and the child weakly and anæmic, presenting many symptoms similar to those in rickets. Spongy and bleeding gums have also been observed. The prevention and treatment are obvious. The nursing mother should take fresh fruit, *e. g.* oranges, tomatoes, apples, etc., and raw green vegetables in addition to good food. Orange and other fruit juice given to the artificially fed baby would prevent the disease, but where the disease is already developed, a treatment conducted similarly to that in the case of rickets gives rapid and good results.

There are many other ill-defined diseases and ailments which are caused by poor nourishment and lack of sunshine and fresh air. Pasty, anæmic children with thin legs and arms, and flabby muscles, whining, crying, peevish, and restless, although brought up on mother's milk, are the product of food devoid of vitamins and a lack of fresh air. Many of them, unable to stand cold, heat or infection develop some disease or other and suffer a premature death.

In India the children of even well-to-do people are under-fed, much below the average weight, and puny, as compared with European children. The

latter are a pound or more heavier at birth and brought up on mother's milk (or even artificially fed) they grow remarkably well, and are bright, playful and plump.

The children of the poor, who alas form the chief population of our country, sucking night and day for two or three years at the withered breasts of their under-fed mothers, can hardly be expected to thrive and show bright chubby faces and fat limbs. They are born in misery, like skinned rabbits in appearance, and eke out their existence on this earth as walking skeletons. What comfort, pleasure or joy of life they experience, God only knows! ..

The human child in India would tell tales of woe and misery if one were only observant enough in understanding its language and reading its physiognomy. It suffers untold pain and trouble. The desperate economic condition of the people has played havoc with child-life and brought nothing but starvation and sickness to the little creatures.

Prevent the chronic starvation of the parents, give them good food and fresh air, and most of the diseases of the children will be rapidly cured and their lives will tell quite a different story.

CHAPTER XXIII

ALCOHOL, OPIUM, BHANG, TOBACCO ETC.

I class these all together as articles of luxury, for they are usually resorted to on the recommendation of others as a source of enjoyment, a relief from pain, or a temporary escape from the troubles of life. Addiction soon follows and the craving becomes so strong, that abstinence is an impossibility. It may be said at the outset, that none of these articles, except for some temporary relief in medical hands, is of any real benefit to mankind, rather, in the majority of cases, do they permanently injure the constitution: therefore to all young men who happen to read these lines, I would strongly advise abstinence. Such advice is useless in the case of an old victim, as neither exposition of its evil effects, nor any amount of persuasion, would be likely to be of the slightest avail in turning any person from the use of the drug to which he became addicted in youth.

Alcohol.—The origin of alcohol is very simple. If a little yeast is added to a solution of grape sugar and kept at a temperature between 70° and 90° F., a chemical action takes place and the sugar is split up into alcohol and carbonic acid. The taste and the physiological action depend on the kind of grape sugar employed, the substances used to modify the taste, and, lastly, the quantity of alcohol contained.

Spirits, such as brandy and whisky, contain about 50 per cent. alcohol ; the former used to be distilled from the grape, but now it is often a blend of many spirits prepared from corn, and the latter from the malted grain. Gin contains oil of juniper, is sweetened by various substances, and is weaker in alcohol.

Wines, such as champagne, bordeaux, etc, contain from 10 to 15 per cent. while port and sherry contain from 20 to 25 per cent. alcohol. Wines are prepared from the fermented juice of the grape, and now of other fruits as well.

Beer, in old times in England, was brewed from malt and hops only, but is now brewed from starch and sugar, with various vegetable bitters added.

In India, as in other countries, various kinds of cheap beers are brewed legally by those who pay duty to the Government, and illegally by those who avoid it. It is scarcely possible, nor even necessary, to give a description of the various methods employed by the country folk in order to provide a drink, for use at festivals, etc., which will help them to forget, temporarily, the cares and worries of their pitiful lives, and give a sense of pleasure and exaltation on such auspicious occasions.

What does alcohol do ? It is hardly necessary to say anything as to its deleterious effect when used regularly and in excess. It has been estimated that the mortality of the intemperate is four to five times greater than that of the temperate of the same age, and in the same class and station of life. Intemper-

ate drinking not only brings about moral degradation, poverty, misery, and lunacy, but has often dire effects upon the generations to come. I give here the concluding remarks of a little book "Alcohol: its action on Human Organism" written by the advisory committee appointed by the Central Control Board (Liquor Traffic) which had, as its members, eminent physiologists, pathologists and pharmacologists of Great Britain. This is what they say about the temperate use of alcohol:—

"The risks of this poison action that have to be guarded against and the precautions to meet these risks may be summed up for practical purposes in the following propositions:—

- (i) To avoid a continued action on the tissues, such an interval should elapse between the times when alcoholic beverages are drunk as will prevent the persistent presence of a deleterious amount of the drug in the body.
- (ii) To avoid direct injury to the mucous membrane of the stomach, alcohol should not be taken in concentrated form and without food.

The temperate consumption of alcoholic liquors in accordance with these rules of practice may be considered to be physiologically harmless in the case of a large majority of normal adults; and this conclusion, it may be added, is fully borne out by the massive experience of mankind in wine-drinking and beer-drinking countries. On the other

hand, it is certainly true that alcoholic beverages are in no way necessary for healthy life: that they are harmful or dangerous if the above-mentioned precautions are not observed: and further, that they are definitely injurious for children and for most persons of unstable nervous system, notably for those who have had severe injuries of the head, or who have suffered from attacks of mental disorder, or from nervous shock."

The reader should note the very careful wording of the authors. What pleasure or enjoyment would there be in taking alcohol if it were to be taken under such restricted conditions!

Opium is the inspissated juice obtained from the capsules of the opium poppy, which is indigenous in India as in many eastern countries. In India opium is often prescribed by hakims, etc., for chronic rheumatic or neuritis pains, coughs, asthma, etc., and the patient finally becomes a confirmed addict, when the longing or craving for the drug is so intense that the victim would suffer agonies without it.

Opium is also used for smoking in India. It is said to produce a pleasant, soothing effect, but the regular use of it brings about moral degeneracy, loss of self-control and, in some cases, even lunacy: all thoughtful people will rigorously avoid it.

Bhang is Indian hemp and consists of the dried flowering and fruiting tops of the female plant of *Cannabis Sativa*. From this two other preparations are made, called ganjah and charas, and both

are used for smoking; bhang itself is used also as a drink and is prepared by crushing and adding water, milk, and sugar. Indian hemp acts on the central nervous system. It produces excitement with hallucinations at first, then a feeling of happiness and well-being, and, finally, brings about lethargy and deep sleep. These symptoms develop almost immediately upon the smoking of ganjah or charas. The use of this drug also causes moral degeneracy and loss of the finer human feelings, and, like that of the others already mentioned, should be condemned.

Tobacco is prepared from the tobacco plant which is grown extensively in this country. Tobacco is probably smoked all over the world, in one form or other. In former times in India, tobacco was invariably smoked in some form of hookah and the smoke passed through water before it reached the mouth. When I came to India, after an absence of many years, I was amazed to find even the working people smoking cigarettes in their own peculiar fashion, holding it between the third and fourth, or fourth and fifth fingers and drawing the smoke through the closed fist at the thumb end, so that no part of the cigarette touches the mouth. Now-a-days cigars and cigarettes are quite common in India and, being a handy smoke, can be indulged in without any preparation.

When tobacco is smoked, nicotine and other alkaloids are decomposed into many poisonous substances. Inordinate smoking causes hoarseness and

cough, especially in catarrhal subjects, also intermittent action of the heart, blurred vision, loss of colour perception, and tremors. The effect of smoking, on those who are not habituated to it, is a sudden rise of blood pressure, followed by collapse with cold sweating, shallow breathing and fall of blood pressure. As the smoking habit develops, all these symptoms disappear.

In cigarette smoking CO gas is produced, and it is estimated that a person who inhales will, smoking 25 cigarettes a day, put out of action 5 per cent. of hæmoglobin. Cigarette smoking has a peculiarly soothing effect on the nervous system and, once the habit is acquired, it is difficult to abandon it.

Tobacco smoking is purely a luxury habit, for no one smokes tobacco for any other reason but enjoyment, and as I advance in years I find its use on the increase. In the West, tobacco smoking has become very common among women, though before the War it was practically unknown.

Does smoking do any harm? In the case of over-indulgence, which is a comparative term and cannot be defined, it certainly does, in catarrhal subjects even moderate smoking is certainly injurious, while as to others it is not possible to form an opinion. It is, however, easy to express the opinion that smoking is a wasteful luxury, of very doubtful benefit.

PART II.
PREVENTABLE DISEASES
CHAPTER XXIV
MALARIAL FEVER

Malarial fever is the greatest cause of ill-health in India. All ages are affected and so are all classes of people, rich or poor, Hindus, Mohammedans, Europeans, and others residing in the country. Even newly-born babes have been found to be suffering from it. It follows surgical operations and accidental injuries, attacks women after child-birth, and is found associated with influenza, nasal catarrh, typhoid fever, tuberculosis, dysentery and other diseases. It brings about anæmia, neuritis, enlarged spleen, cachexia, neurasthenia, melancholia and all the misery and unhappiness attached to these and other conditions. It is ubiquitous and found all through the year, except when and wherever the atmospheric temperature falls below 60 degrees Fahrenheit. In order to deal with a calamity of such great magnitude as malarial fever, it behoves all men and women of this country to try to understand a few salient features of the disease, so that they may not only learn to escape from it, but may take suitable measures to banish it from the country, for, after all, malarial fever is an eminently preventable disease, the cause of which is now well established.

Malarial fever is caused by the bite of the anopheline mosquito, and, through the bite, by the injection of a certain parasite into the blood of man. The parasite has three varieties and according to whether one, two, or all varieties have found their way into the blood, do the symptoms of the disease and the prognosis vary considerably.

The malarial parasite has two distinct cycles, one asexual and the other sexual. It is found that a parasite in the human blood produces roughly from a dozen to two dozen young ones by simple division in one generation. This is what is known as the asexual cycle, and it takes place in two to three days. After about 10 similar generations some of the parasites take on quite a different form and develop into male and female parasites. It is these so-called sexual forms that are very resistant to medical treatment, and as long as they remain in the human blood no further change takes place in them. The male mosquito is a vegetarian and lives on flowers, etc., while the female mosquito lives on human blood and during her feeding operation swallows some sexual forms of parasites. The sexual cycle is now completed in her body and thousands of asexual forms are produced. These are injected with her saliva into the human blood during her blood-sucking operation. Thus both cycles are complete. The sexual development and production of asexual forms in the mosquito takes from 10 to 12 days, and from the moment of injection of parasites into the blood to the development of symptoms of malarial fever

a period of fourteen days elapses, during which the parasites continue to multiply and produce toxins in the system. It is thus evident that from the time a mosquito is infected with the sexual forms of parasites, an interval of at least 24 or 26 days must elapse before malarial fever can develop in man.

This, in brief, is the life history of this insignificant looking minute parasite which plays such havoc with the health and the social and economic life of the people. The ideal remedy for exterminating this disease is the destruction of all female anopheline mosquitoes accustomed to harbour the parasites, or to destroy the parasites present in the human blood, or, as is more practicable, to attack both problems simultaneously. The situation is beset with difficulties and complications, and unless it is seriously and diligently tackled, no amelioration is possible. Suitable means have been adopted in various parts of the world with success. Thus in Panama, malarial fever and yellow fever were at one time rampant in such a virulent form that it was impossible to carry on operations for the building of the canal. Sanitarians were then given a free hand and health was preferred to wealth. Systematic measures were instituted vigorously and Panama was made free from malaria. In the Panama Canal area the death-rate from malarial fever fell from 20.5 per 1,000 in 1881 to .96 per 1,000 in 1911. In Ismalia, the work of anopheline destruction was carried on under the direction of the late Sir Ronald Ross, and cases of malaria were reduced from 1551 in 1902 to 37 in 1905, and there was not

a single case from 1906 to 1908. In England malarial fever existed in endemic form at one time, but it was unknown for many years before the War, when a few parasites were introduced by Indian and other soldiers, causing occasional cases of the fever. The disease is now compulsorily notifiable under a heavy penalty and a medical man notifying a case receives a fee of about Re. 1-10-0. The case is properly dealt with by the health department of the district, and all chance of its spread is thus avoided.

To be successful, measures should be carried out systematically by the health department of the province, and the intelligent assistance of the people should be acquired. The people should be educated by lantern lectures, illustrated pamphlets and other suitable means as to the injury to the health of the nation afflicted by the disease, the mode of spread of the disease, the life history of the mosquito and the methods that should be adopted to kill it, its eggs, larvæ, and pupæ, and to make the soil unfit for its propagation; and finally, as to the best mode of protection from its bites and, if infected, of extermination of the parasite in the body. Half-hearted measures are worse than useless. The scheme should be carefully thought out and measures should be carried out methodically, comprehensively, scientifically and economically. They require the active sympathy of the Government with the helpless condition of the people, the diligent services of inspectors, the scientific skill of sanitary engineers, and the intelligent co-operation of the people.

The Municipality or the Health Authority of each district should carry on the construction of suitable drainage, attend to the cleanliness of roadside ditches, control pools by oiling, fill depressions and use larvicides where necessary. The Municipality should undertake to discover carriers of malarial parasites and for this purpose the assistance and co-operation of medical practitioners, school authorities, and employers of labour is very essential. Quinine, or some similar drug, should be administered to all carriers free of charge.

As to the protection of healthy persons from malaria, all houses should be properly screened against mosquitoes. Mosquito nets are useful protectives against bites, as are also fans. Protective oils may be rubbed on the exposed parts. Probably the best deterrent oil consists of $1\frac{1}{2}$ parts of citronella oil, 1 part of kerosene, and 2 parts of coconut oil to which 1 per cent. of carbolic acid is added.

Boots protect the ankles and it is worth remembering that a mosquito will not bite through two pairs of socks or stockings owing to the risk of bending and injuring her proboscis.

Lastly, the great preventive measure is quinine. It is by no means a sure preventive. Those who habitually suffer from malaria should try it during the malarial season along with other measures, taking 5 grains every morning. It may not clear the blood from all the parasites, but it will no doubt prevent

them from multiplying to the point where symptoms are produced.

An interesting communication, "Why is cultivated Egypt immune from malaria," from the pen of Sir William Willcock was read at the Institute d'Egypte in December 1927. Sir William argues that malaria is rare in Egypt and that its rarity is due to the growth of leguminous plants, chiefly clover, and that their active principle, coumarin, produces immunity in mosquitoes to malaria; or at least renders malignant mosquitoes benign. If this idea were proved correct, the problem of mosquito destruction would become much simpler, and Sir William's discovery would prove a great boon to India. But convincing proofs are needed before his ideas can be put into universal practice.

CHAPTER XXV

TYPHOID FEVER AND PARATYPHOID FEVER

These two diseases are described together as they give similar symptoms and are similarly communicable and preventable. They are moreover caused by similar microbes which, entering the intestines through the medium of food or drink, develop rapidly and give rise to fever. The fever usually commences slowly with some headache, loss of appetite, or sleeplessness. The patient may be walking about and carrying on his occupation for some time, merely complaining of a tired feeling. Such cases are not however so common in India where the fever tends to be prolonged and severe, lasts three or four weeks, and is subject to two or three relapses. It is well to remember that in India typhoid or paratyphoid fever often attacks malarial patients, and the onset may then be sudden and sharp and associated with shivering, a common feature of malaria. In its chronic form the disease is known to last a year, the diagnosis thus presenting considerable difficulty and needing the bacteriologist's assistance.

Next to malaria, these are probably the most invalidating fevers in India. Their incidence may be cited as an index of the insanitary condition of a country. Epidemics of typhoid were fairly

common all over England about a quarter of a century ago, but to-day, with the rapid improvement in sanitation, the disease is under control and the number of cases is negligible. In India there is no reliable means of estimating the incidence of the disease, but it may safely be said that scarcely a house escapes its visitation, and patients suffer from repeated attacks of one or other form of the fever.

✧ As a rule one attack of fever confers immunity on the patient, but he may, besides the attack of typhoid, also have paratyphoid, which has two distinct varieties.

Infection exists in the stools and urine of the patient and is thus easily communicated, by personal contact, to nurses, parents and other members of the family. It is also present in the excreta of the convalescent and is found sometimes to continue for years after the attack. The patient, therefore, although quite well himself, is still able to infect others with the disease; he is then called a "carrier." As typhoid and paratyphoid are very prevalent among all ages and classes of people in India, it is safe to assume that carriers exist in almost every family. If the carrier is a milker, he will infect the milk; if he is a cook or servant, he may easily infect the food or drink; if he is a dealer in sweets, they will most probably be infected; or, in the case of a dispenser, the medicine he dispenses may be infected. If a carrier bathes on the edge of a well, he may impart infection to its water.

As I have explained before, on account of the habit of our people of defecating anywhere in the vicinity of village, town, or house, the land is polluted with infective matter, and particles of dust, flies, or even shoes inadvertently treading thereon, may convey infection to human food. There are innumerable ways in which infection may be transmitted to healthy persons, and it is not difficult to understand how it may reach the unlikeliest homes and cause small epidemics. Epidemics have been known to have been caused by an infected milk or water supply.

Prevention.—The problem of the prevention of the spread of this disease resolves itself into the answer to two questions, *viz.* :—

(1) How to prevent the patient, convalescent, or carrier from infecting healthy people?

(2) How should the healthy person escape infection?

The answer to the first question is this:—The excreta of patient, convalescent, or carrier, should be disinfected immediately after defecation or urination, and he should wash his hands with soap and water after. His clothes too should be kept clean and unsoiled. Carriers should not engage in any occupation connected with the public milk, water, or food supply, and, if this is unavoidable, scrupulous cleanliness should be observed. The nurse and other attendants on the patient should see that all utensils used by patient or carrier are thoroughly disinfected and cleaned, as also the clothes used or worn. They

must not lose sight of the fact that, unless the hands are well washed, each contact with the patient may impart the disease. Rigorous cleansing of the hands with soap and water after each contact is therefore absolutely essential.

In India, where the milk, water, and food supply of the public is not protected, by the sanitary authorities, from infection, it is unsafe not to be very circumspect. If there is the slightest suspicion of the water or milk it should be boiled before being taken. *Dahi*, which is so useful an article of diet, but which, if not well protected, may be the means of spreading the disease, should be taken with caution, for typhoid bacteria thrive in it. No sweets or articles of food sold in the bazar should be eaten unless their purity is assured, as they may easily be infected. Care should be taken to see that the servants who have charge of the preparation and serving of food are not carriers. The people serving drinks to pedestrians in hot weather should be scrupulously clean, whereas they are usually dirty and unscrupulous. Articles of diet which are taken uncooked, *viz.* fruit and some vegetables, should be well washed before being eaten. The problem of escaping from typhoid, therefore, involves great vigilance and the observance of a scrupulous cleanliness in the ordering of life, so that the possibility of infection is reduced to nullity.

The preventive measures described are, it must be confessed, very difficult to carry out, and such stringent methods would not be necessary if only

some attempt was made by the sanitary authorities to protect the food and drink of the public, to treat the patients in hospitals, and enforce the sanitary laws generally. Thus it is that in England, and many other civilised countries, one can move about freely and eat and drink at cafes, hotels, etc., without the least danger of infection.

Anti-typhoid inoculation brings protection for a year or so, and is useful when an epidemic is in progress or when it is not possible to follow rigorously the necessary preventive measures on account of living in the midst of the most unparalleled infringement of sanitary laws known to civilisation.

CHAPTER XXVI

CHOLERA

The word Cholera or '*Haisa!*' What sad and mournful scenes does it conjure up before our vision, what an uncanny and distressing dread overtakes the population during an epidemic! How swift its deadly attack and how devastating its effect on a household! How regular and defiant its appearance in the months of July and August! Present in endemic form in Lower Bengal and many other parts of India, this disease spreads in epidemic form and claims thousands of victims wherever it appears. Many of our brilliant young men and women have succumbed to it and what unthinkable havoc does it cause to the economic, intellectual and social life of the country. Cholera, it appears, was present in the times of Charak and Sushrut. These books describe the disease. Very few countries in either East or West have escaped its attack. It has been the dread of armies in the battlefield. From European countries, however, it has been banished by the sanitary authorities and during the last war its deadly sting was not felt, for being a preventable disease, routine sanitary measures were sufficient to ensure immunity from it.

At Lahore there used to be an Infectious Diseases Ward close to the main Hospital building and during my clinical clerkship in 1896 or 1897 it con-

tained cases of malignant small-pox, leprosy, advanced cases of tuberculosis, typhoid fever and cholera. I never forget the terrible dread I used to feel on approaching the building and looking back, I wonder how I escaped the diseases among which I had to move and with which I came into close contact. One night a cholera patient descended a well near by and after having a good drink returned to his bed. He recovered, but next day we had several cases of cholera among students who happened to drink the infected water of the well, the incident causing a great sensation in the Medical College. What little care was taken to prevent the spread of infectious disease will be well remembered by the students of those times. Our escape was nothing short of a miracle.

Causation.—The cause of this disease is a comma-shaped microbe: these microbes are found in the stomach and intestines and are hence voided in vomited matter and especially in stools. They have been found in virulent form in the intestines of healthy persons. It thus appears that they do not cause the disease in every person. Dyspepsia, constipation, indigestion, diarrhoea and low vitality probably predispose to the attack of this disease.

In India, cholera spreads in July and August, the months which are very hot and moist. Flies, cockroaches and insects of all kinds abound, and these insects especially flies carry infection not only on their bodies, but in their excreta. Vegetable gardens are polluted by human excreta and

the monsoon rainfall increases the pollution. The microbes live and multiply in moist stools, water and milk; thus green vegetables, water, milk and other articles of food are liable to infection. It is said that uncooked vegetables and raw fruit are liable to cause loose motions and thus a predisposition to the infection from microbes. People are warned during epidemics to avoid eating raw vegetables and fruit, *e. g.*, melons, cucumber, etc. In my opinion, however, people run the risk of having the disease in consequence of eating infected vegetables and not because of their being uncooked. A thorough washing with soap and water, permanganated water, and then clean running water will remove all danger of the disease. The use of fresh fruit and vegetables, *e. g.*, melons, water-melons, cucumber, tomatoes, lettuce, water cress, etc., is on the other hand wholesome, for in them one consumes a large amount of vitamins, which are known to provide immunity from many infectious diseases. I consider that green vegetables and juicy fruits are Nature's provisions in hot weather for providing pure fluid to alleviate thirst and vitamins for the prevention of infection and the preservation of human vitality. They should certainly be avoided by those who cannot supervise their washing and thus ensure their cleanliness and freedom from infection. Human carriers who harbour live cholera microbes in their intestines, especially cooks, sweet sellers, etc., are very dangerous. Epidemics of cholera spread during great fairs in consequence of the prevalent

insanitary conditions, and pollution of water, milk, and other food.

Symptoms.—In the beginning of the epidemic frequent rice-water motions of large quantity, great thirst, cold sweats, agonising cramps, sunken eyes and cheeks and great prostration ends life in a day or two; during its progress however reaction begins to set in and death is delayed for a few days or recovery results. Hakims and vairs then begin to acquire a reputation for cure and patent medicines are in great demand. As the recoveries increase in number, money pours in and fortunes are made by unscrupulous persons. Credulity and ignorance have their sway over the people and survivors tell stories of miraculous cures and continue to spread the darkness of ignorance among poor and trusting people.

A more or less permanent damage is caused to the health of the patients who eventually recover. Thus anæmia, eye diseases, diseases of the bowels, etc., are very frequent.

Treatment and prevention.—It is not customary in these notes to give the treatment of preventable disease. I however wish here to sound a note of warning and to point out that medical men have been at great pains in trying to find the treatment for this terrible disease. They have searched even the ancient books of this and other lands, but have found no sure cure. Readers must therefore avoid with care all quack remedies and advertised patent

panaceas. People in a terrified and despondent condition, in the face of a grave calamity such as an epidemic of cholera, are apt to try all kinds of useless or even harmful remedies, which are advertised by ignorant or interested people, and may thus lose valuable time, every second of which should be utilised in employing the best means known and available in order to prevent the fast approaching end of life. The best and most up-to-date treatment is published by medical men who should be ready in time of epidemics with all requirements, so as to save as many lives as possible, for this treatment has been proved to be the most reliable in saving the largest number of patients.

Pre-Epidemic Precautions.—The washing of the hands before meals and after defecation and micturition, which is a laudable custom handed down to us, should be regularly enforced. Unfortunately washing with cold water is not effective. The hands should be washed with soap and hot water both in summer and winter. Hot water is usually free from microbes and soap helps to clean the hands and removes dirt and kills microbes. This habit should be extended to the servants, who directly or indirectly handle food, drink, or utensils and it is necessary to watch and see that they acquire it. The cook should keep the towels for the hands and utensils clean by frequent washing with soap and water. Kitchen ashes, burnt earth and sand kept in the kitchen for brass utensils, and soap and hot water for china and glass-ware should be used for cleanliness. No

earth of doubtful or suspicious origin should ever be employed in the kitchen, which should be kept perfectly clean. The floor, if cement, should be daily washed with water, or earth-washed if it is made of earth. Flies, cockroaches, ants, etc., should be rigorously excluded from the kitchen. All green vegetables, *e.g.*, cucumber, tomato, cabbage, carrot, radish, etc., and all fruits, *e.g.*, melons, mangoes, apples, pears, etc., should, before use, be washed with permanganated water or even soap and water (if permanganated water is not procurable) and then in clean running water until the permanganate or soap is thoroughly washed off. They should be kept in a clean place free from flies and should be covered by a clean cloth if necessary. Sherbet, iced drinks and ice cream should be rigorously avoided as they are liable to convey infection if bought from unscrupulous dealers. In hot weather, drinks can be cooled by placing ice round the utensil containing the drink. Bazaar sweetmeats and foods (unless hot) should not be bought, and, when bought hot, should be kept in a closed and clean vessel. Cold food and sweetmeats are liable to pollution from flies, dust, and the dirty hands of dealers. Suspicious water should not be drunk unboiled; and bazaar milk should be well boiled and kept in a clean place and protected from insects. It may be thus seen that the habit of perfect cleanliness and watchful care in a household constitutes the rational method of prevention of this and many other diseases. On the approach of the months of cholera epidemic, the precautions and

rules above mentioned should be more carefully enforced. Cold drinks, sweetmeats and food from shops should be shunned unless and until the Sanitary Authorities begin to take interest in the health of the people and enforce, upon the shopkeepers who prepare food and drink for sale, rigid cleanliness and ordinary sanitary laws. This is an elementary duty which all civilised countries carry out.

In India the primitive method of the disposal of night soil is still in vogue. In the villages the people use the neighbouring country for their need, and in towns the night soil is kept on the premises and is removed in covered carts, to be buried in trenches or spread on vacant land. Other and more hygienic methods are conspicuous by their rarity. It is thus clear that kitchen gardens are often polluted. The growers of vegetables should carefully guard their land from human pollution. After defecation the stools should be covered by dry soil, which prevents the settling of flies and helps to decompose the organic matter quickly. Village wells should be protected from outward pollution. Bathing on the parapets and polluting the water by mud-besmeared buckets should be prohibited.

Personal precautions during epidemic.—The instructions and rules laid down for personal and home cleanliness during pre-epidemic periods, should be observed with redoubled vigour, and great vigilance should be exercised with reference to food and drink. Meat, fish (tinned or fresh) and all decomposable food should be abandoned, for it must be

remembered that these foods often cause ptomaine poisoning, which is very akin to cholera.

Public precautions.—In England, each sanitary authority has an Isolation Hospital with a certain number of beds for the infectious diseases that commonly occur. In addition it maintains a small-pox hospital (either alone or jointly with some other sanitary authority) and sometimes these small-pox hospitals remain empty for years. The one belonging to the district of which I was Medical Officer was empty (to my knowledge) for a period of twenty years and yet it was there, away from all habitation and away from the Isolation Hospital for other infectious diseases, and kept in good repair with all its equipment ready to deal with any epidemic. It is thus that the governments of civilised countries protect their people from dangerous diseases.

In India cholera epidemics are of almost annual occurrence in the months of July and August. The Sanitary Authorities with their bacteriological equipment should be ready to meet the situation. Isolation hospitals should be ready to treat the cases in the most up-to-date manner. By house to house search, cases should be discovered early and the co-operation of medical men should be solicited for the early notification of cases and assistance in their removal to the hospital. Hospital treatment under the supervision of a capable medical man and nursing by a sympathetic staff provides the best chance of recovery and the best means of preventing the spread of the epidemic in a household by contact.

The house can be immediately and thoroughly disinfected, the excreta made innocuous and the house thus freed from the danger of infection.

The education of the public by printed leaflets in all prevalent languages, the free attendance on patients either in hospital or at home, the disinfection of stools and vomited matter and lastly the free use of anti-cholera inoculation are among other preventive measures.

It may be observed that the insanitary method of dealing with night soil which prevails in India, is the central feature of this centuries old and annually recurring calamity. This disease has been practically exterminated in all civilised countries, an occasional imported case being securely isolated and no spread allowed to take place. England, France, Germany, and most European countries enjoy perfect immunity from it. This is due to the scientific application of ordinary sanitary laws by the governments and the whole-hearted co-operation of the people. The building of sanitary houses for all classes of people, the provision of a wholesome and well protected water supply, the procuring of a pure milk supply (by the legal enforcing of bye-laws and regulations for the cleanliness of cows, utensils, cowsheds and milkers, and by the elimination of tuberculous or diseased cows, and the prevention of the milking of cows by tubercular persons) and the protection of foods, sweets, etc., from all harmful and injurious influences during their preparation and exposure for sale, by frequent inspections by fully qualified inspectors in order to

see that all the bye-laws are observed with reference to the protection of articles from dust, flies and other injurious influences. To give only one instance of a small town in England, with the Sanitary conditions of which I am fully acquainted. It has a population of about 13,000 and owns a water works, which is situated at a distance of three miles. The reservoir was built by damming a valley and is about 63 feet deep. It cost the town 12 lakhs of rupees. As they need more water, extensions and re-arrangements are going on and will absorb another 2 lakhs. The people possess sanitary houses which are supplied with water closets, the sewerage and drainage is in excellent condition, an ample and up-to-date sewage works deals with the sewage, their own gas-works supplies the town with gas for cooking, heating, etc., and now they have secured an electric supply. It is thus that these towns are safe from such deadly diseases as cholera, typhoid, dysentery, etc. Insanitary conditions have multiplied in our towns in consequence of over-crowding, and in the villages in consequence of ignorance. The sweeper class handles excreta in every house all day long and is doomed to a miserable existence for life, while the most primitive and disgusting method of the disposal of night soil continues to pollute the land and thereby the food and water supply. The people are still kept in ignorance of the sanitary laws and poverty continues to grind the populace. Redress there appears to be none, and the legacy of these formidable calamities continues to spread death, untold misery and unhappiness among the millions of suffering and starving people of the country.

CHAPTER XXVII

DYSENTERY

Dysentery is the name given to a disease which causes the passage of blood and mucus, accompanied by abdominal tenderness and griping. It is very common in India; hardly any person escapes from its attacks. It may infect the whole household and many people suffer from it year after year. The disease is so well-known that it is scarcely necessary to describe its symptoms. Its causation, unfortunately, is little understood and all kinds of fanciful ideas are in vogue. One lady told me that each time she removes to a certain hill station, she develops this disease. This and similar ideas are born of ignorance and if the true cause is known, all the popular but false ideas can be easily explained away.

Causation.—There are all kinds of causes. Malignant malarial parasites sometimes cause the disease, as do also certain well-known worms, *e.g.*, schistosomes, and there are other rare causes, but dysentery is never caused by any forms of food or drink, providing they are clean. There are two serious forms of the disease which are the commonest. One of these is called amœbic dysentery and is caused by a small one-celled animalcule or protozoon. The presence of these animalcules can easily be demonstrated from fresh dysenteric

stools by the help of a microscope. They exist in the form of cysts in the stools of convalescents and even those who have recovered perfect health after an attack. These carriers are the principal cause of spreading dysentery. A cook or servant handling food and drink, or even a relative, may be a carrier and spread the disease in the household. Apart from carriers, infection may take place by uncooked fruit or vegetables being soiled by the hand of a dealer, etc. This may bring the infection directly from the dysenteric motion to the food. These cysts, when swallowed by flies, pass through them and are voided alive. Flies thus may infect food material by bringing the cysts on their legs or even by their excreta. Earth soiled with dysenteric stools may infect the otherwise pure water of a hill stream, and dust from such earth may find its way to food and drink.

The other kind of dysentery is called bacillary dysentery. Several kinds of germs have been found associated with it and this dysentery causes much greater prostration and suffering and spreads in very much the same manner—through infected food or drink.

The terrible nature of the disease can be gauged from the fact that in addition to causing great pain, general suffering and exhaustion, lasting sometimes for days and weeks, it often brings about inflammation of the liver, liver abscess, peritonitis, gangrene of the intestines, chronic constipation, and even death.

It must be noted that dysentery, like the other diseases described in my health notes, is a preventable disease practically extinct in all countries which have adopted ordinary sanitary measures. During my active practice for over a quarter of a century in England, I do not remember seeing a single case of dysentery; though some cases did occur during the war among soldiers, and do occur from time to time in such ports as Liverpool, London, etc., imported from African and Asiatic carriers. In England dysentery is compulsorily notifiable under penalty of a fine of £ 20, and those English soldiers who contracted the disease during the war and were invalided home, were immediately notified to the medical officer of the district in which they lived where suitable precautions were taken by the sanitary department to avoid the spread of the disease. Occasional relapses and sporadic cases occurred here and there, but they never caused any serious concern.

Prevention.—Dysentery, it must be admitted, is a dirt and poverty disease, and it is no wonder that in India it exists in endemic form in all villages and towns. In the villages there are no closets in the houses of the people and they walk out to the surrounding fields and common lands to empty their bowels. Children and sick persons use the mud floors or roofs of the houses, whence their motions are removed by the sweeper once a day, or often even remain there for days. It is evident that the greatest personal cleanliness, which is admittedly habitual in

our homes, is not sufficient to prevent the spread of infection. Flies, and the dust blowing about from soiled earth, can easily carry infection, and the slightest oversight in personal cleanliness would further add to the danger. Cesspools attached to houses and wells, overflowing into the streets may similarly cause infection. The habit of rubbing a bucket with dirty earth (ostensibly for the purpose of cleaning it) and then lowering it into the well water, is one which should be condemned. Bathing on the parapet of an open well and the washing of soiled clothes would easily pollute the water. There are thus hundreds of ways in which infection is spread in towns and villages, where the disease remains prevalent in hot weather.

Mud houses, and others having no suitable sanitary accommodation, cesspools, and wells, thus need attention. A commode or earthen vessel should be kept for emergencies and some disinfectant, *e. g.*, izal or cresol should be freely used in order to disinfect the vessel. It is always dangerous to allow the floor or roof to become soiled with dysenteric stools. Soiled hands and other parts of the body, and soiled clothes, should be washed with soap and hot water. Ashes and dry, clean, burnt soil which are used for cleaning metal utensils, are not suitable for cleaning infected hands and should be discarded in favour of soap.

Fruit and uncooked vegetables, such as apples, mangoes, apricots, melons, carrots, radishes, cucumber, etc., should, before they are eaten, be thoroughly

washed in soap and water, or, preferably, in permanganated water and then clean running water.

Dust, flies, cesspools, open wells, sanitary conveniences, and dwelling houses, are sanitary problems which should be assiduously tackled by all civilised governments of the world. In India, somehow, matters are allowed to drift, and in spite of the teaching of hygiene in schools and colleges, in spite of the presence of health officers and sanitary inspectors all over the country, in spite of the existence of well-equipped Research Institutes, there does not appear to be any improvement in the general sanitation of the country; and the practical sanitation that should permeate society from one end to the other and form the inheritance of man, woman and child, is conspicuous by its absence.

The presence, in a country, of such diseases as dysentery, typhoid, cholera, etc., is the measure of its poverty, ignorance and helplessness. With respect to these diseases, I believe that without the slightest exaggeration, India finds itself in a densely dark cloud without any visible silver lining.

CHAPTER XXVIII

PLAGUE

Plague appears with such regularity in various parts of India during the pleasant months of spring and early summer, that even the dailies note its incidence cursorily, without any comment, and the populace accept the inevitable as indifferently as the people in England accept continuous bad weather. It has now ceased to stir the imagination of the public and the active sympathy of the sanitary authorities. Like other infectious diseases it is the "visitation of God" and cannot be prevented, yet it often happens that in the commencement of the epidemic practically 100 per cent of the cases die. The unhappy people have so many social and political problems engaging their attention, that they have hardly any time to demand, from the arbiters of their destinies, the security of their life from this and other diseases. Very different is the case in other countries. In the British Isles, for instance, when plague appeared in Glasgow in 1907, every newspaper in the country placarded the news in bold headlines and the town-council and its officers were astir and vigorously attacked the intruding disease until it disappeared from the country. The ports authorities are always vigilant and sanitary machinery is always in readiness to deal with the problem whenever it may arise. The Ministry of

Health publishes all information of its incidence in other parts of the world, in order to keep the facts of the situation before the port medical officers, who, in addition to the usual investigations as to the sickness of any passengers, etc., enquire, on the arrival of a vessel in port, as to the mortality or sickness among rats during the voyage. Every year a rat week is observed, when the sanitary authorities of the country give all facilities to the people, by distributing rat poison for the destruction of rats in ware-houses and granaries, etc., Plague has been known to spread all over the world. Since the year of its last introduction into the country from China, in 1896, it has extended all over India, and millions of people have succumbed to it. It is, however, essentially a filth disease, and is associated with poverty and overcrowding, and with soil saturated with organic matter. India is a poverty-stricken country, with consequently hardly any sanitation worth the name, especially in the quarters where the poor Indians live, where the houses are dark and dingy and made of mud, the drains stink with decomposing organic matter, the cesspools containing slops and urine overflow into the streets and muddy channels, formed by rain, receive this overflow which continues to saturate the soil and subsoil with filth and the atmosphere with a horrible stench. These houses provide ideal conditions for the habitation of rats, and hence for the spread of plague. This is probably the reason why plague is almost as widespread in India alone as in all other parts of the world together.

Causes.—It is now definitely established that plague is the disease of rats, and that from rats it spreads to man. It attacks also some other animals. It is caused by a germ called *Bacillus Pestis*. At the death of the infected rat, its fleas desert it and attack man, inoculating him with the disease. Plague is thus invariably preceded by an epizootic among rats. If pneumonia develops in a case of this disease, it then spreads also from man to man by the inhalation of infected air, through expectoration and coughing, but it is the rat flea which brings about the fatal association of man with the rodent and starts the epidemic.

The epidemic spreads rapidly when the fleas breed actively and when they can survive longest after the death of their host, the rat. A moist atmosphere and a temperature of approximately 70 degrees Fahrenheit provide ideal conditions for them. These are found in the Punjab in March and April. Hence it is that plague is prevalent in these months. Cold winters and hot dry summers are unfavourable for their propagation and longevity.

Prevention and control.—The rational measure of prevention and control of the epidemic is the prevention of the contact of man with the rat or its fleas, and the creation of conditions that would discourage the presence of rats. For this purpose it would be essential that the rat-runs, that workmen's dwellings are, should be converted into houses fit for human beings to live in. They talk of the slums of English cities

and one reads revolting accounts of them in books, but they are palaces compared with the houses in which our village people live. These latter houses are made of mud with floors of virgin soil, to which rats and mice have free access; and the roofs, which are thatched with straw or made of rough wood covered with earth, are the play-grounds of lizards, serpents and other reptiles. There is no ventilation, no arrangements for lighting, no separation of rooms into bedroom, dining room, kitchen, etc. Sometimes even animals have also to be accommodated in the same house. There is no drainage; all dry refuse is thrown into the street; and the liquid refuse, as I have already said, runs out into a cesspool in the street, or directly into the hollows and ruts made by the monsoon waters. The task of preventing plague epidemics appears to be well-nigh hopeless. But what, one would ask, have the sanitary department done in this matter? They have a very able medical staff, fully trained in sanitary matters. What use have they made of their sanitary knowledge, of their study of insects and parasites, of their scientific grasp of the causation of preventable disease? One cannot exterminate this disease without a comprehensive campaign. They are no doubt all astir with commonplace advice, and prepared to waste time and money in manufacturing and distributing sera and vaccines of meagre utility, attending to other simple and commonsense matters while the town, city or village is ablaze with disease and when the moans of the afflicted and the cries of the relatives of the dead and dying

are heard everywhere. But they make no genuine attempt to devise means of its prevention. Like famine, malaria, cholera, tuberculosis, etc., this is "God's act" and must be endured! The unhappy people try to escape as best they can, and they die by hundreds and thousands when they are caught in the blaze. Nowhere is found any evidence of scientific direction, of systematic action, or of an organised and concerted attempt to approach the problem. There is the silence of indifference and inaction. This, also, is a disease of poverty, and the poor must suffer. How can one break the association of man and rat in mud houses, in dark and dingy rooms, or in alleys of indescribable filth? All this requires money: India can afford medical officers, but not clean and sanitary houses for her people, and they must wait until in the nature of things the epidemics of plague have worked themselves out.

The preventive measures that are usually adopted in India when (and not before) the epidemic begins, are the removal of (a) the people from infected houses to a quarantine camp, (b) patients to an improvised hospital, (c) inoculations, and (d) the destruction of rats. The main reliance is placed on inoculations, the killing of rats, burning or burying the dead ones, and some disinfection of houses, until excessive heat destroys the fleas and the epidemic naturally dies down. These are hardly adequate measures for dealing with recurring epidemics of this dangerous disease.

CHAPTER XXIX

DENGUE FEVER

In India a very cursory observation would show that fever of one kind or other is the disease from which people suffer most frequently. So commonly is it found, that a busy doctor hardly finds sufficient time to arrive at a definite diagnosis at the commencement of the illness, and the generic term "fever" is applied to all rises of temperature until a few days after, when the nature of the fever manifests itself beyond all possibility of doubt. Fevers, e.g., malarial, tuberculous and typhoid, are perhaps the commonest, while such fevers as smallpox, measles, influenza, etc., occur in epidemic form. They require definite preventive and hygienic measures, and also specific treatment. Haphazard treatment often enough proves detrimental, not only to health, but even to the life of the patient. It is therefore very necessary to try to diagnose each case of fever at its very onset, so that suitable treatment may be instituted immediately.

There is a certain set of fevers frequently found in tropical countries. They occur in epidemic as well as endemic form, and exhibit both mild and severe types. They are known as dengue and dengue-like fevers. Dengue resembles in its symptoms rheumatic fever, influenza, scarlet fever, smallpox, and sand-fly fever. Like malarial fever,

it spreads through the agency of certain mosquitoes. After the bite it takes from three to ten days before the fever develops. The attack is ushered in suddenly with severe pain in various parts of the body, by chilliness or shivering, by an appearance of great fatigue, and by flushing of the face. The temperature rises from 103 to 106, the pulse rate rising proportionately. There are pains in the head, back, legs, and joints. Sometimes the cervical and axillary glands are enlarged and tender, and remain so for some time after the disease has run its course. On the third day the temperature usually falls, sometimes even to normal, and there is profuse perspiration, severe diarrhoea, and bleeding from the nose; but the fall in temperature may also occur without the latter signs. On the fifth day the temperature rises again with the appearance of a measly or scarlatiniform rash on the palms and backs of the hands, rapidly spreading to the arms, abdomen and legs. After a day or two's rise the fever disappears on the sixth or seventh day of the commencement of the disease, with or without perspiration, while the rash lasts from two to eight days.

Another form of dengue fever goes by the name of seven days' fever. This fever appears suddenly and the temperature rises to 105, but the pulse remains proportionately slow. The face is flushed and the eyes are red. Some rose-coloured spots may appear on the skin and there is pain in the back. After the initial rise of temperature there is a gradual remission for two or three days, after

which it rises again, falling quickly again to normal on the seventh or eighth day.

All these fevers are not contagious, but are carried from man to man by certain mosquitoes or similar insects.

It will be noted that the disease resembles various well-known fevers in its distressing symptoms.

Tropical countries, such as India, are a prey to a variety of diseases unknown in temperate countries where these insects do not flourish, and dengue fever is one of these. Its prevention can be undertaken in the same manner as malarial fever. In the first place the breeding place of mosquitoes should be systematically destroyed and careful hygienic measures should be carried out by the Health Department in the matter of a due observance of cleanliness, the proper drainage of soil, and the building of houses on scientific lines, and, in the second place, all houses should be well screened, and insects should be rigorously prevented from gaining admission to the house. Tropical countries need even greater diligence than sub-tropical and temperate countries in establishing thoroughly scientific measures in order to make the land unsuitable for the breeding, growth and propagation of injurious insects, which both directly and indirectly cause misery, disease and death to the people. By this means the pest would gradually disappear and, with it, a large number of diseases which are the bane of the life of the people of this country.

CHAPTER XXX

MALTA FEVER IN THE PUNJAB.

Malta fever has for centuries been known to exist in the neighbourhood of the Mediterranean Sea, but in the middle of the last century an accurate description of it was carefully noted by a medical man who himself suffered from the disease ; and its causation was worked out by an investigator about the end of the last century. It was in the year 1906 that its existence in the Punjab was discovered. Though a disease of almost world-wide prevalence, this fever has remained unrecognised and undiscovered on account of the fact that, its symptoms being very similar to such common fevers as typhoid, paratyphoid, malarial, rheumatic, and even tuberculous fever, hardly any suspicion arises as to its existence ; and that the best means of diagnosis is by the aid of the microscope, which is seldom used for differentiating this disease from the others, and lastly, that, in India, a doctor hardly ever has an opportunity of following a case through. It is thus extremely difficult to detect the existence of this fever which is usually of a chronic nature, and may, with many remissions and relapses, last almost a year, causing great exhaustion and suffering to the victim. Though fairly common, its presence is not sufficiently known and realized.

The cause of Malta fever has been found to be a minute micro-organism (which has been designated *Micrococcus Melitensis*) and other allied micro-organisms, which appear to exist in goats without disturbing their health. These micrococci were first discovered in Malta, where the inhabitants contracted the disease by drinking goats milk—hence the name "Malta" fever. They are also found in many other animals, e. g., horses, mules, oxen, cows, dogs, etc., and are very hardy and can exist in water, soil, milk, etc., for many days. They continue to appear in the urine even two years after the recovery of the patient, who may thus act as a carrier of the disease. Thus it may spread either from person to person or from infected goats.

The fever begins gradually, the temperature rising, as in typhoid fever, in five or six days, coming down to normal, also similarly slowly, in about ten days or a fortnight. There is a considerable amount of pain in the joints and nerves, and also sweating. After a few days a relapse occurs, and the rise and fall of temperature is repeated. The patient gradually loses ground and pallor and exhaustion supervene until convalescence sets in, the patient recovering usually in two or three months, though sometimes not until after several months, while the malignant variety of the fever may even prove fatal.

For the prevention of the disease and its spread to others, personal cleanliness is the most essential requirement. A Malta fever carrier must see

that the body is kept clean and the hands well washed, as should those who come in contact with him also observe the strictest rules of cleanliness. Goat's milk should not be used without boiling, for, as the infected animal does not show any signs of illness, it is impossible to recognise the existence of infection without the bacteriological examination of the milk.

Thus human beings undergo suffering of one sort or other from this and similar preventable diseases where and when suitable hygienic measures are not put into operation. As it is fairly common in the Punjab, every thoughtful person should carry out the preventive measures in order to escape from the chronic illness which malta fever is known to cause its victim.

UNIVERSITY OF
LONDON
LIBRARY
MUSEUM
OF
NATURAL HISTORY
CROMWELL ROAD
LONDON, W.C. 1

The cause of malta fever has been found to be a minute micro-organism (which has been designated *Micrococcus Melitensis*) and other allied micro-organisms, which appear to exist in goats without disturbing their health. These micrococci were first discovered in Malta, where the inhabitants contracted the disease by drinking goats milk—hence the name "Malta" fever. They are also found in many other animals, e. g., horses, mules, oxen, cows, dogs, etc., and are very hardy and can exist in water, soil, milk, etc., for many days. They continue to appear in the urine even two years after the recovery of the patient, who may thus act as a carrier of the disease. Thus it may spread either from person to person or from infected goats.

The fever begins gradually, the temperature rising, as in typhoid fever, in five or six days, coming down to normal, also similarly slowly, in about ten days or a fortnight. There is a considerable amount of pain in the joints and nerves, and also sweating. After a few days a relapse occurs, and the rise and fall of temperature is repeated. The patient gradually loses ground and pallor and exhaustion supervene until convalescence sets in, the patient recovering usually in two or three months, though sometimes not until after several months, while the malignant variety of the fever may even prove fatal.

For the prevention of the disease and its spread to others, personal cleanliness is the most essential requirement. A malta fever carrier must see

CHAPTER XXXI

TUBERCULOSIS

Tuberculosis is a disease caused by destructive processes set up in the lungs, or in other parts of the body, by a small micro-organism called the tubercle bacillus. When the disease affects the lungs, it is commonly known as phthisis. It is a communicable and preventable disease.

The tubercle bacillus is one of the lowest forms of life. It consists of a single cell and measures $1/24,000$ of an inch in length. A phthisical patient may emit over 4 billion bacilli in 24 hours. He spits in the streets, on roads in parks, and on the floors of a house, stair-case or on the walls. Thus in India, where the ideals of sanitation are known only to the sanitary officers, and where its practice is in a very primitive state, the tubercle bacillus is omnipresent. Flies, shoes, clothes, and dust, convey the deadly germs to all kinds of unexpected places. For example, a tubercular patient resting for a few minutes in a park will spit round the place where he is sitting. A few days later, when the sputum is dried up and unrecognisable, a picnic party may settle down on the same spot and place their provisions on the ground. The bottom of a basin, the mouth of an aerated water bottle, the ice, or the hands of some of the party may easily be infected. Infection is thus conveyed to the stomach

and causes tuberculosis of the intestines. Dried or powdered sputum is mixed up with the dust blowing about in the bazaar, passers by receive infection by inhalation or by the ingestion of the sweets on which the infected dust has settled. There are thus innumerable ways for the spread of tuberculosis. The direct inhalation of tubercle-laden spray from the mouth of a phthisical patient, ejected during the act of coughing, infects friends and relatives.

The houses of our working people and of the unemployed, who live by begging, robbing, or on the generosity of relatives, are notoriously insanitary, unventilated, unlit and undrained. Our better class population build part of the house like a dungeon, having as few doors and windows as possible, and here their womenfolk spend days and nights, where neither the cool, pleasant air and sunshine of winter, nor the refreshing morning and evening air of summer, laden with ultra-violet rays, can gain admission. The Mohammedans are the worst sinners in this respect. Their daughters from the age of about 6 years, in fact all the female population, except the babies and very young girls, are not allowed outside the house without covering themselves with a *burqa*. This hangs all over the body from head to foot, so that nothing is visible to the eye of the public. It has net-like holes through which the wearer can see others. She thus breathes the same imprisoned air over and over again. No wonder that there is a much higher incidence of the

disease among Mohammedan women than among their Hindu sisters, and the death rate from this disease is much higher, being 5·8 and 3 per 1,000 respectively. Once when I asked a Mohammedan mother why she kept in a *burqa* her ten year old daughter who was already suffering from tuberculosis and who needed plenty of fresh air and sunshine, she replied that she only put it on when she came out of the house. It would have done her perhaps no more harm, had she been veiled in the house but a great deal of harm results from her going out veiled. The irony of it is, that it is impossible successfully to treat a veiled sufferer from this disease. Probably the greatest boon the Government of Mustapha Kemal Pasha has conferred on his great country is the emancipation of the women from this pernicious custom. How the Mohammedan brethren of India have clung to this deadly and dangerous custom is evident from the fact that the enlightenment and education of the last quarter of a century has made no appreciable change in it. The Hindu women of the Punjab are not much better. If they do not veil themselves quite so closely, they confine themselves within the four walls of their houses, and among the crowds of people who come out of the city of Lahore for fresh air and exercise, on foot, cycle, and horseback, the number of women is conspicuously meagre. No wonder that the death rate from tuberculosis among women is estimated at 6 times that of men.

"The germs of tubercle find a remarkably

happy hunting ground in India in consequence of its extreme poverty, its revolting child marriage, which deteriorates the constitution of the girl-mothers and their children, and lastly, the ugly and unhygienic veiling and imprisoning of our women, especially in the Punjab and United Provinces. tuberculosis, unlike other infections, *e. g.*, malaria, plague, small-pox, measles, etc., is of a chronic nature, undermines the health of its victim slowly, and may progressively lead to death in from a few months to years.

In its early stage, it is very difficult to diagnose. A sufferer from it may be merely out of sorts, with or without a cough, or may suffer from indigestion or occasional vomiting, or may form part of the crowd of patients, whose illness, for want of a correct diagnosis, is designated as "fever," or may be short of breath and anæmic and thus be lost among the millions of our pale, pasty folk with hollow cheeks, sunken eyes and muscleless arms and legs—a class of people one comes across walking about in the bazars and streets, for it is not customary in India for anyone to stay in bed, especially among the poor, who have no extra room or bed for the sick; and numbers of persons suffering from fever up to 104° may be seen walking in the streets and going to the hospitals, doctors' consulting rooms, etc. The diagnosis of this disease among this motley crowd of sick people presents very difficult problems, and when the *hakims* and *vaid*s have tried their hands, and busy doctors,

(who learn to diagnose by feeling the pulse or, at the most, by a hurried touch of the stethoscope or the taking of the temperature) have treated it for indigestion, fever, bronchitis, etc., the case is too far advanced for treatment, though diagnosis has then become quite an easy matter. The fact of the matter is, that in India, as a consequence of the grinding poverty, life has no charm and death no terrors. Fate and destiny decide the problems of the life of the people. Men and women are old at 45 and consider themselves approaching the end of life. Any illness at that time of life among the poor, especially the women, is hardly worth the trouble of diagnosis, and tuberculosis thus often escapes notice.

The prevention and control of tuberculosis is hardly a quarter of a century old in Europe and America, and since the Great War has been carried on very intensively. The prevention and control of tuberculosis depends on the grasp of the causation of the disease, as has been described above, and consists in the treatment of tuberculous patients, men, women and children, poor or rich in suitable atmosphere and surroundings, well conducted sanatoria and dispensaries; the education of the sick and the convalescent in the proper mode of living, so that all danger of the spread of tuberculosis by dust, flies, milk, etc., is removed; the improvement of general sanitary conditions; the compulsory prevention of early marriages; the compulsory removal of the *dwaga* from all

classes of women, and lastly, (though really primarily) the removal of poverty. Scarcely any of these problems is seriously considered in India and it is unnecessary to amplify them.

I would like, however, for the information of the students of sanitary science to give a short account of the sanitary work carried out by the municipality of Lahore. They have undertaken the very laudable work of tarring roads outside the city proper, which is left severely alone to its mud, dirt, and dust. They employ a dozen or two women who, sitting on their haunches, brush the road with a broom and raise clouds of dust round themselves which they breathe and which finds its way into the houses. Some of these women have nursing babies who lie on the grass by the roadside inhaling the dust raised by their mothers. These women work in the sun in a temperature of about 120°, are paid 11 annas a day, and lunch on roasted grams and water. When the road is swept clear of dust, by these young women, it is tarred by a set of men. It is to be hoped that the Lahore municipality and sanitary officers realise the injurious effect of the inhalation of dust by these young women and mothers, but probably the working women (as the city itself) are not included in any scheme of sanitary improvement. These are coolie women, who are used to heat, dust and dirt, and their lives are of no consequence!

Hakims and *Vaids* are said to diagnose

tuberculosis without difficulty and have some wonderful cures to their credit. They dispense their decoctions, confections, powders, and pills, as medical men dose their patients with cod liver oil and a host of patent remedies. Still the unfortunate sufferers continue to swallow these more or less useless remedies without any relief, and tuberculosis continues to take its toll of over a million a year at the lowest estimate. In the prevention of tuberculosis, as in other preventable diseases, we have still to make a beginning. When it will be made no one knows !!!

CHAPTER XXXII

DUST AND TUBERCULOSIS

In India, except in the mountains, dust pervades the atmosphere everywhere. Her countryside, her roads, her cities and villages are dust laden from year's end to year's end, except when the monsoon is in progress and the atmosphere is washed by torrential rains and the ground is soaking. Dust is present in maximum quantity (at least in the Punjab) in the hottest months of May and June, and in minimum quantity in the coldest months of December and January. The only period when the atmosphere can be said to be free from dust, is after heavy rain until the earth is dry again. In the month of June, the pedestrian on the Lahore Mall, and even walking along the banks of the canal, can actually smell the dust.

The fine, sun-dried, pulverised dust raised by the hoofs of horses and donkeys, and by sweepers' brooms and swiftly rushing motor vehicles, hangs like a pall many feet above the ground and is present even in the cool hours of the morning, paling and dimming the rising sun until it is quite high up on the horizon. The evening air contains, in addition to an increased quantity of dust, dried particles of dung and of human nasal excretion and expectoration, and is unfit for respiration. The sweeper's broom is a particularly

mischievous instrument in the hands of its wielder. Its long pliable fibres spread as he sweeps, raising dust in every direction. With back bent to the task (an awkward and unnatural position), at each stroke he whips up the dust, gathering up leaves, dried grass, stones and particles of earth, etc., while he himself and everything in his immediate vicinity is seen through an almost opaque cloud of fine dust. The sweepers also keep the atmosphere of the bungalows dusty by plying their brooms twice a day on the drives and paths. Part of this dust hangs in the air and thence settles down both outside and inside the house on walls and furniture. The cleaning of furniture, carpets, curtains, etc., with the brush merely transfers the dust on to the walls, and saturates the air with its fine irritating particles which also gradually settle back again on the furniture. Thus, in the summer months at least, it is impossible to breathe clean, fresh air, either on the Mall or in and around the bungalows.

In the bazaar, however, dust is ever present. Here, in addition to the sweepers' brooms there are the women's slithering heel-less shoes and trailing veils and garments all raising the dust in their wake, while mats and sacking from the shops are shaken in the face of the passer-by, and sweepers, going to and fro with their overladen baskets of filth and ashes leave behind them a trail of dust and a disagreeable odour which is inhaled by the people as it settles down on the food and other wares exposed for sale in the shops.

The air of the narrow streets, alleys and houses also contains dust which is raised chiefly by pedestrians and housewives engaged in their daily work. As there is no ventilation and hardly any sunshine, the air is usually humid and still, and pathogenic organisms, *e.g.*, the germs of tubercle, once having gained admission to the houses and streets, from dried sputum and other excretions, linger there for months and years. Although the outside atmosphere may be free from dust during the rainy season, the atmosphere of the houses cannot be so while the rooms are swept in the manner already mentioned.

In cleaner countries, where hygienic measures are rigorously carried out, and even in England, where it rains some part of the day during the major part of the year, and where the fields are green and the roads dustless, the dust of the houses, institutes, railway carriages, omnibuses and trams has been found to contain live and virulent germs of tuberculosis. This is considered to be one of the most common methods by which this deadly disease is spread in those countries. What then should one say with regard to the city of Lahore?

In Lahore over a thousand cases of death from phthisis are notified by careful educated people, but many remain unnotified because of carelessness or ignorance. Numbers die from intercurrent diseases, *e.g.*, influenza and pneumonia, though also suffering from this disease, and many others—mendicants, fakirs, and all kinds of waifs and strays—die unattended and uncared for. There are also large numbers of

deaths from this disease which are not notified as such because of the fear of publicity. The number of deaths from phthisis is consequently much greater than the number recorded. I am not considering here tuberculosis of other organs.

Taking the very lowest estimate, there must be at least 15,000 persons who are at any time suffering from phthisis in the city alone, and of these there must be at least 1,000 whose disease is sufficiently advanced to produce the dangerous phlegm which they are compelled to expectorate, but which they have not learnt how to dispose of. They spit on the floors and walls, in house, street and bazaar, and the sputum dries and is blown about in the air along with particles of dust.

It has been proved that the dust of a room occupied by a tuberculous patient who is in the habit of spitting on the floor, or even into his handkerchief, contains live germs of the disease, whereas the germs are absent where the patient uses the spittoon or spit-bottle. The germs of tuberculosis have been found in the house months after the death of the patient.

It is interesting and instructive here to make a little calculation. A single pellet of tuberculous sputum contains 300 million germs. Supposing a person discharges 24 pellets in twenty-four hours, 7,200 millions of germs are voided every day. In the city of Lahore, where ten thousand tuberculous people are spitting tuberculous phlegm daily, the number of tubercle bacilli evacuated in a single

day becomes well-nigh incalculable. These germs are very hardy and under suitable conditions live for months. Thus it is that this all-pervading dust contains a dangerously large number, which are freely inhaled daily by all classes of men, women, and children. Many are strong enough to withstand the infection while others are infected but cured in the course of time by the natural resistance of the body. Some develop phthisis and others develop the disease in other organs.

In Lahore, besides the 15,000 cases of phthisis, a large number of persons suffer from tuberculosis of the abdomen. The infected dust is swallowed and ultimately the germs gain their foothold in the interior of the intestines, and in other cases they enter the lymph stream and affect the abdominal glands, while in still other cases the peritoneum becomes studded with tubercle nodules.

Abdominal tuberculosis is far more common in Lahore than is generally known, and the infection is undoubtedly caused by the swallowing of infected dust either directly (especially in the case of mouth breathers), or indirectly, by the taking of food and drink polluted by infected dust in houses and shops.

Abdominal tuberculosis is found among men, women and children. These victims are usually very thin, with hollow cheeks and careworn eyes, the chest and legs a mere skeleton: they often have a proportionately large abdomen, which is sometimes concave and hollowed, when the glands can be easily felt,

and there is slight temperature and loss of appetite. In the early stages they go from doctor to vaid and vaid to hakim, and often the disease ebbs and flows, bringing credit or discredit to the immediate professional or quack attendant. Often enough after a short or long period of illness, the disease cures itself either by a change of climate, by better climatic conditions, or by better and more judicious dietary and exercise; but in a number of cases the disease continues to progress slowly, until the patient succumbs either to exhaustion or to the spread of the disease to the lungs or brain, or may be to some fever, *e. g.*, influenza.

Thus dust claims a terrible toll of victims among the population of Lahore, and brings ill-health and suffering to a still larger number of people. It is not possible to estimate this number which must undoubtedly be incredibly large.

Sir Arthur Newsholme, late Chief Medical Officer to the Local Government Board (now the Ministry of Health) wrote in 1908 as follows: "Poverty and Tuberculosis are allied by the closest bonds and nothing can be simpler or more certain than the statement that the removal of poverty would effect an enormous reduction of the death rate from tuberculosis." This is quite true, but beside this the problem of the prevention of dust and the education of the people against the dangerous habit of spitting to the detriment of public health, take a foremost and important place.

This requires the serious attention of the Sanitary and Education Authorities in India more than in other civilised countries. It is in fact a national problem intimately related to our health and prosperity.

CHAPTER XXXIII

ABDOMINAL TUBERCULOSIS—A SNAKE IN THE GRASS

I have already had occasion to refer to this subject in these columns, but I have come to the conclusion that it possesses an importance of far greater magnitude than I realised on my return to India.

In England it is rare to meet cases of abdominal tuberculosis in adults; in fact, so rare is it that I can recall almost every case I treated during my long stay there. In children it is caused by tuberculous milk, but is often cured by careful treatment; and now that such a great improvement in the purity of milk has been effected by the frequent inspection of milch cows by qualified veterinary surgeons, and by the bacteriological examination of milk, the incidence of this form of tuberculosis in England has still further decreased.

In India, so far as my investigation goes, in spite of the very primitive conditions prevailing in cattle-pen and cow-shed, tuberculosis is very rare in the cattle themselves, and the milk, however dirty it may be, is usually free from tubercle germs. Considering also our Indian custom of boiling the milk, which still further sterilises it, I had not expected to find much abdominal tuber-

culosis in India. When, however, I came to examine hospital patients, I found a very large number suffering from this disease in its various stages. Many of these cases seek advice in consequence of some acute or chronic illness *e. g.*, influenza, bronchitis, enlarged spleen, malaria, anæmia, neuritis, etc., and the underlying debilitating condition of tuberculosis is discovered during the examination. Tuberculosis of the abdomen often escapes early recognition, as the early signs are so obscure and trivial that the patient does not consider it necessary to consult a medical man, or if a physician is consulted on the score of some other complaint, a careful examination of the abdomen may not be made, and the disease may thus be overlooked. A patient complaining of cough, fever, etc., may on examination be found to be suffering from tuberculosis of the abdomen as well as of the lungs, and it is not always easy to say which part of the body was first affected. Then there are the cases which show symptoms of varying kinds. Take for instance the following :—A child has been suffering from diarrhoea or pain in the abdomen at the decreasing interval of one year to two or three months, and has had slight fever, lasting for two or three months at a stretch : another loses his appetite, vomits whatever he eats and complains of abdominal pain at intervals ; or yet another rapidly loses weight, is very seedy and eats very little food : a woman complains that she is losing weight, occasionally vomits, first has diarrhoea and then constipation, with much noisy rumbling and

spasms of pain in the abdomen at irregular intervals: similarly, a man has been growing weaker as his appetite has decreased, he is very short of breath when he walks, while his body grows thinner and his abdomen more protruding. Thus men, women and children suffering from this disease daily visit the hospitals. They spend months, even years, in search of relief, but if undiagnosed or not carefully handled, and even sometimes under the best treatment, the disease takes a downward course and gradually overpowers the victim. The patient may also at the same time suffer from other diseases, *e. g.*, influenza, malaria, dysentery, etc., and may succumb to any one of them.

Abdominal tuberculosis is thus very commonly met with in Lahore and attacks persons of all ages, but women and the young are more commonly affected. It is clear that the cause of this disease cannot be attributed to tuberculous milk, for as I have said before, tuberculosis is very rarely found in the cows. The cause of the disease is the tuberculous dust, which is swallowed in all sorts of ways. The sputum of ambulant phthisis patients dries up and, along with the dust, is stirred up by the feet of pedestrians and settles on the eatables (sweets, curd, fruit, etc.) exposed for sale in the shops or on the baskets and trays of hawkers. This tuberculous sputum, picked up also by the soles of shoes, is brought home, dries up on the floor or carpet of the house, and then, blowing about in the air, settles on the food and is fin-

ally eaten, Or servants, themselves suffering from tuberculosis, may infect the food and drink of the household and spread the disease in the family. Thus in innumerable ways, the germ-laden sputum may infect the populace living huddled together in ill-ventilated, ill-lit rooms ; and even the more fortunate people who live in modern bungalows outside the city are not safe from it. In fact, a very large number of households sacrifice at least one young member either primarily or secondarily to this disease, and it is most essential to pay attention to the methods of prevention, for the cure is very difficult and requires prolonged and patient treatment.

The prevention of abdominal tuberculosis depends upon a rigid observance of the very elementary rules of hygiene, the ensurance of which is the duty of the Municipal authorities and the Government. So long as they do not put into operation the ordinary rules of hygiene and public health, as regards the purity and cleanliness of the food which is sold in the bazar, no sweets or cooked food should be bought and used by thoughtful people. All fruit and vegetables that are eaten uncooked and unskinned (*e.g.*, dates, grapes, etc.,) should be thoroughly washed in clean running water before being eaten. The floors of the house should be hard and smooth and should be washed frequently ; shoes should be carefully cleaned before entering the house, and all precautions taken for the prevention of the propagation of malignant germs.

No servant suffering from phthisis should be employed. The kitchen should be kept scrupulously clean and its floor should be made of cement concrete so that it may be washed daily. If it is made of mud, it should be mud-washed daily with clean clay. The custom of keeping shoes out of the kitchen is based on scientific and hygienic principles. The barefoot servant returning from the bazaar should wash his feet with soap and water before he enters the kitchen. Boiled milk, cooked food, and fruit, should be kept covered and some distance above the ground. If any member of the household is already suffering from phthisis, the greatest care should be taken to prevent the infection of food and drink. Infected sputum in one way or another is the cause of abdominal tuberculosis in India. Hygiene, unfortunately, takes a back seat in our affairs, and hence it is that preventable diseases claim a ruthlessly heavy toll from our young people.

CHAPTER XXXIV

SMALL POX

When I was a student in the Lahore Medical College in the nineties of the last century, there used to be a quadrangular ward for infectious diseases, close to the general hospital. As a clinical clerk I had to attend the patients and whenever I approached this ward I felt decidedly nervous, for it had in its small rooms such cases as advanced tuberculosis, cholera, dysentery, typhoid and small pox; and small pox it was that I dreaded most. I was vaccinated in my childhood, but no one offered to re-vaccinate me when I was put on duty there. The small pox cases were very gruesome in appearance, with arms and legs covered with pustules in such large numbers as to leave hardly any clear skin between them; the face a mere unrecognisable pus-discharging mass, the eyes buried and closed in the swollen pulpy cheeks, and the eyelids and lips glued together by oozing pus. To add further to the horror of the picture, swarms of flies fed on the unfortunate victims. I have never forgotten the pitiable condition of the small pox cases that were under treatment at that time. Small pox is thus a filthy and loathsome disease. It may prove fatal, and even if the patient recovers, he may be left blind, marked with ugly pits, or defective in other ways.

Small pox is very infectious. From the day of the attack until the patient either recovers or dies, he may spread the disease to others by his breath, the discharges from the mouth and nose, or from the clothes he wears. In fact, the air of the room in which he lies is saturated with infection which may reproduce the disease in any unprotected person who comes in contact with it.

Small pox has been endemic in this country from time immemorial and is found all over the world, though practically all the civilized countries have almost banished it from their midst, or have made it more or less harmless by active and systematic preventive measures.

In India it appears also in severe epidemic form, and carries away men, women, and children, by thousands every year. No specific treatment has ever been discovered for the disease. The helplessness of the people in this country is apparent from the fact that they look upon it as a goddess—"Mata" or "Maharani"—whom they propitiate by charms, incantations, and offerings. It behoves all who can find time, to study its symptoms so that they may recognise it early and try, by all possible measures, to prevent its spread in the family, or among neighbours and friends.

Symptoms—Small pox begins suddenly with headache, pains in the back, and aching all over the body. There is great prostration, vomiting, feverishness (to 103 or 104°) and delirium. These symptoms are at their height for two days and during

the next three days the temperature gradually falls, with a remission of all the symptoms, the patient feeling well enough to get up. As, however, the temperature falls, the characteristic rash appears, *i.e.*, on the third or fourth day from the commencement of the attack. The rash consists of spots which appear first on the face (on a fair skin it is of a pinkish colour) and then on the arms, legs, and body generally, but at this stage it causes no disfigurement. The terrible feature of the rash is the inexorable march of the insignificant looking rash to harder spots, on to watery heads called vesicles, and then to pustular heads, when the skin around the pustules becomes red and swollen and in severe cases the whole face becomes, as I have already said, a swollen and unrecognizable mass. In fatal cases death occurs at this stage, but in milder ones the pus is discharged, the spots dry up, and the patient gradually recovers after shedding the dry scales.

Incubation period.—From the day of infection with small pox, it takes twelve days (sometimes a day or two more or less) before the actual attack begins. This period of quiet development is called the incubation period and is harmless to those who come in contact. It is the attack or the appearance of the disease which lets loose the terrible infection.

The last cases of small pox which I came in contact with occurred in England in the year 1902. The first of these came to the consulting room

suffering from fever and headache, in a season when influenza was prevalent in the town. Two or three days after the man returned, saying that he was all right, and asked for a discharge certificate, as he thought he was fit to resume his ordinary work. In the rather poor light of the lamp I noticed the familiar rash on his face. There was not a single case of small pox in the town, but I told him to go home and stay in bed until I saw him in the morning. In the day light it was quite apparent that it was a case of small pox, though a mild one, having only 25 spots on the body. The man had been vaccinated in his childhood. As soon as the case was notified, the patient was removed to the Small Pox Hospital and the Public Vaccinator appeared in the house and offered to vaccinate or re-vaccinate the other members of the family. The father, though vaccinated in his childhood, was a conscientious objector to vaccination, and refused the operation. He was discharged by his employers and had to stay at home until all danger of infection was over. The rest of the family were all vaccinated, with the exception of the baby, who was not done on the assurance given by the mother that he had been vaccinated recently—a false assurance which cost her her child; for the only ones who developed the disease were the father and the baby, the latter succumbing to it.

I have briefly related this story as it is instructive in many respects, *vis.*, (1) the highly infectious nature of the disease, (2) the development of the virulent

disease in the unprotected baby, (3) the escape of all those members of the family who were re-vaccinated, (4) the appearance of the disease in mild form in the case of the first patient and his father, both of whom were vaccinated in childhood, but not re-vaccinated.

I may here point out that in Great Britain every sanitary authority is bound to have a hospital in readiness for the reception and treatment of small pox cases. The hospital in the district of which I was Medical Officer of Health was empty, for lack of a case, for at least 22 years, *viz.*, all the time I was connected with the town.

Preventive Measures.—As no proper provision in the way of hospitals for the numerous villages and small towns exists in this country, it is impossible to control the infection in a systematic manner. Cases will therefore continue to occur here and there, even if there is no epidemic. If the case is removed to a suitably equipped hospital, the problem of the other members of the family is simple. All should be vaccinated or re-vaccinated, as the case may be, all the clothes used by the patient should be soaked for twenty-four hours in izal or phenyle solution before being sent to the wash. The proportion of izal or phenyle should be carefully noted. If the Municipality provides disinfectant, clear instructions are given for its use, or there may be a disinfecter where clothes and bedding, etc., may be disinfected and returned. ¶ If the floors and walls are made of mud, they may be white-washed or

earth-washed, but in the latter case a sufficient quantity of phenyle or izal should be added. Cemented floors should be washed with a disinfectant solution. It is necessary to use a disinfectant wherever possible. Inexpensive articles may be burnt, if they are not worth the expense of disinfection. Formaldehyde may be used for disinfection, but this can only be done by trained sanitary inspectors.

If the case is to be treated at home, the house should be isolated and no visitors allowed. All the contacts should be vaccinated and members of the family should, for the protection of the public, rigorously abstain from attending meetings, cinemas, churches etc., or visiting friends and neighbours. A thorough disinfection of all the clothes of the family should be vigorously carried on as long as the case lasts and the patient is not pronounced free from infection.

In India, where systematic measures are not in use, one does not know when an epidemic may flare up, or when one may come in contact with a case. It is therefore necessary that children should be vaccinated at the age of three or four months, re-vaccinated 8 years after (sooner if any cases of small pox exist) and similarly re-vaccinated every five to eight years. If the vaccination is not successful, the person may be considered immune from small pox for some years. It may be noted, that if an unprotected person is vaccinated with good potent lymph within 72 hours of exposure to infec-

tion, the attack may be altogether averted ; and even if four or five days have elapsed before vaccination, the attack may be modified. After five days, however, vaccination appears to have no effect in modifying the disease.

Vaccination was discovered by a young English doctor, Edward Jenner, who noticed that while everyone in the district was having small pox, the farmers escaped. He also noticed that the only difference lay in the fact that the farmers suffered from sores on the fingers caught, at the time of milking, from sores on the cows' udders. As these cows appeared to have a form of small pox (called cow pox) Dr. Jenner advocated protection from small pox by the communication of cow pox, a very mild disease, by means of vaccination.

It is the duty, therefore, of everyone who loves his family, his fellow creatures, and his country, to understand the dangers from small pox and to spread the knowledge of this, the greatest and surest preventive measure which the keen observation of Edward Jenner has given to the world.

CHAPTER XXXV

NASAL CATARRH

Nasal catarrh is looked upon by the layman as a simple and harmless annual or bi-annual visitation, which causes slight discomfort and disappears in a week or two. People have all kinds of fanciful ideas about its origin, frequent and troublesome quantities of nasal discharge being considered by many to be the decay or degeneration of cerebral substances, causing mental and physical debility. Neurotic persons often attach great importance to chronic nasal catarrh, telling romantic tales of its baneful effect on the system: and our vaidis and hakims have their own mysterious belief as to its causation. It is thus very necessary that the man in the street should form a rational idea of its nature, cause, and prevention, and save himself from avoidable dangers and injury to health.

The acute form of the malady is ushered in by some feeling of roughness or uneasiness at the back of the throat. There may be a tight feeling across the nose, fullness of the head, and frontal headache. There is frequent sneezing and watering of the eyes, and a flow of thin fluid follows, necessitating frequent blowing and clearing of the nose. Nasal catarrh also occurs in chronic forms, and hawking, sniffing, and snorting, are the attempts to clear or control the excessive thick discharge. There may

be loss of smell or taste, and the patient may suffer from ear-ache or have a slight rise of temperature.

In order to understand the disease, the reader should try to visualise the inner structure of the nose and for this purpose let him imagine that the mouth and nose are parts of a double-storied building the lower storey (or the mouth) has only one room, the roof of which (the palate) forms the floor of the upper storey, which is two-roomed. The dividing partition, or the central wall, is called the septum. These upper rooms slope down in front into small openings (the nostrils) and behind they open into the throat on to a terrace. It is here at the posterior opening, that the nidus for mischief usually exists in cases of simple chronic catarrh, which is the starting point of acute attacks and prolonged irritating and annoying cough, and it is here that the preventive measure of douching has the most beneficial effect. On each side there is the opening of a tube leading to the ear. (The association of nasal catarrh with ear-ache is thus easily understood). These parts are not visible, but their reflection can be seen by the use of mirrors.

Air, passing through the nose or the mouth, enters the throat and then travels down the air passage to the lungs. It may be remembered that the interior of the nose, throat, and air passages, and the tube opening from the ears on to the floor of the posterior part of the nose, are lined by a membrane, called the mucous membrane, which normally discharges fluid for the purpose of keep-

ing the passages moist. Any curvature, spur, or swelling on the septum due to injury to the nose, or from some other cause, or the formation of small growths in the interior (called polyp) or overgrowth in the posterior part of the nasal chambers in children (adenoids), may cause obstruction in breathing through the nose and result in mouth-breathing. Persons subject to one or the other form of obstruction are easily liable to inflammation of the nasal mucous membrane, or nasal catarrh.

Exposure of the body, especially the feet and legs, to wet and cold; sudden changes of temperature, nervous exhaustion, and inhalation of irritating gases, fog, dust, etc., are other causes of nasal catarrh. Nasal catarrh is also the precursor of measles and influenza, while a slight attack of influenza is almost indistinguishable from a severe attack of nasal catarrh. Acute catarrh of the nose is very contagious through the inhalation of the spray caused by the sneezing or coughing of the patient, and an afflicted person may spread it to his household, friends, passers-by or companions in train, tram, etc.

Prevention—Nasal catarrh, if frequent, is very annoying, troublesome and even dangerous. If severe, it may cause deafness either temporary or permanent, laryngitis, bronchitis, pneumonia, catarrh of the lungs, and may even be a precursor of tuberculosis. It behoves all who desire to preserve health to understand the methods of preventing this malady of far-reaching consequences.

It is very essential that all who are subject to frequent acute attacks should consult a specialist in order to find out if any defect or obstruction is responsible for them; and if found, it should be removed. For instance, polypi, adenoids, bone spurs etc., are dealt with easily by experts with great and immediate relief, and freedom from subsequent attacks.

Smoking and public speaking often cause catarrh by irritation; and when this is the case smoking should be given up and public speaking, moderated, or if necessary, abandoned.

The cold bath and exercise in the fresh air are great preventatives of cold, and should be taken in all seasons.

When sneezing or coughing, the nose and mouth should be covered with a handkerchief, and all precautions should be taken in order to protect others from the infected spray. A little eucalyptus oil on the handkerchief is useful as a preventative during an epidemic of "colds." In cold weather the feet should be kept warm. Cold in the head is brought about by chilled feet, and not by chilled heads. It is common in winter to see people with the nose, mouth and head wrapped up, walking or cycling with bare legs and feet. This is certainly the best method of inviting trouble.

In the season when coughs and colds are common, it is advisable to douche the nose with a hot, non-irritant antiseptic, by means of a duck-shaped nasal douche, which can easily be procured

from the chemist for a few annas. This is very useful in the case of those who suffer from chronic catarrh. The solution that I have found most useful and handy can be easily prepared. Take one teaspoonful each of bi-carbonate of soda, boracic acid, and table salt (sodium chloride) add to these four teaspoonsful of clean white sugar, and bottle for use. Take a level teaspoonful of the mixture dissolve in half a chhatank of very hot water, and fill the douche with it. The reader should understand, if he has grasped the structure of the nose, that the fluid poured into one nostril will flow out of the other nostril if the head is tilted on one side. The solution may be allowed to rest a little on the back part of the nose above the palate by tilting the head backwards and then allowing it to run out through the nostril. If some fluid runs down into the throat, it is immaterial. The hot fluid cleanses the dirty, thick, infected mucus, soothes and foment the inflamed mucous membrane, is non-irritating and mildly antiseptic. It is also easily and cheaply prepared at home.

CHAPTER XXXVI

MALNUTRITION

In India, the population may be divided into those who can afford to take the diet which they have been accustomed to for generations, and those who cannot. Among the latter are labourers, sweepers, hawkers, petty clerks and the unemployed. In the Punjab, for instance, the usual dietary consisted of two main meals, and a morning drink of milk and, sometimes, a drink of milk or fruit between the meals. Each meal consisted of wheat or maize bread, well buttered, one vegetable and (or) one dal, which also contained butter, *dahi*, milk pudding, seasonal fruit, dried fruit,—*e.g.*, pine kernels, cocconut, almonds, etc. Raw vegetables—cucumber, onion, radish, etc., together with achara and chutnies were also freely consumed. In these days ghi and milk is adulterated and too dear to be within the means of the poor people. Fruit is a luxury, and dried fruit is also far too dear. They live on unbuttered chapatis, which are taken with a little achar, onion, or sometimes dal. There is no milk, no ghi, and no fruit. This is evidently starvation diet and one cannot expect these men to be healthy and strong. It is thus common to find these workers emaciated, pale, and prematurely old. They often suffer from anæmia, constipation, colitis and tuberculosis, together with fevers whose number is legion.

There is only one set of people, among the workers, who can still maintain themselves on their ancestral diet, and these are the agricultural workers. They keep a cow or buffalo and thus milk, butter, curd and whey, together with uncooked vegetables, also such seasonal fruits as water melons, mangoes, are available. The Sikhs in the Punjab who have continued to live on the ancestral dietary, and whose vocation keeps them in the open air, form the strongest and most virile part of our population. Their womenfolk work with the men in the fields and are usually well-built, strong and healthy.

Our well-to-do population is made up of lawyers, doctors, engineers, professors, civil servants, contractors, money-lenders, etc. Their dietary is of a mixed variety. They usually eat more than they can assimilate for the benefit of their body and the surplus fat accumulates in various parts of the body, making them fat and ungainly: their women-folk have neither exercise nor fresh air as they are confined to the house practically day and night, and so they are often fat and flabby, or thin and pale. They eat all kinds of indigestible delicacies instead of fruit and vegetables, and drink tea and coffee instead of milk and *lassi*, and it is very common to meet with all kinds of diseases caused by faulty nutrition, *e. g.*, dyspepsia, hæmorrhoids, gall-stones, neuritis, diarrhœa and anæmia. The diet of our agricultural population is invigorating and wholesome and it would be well to adopt it as nearly as possible. This is the cheapest and most

well-balanced dietary. Any diet below this standard is poor and starvation diet.

For a diet to be invigorating and nutritious, it should be well-balanced and palatable. Too much cooking and frying makes it indigestible and destroys its valuable vitamins, thus not only detracting from its usefulness, but making it positively harmful. Thus, our working people (except the cultivators) cannot afford suitable food and are obliged to maintain themselves on very meagre, unpalatable, starvation diet, while our well-to-do people in search of delicacies, ruin their constitutions by leading sedentary lives and consuming indigestible and unwholesome food, devoid of vitamins.

From the point of view of health, the condition of the former is hopeless and beyond the pale of medical advice, while that of the latter is amenable to improvement. In a tropical country such as ours, a liberal supply of seasonal fruit, nuts, uncooked vegetables, milk, curd, butter and whey constitute a normal requirement for health and longevity, and those who can afford it should escape from the consequences of faulty nutrition by adopting a rational and wholesome diet.

CHAPTER XXXVII

PYORRHŒA

Pyorrhœa is a condition of the gums and teeth which is prevalent among all classes of people, and in addition to causing foul breath, loose teeth, sore gums, gum-boils, and oozing pus, produces serious constitutional disturbances. It starts fairly early and continues to progress as age advances, until in middle age it becomes troublesome and in many cases a dental surgeon has to resort to the extraction of teeth and the fitting of artificial dentures in order to relieve suffering and ill-health.

Two things, above all others, play a most important part in the causation and progress of the disease, *viz.*, sepsis and unsuitable dietary.

Sepsis.—In India the cleaning of the teeth in the morning and the washing of the mouth after each meal is practically universal, and it is a very wholesome custom. The custom of cleaning the teeth with a brush made by crushing the end of a suitable length of the twig of trees, is inexpensive and excellent. The twig is usually taken from the nim or kikar (acacia) trees. The chewing of one end for the purpose of converting it into a kind of brush provides wholesome work for the teeth, and a continuous stream of fresh alkaline saliva flows to bathe the teeth and gums. During the washing of the mouth the water is

churned by jerky movements of the cheek muscles loosening and separating food particles adhering to the sides of, or lying between the teeth. The gums are also massaged with the index finger and any small particles lying under the edges of the gum are squeezed out. Thus the mouth is kept clean without the unnecessary expense of a tooth brush and tooth paste. This procedure of cleansing the mouth is natural and eminently satisfactory. It is appetising and gives a wholesome feeling in the mouth. It is difficult to keep a tooth brush clean, especially when it is used daily for months and, toothpaste may prove injurious if sufficient water is not used to wash it out, as it is liable to adhere between the teeth.

It must, however, be borne in mind that the twigs should be fairly fresh. They should be washed in clean water and kept in a clean case. They should not be kept in a wet or dirty place, for fear of the absorption and adherence of impurities.

The only time when the mouth is liable to become unclean is during sickness, and unfortunately we are subject to all kinds of long, debilitating, though preventable, fevers and diseases—typhoid, dysentery, malaria, tuberculosis, etc.—and then the mouth does not receive the attention it should. During sickness the mouth should be rinsed out with warm, weak lemon water, or warm water in which a small quantity of sodium bicarbonate is dissolved, and the mouth may thus be protected from the development of pyorrhœa.

Unsuitable Dietary.—Frequent eating, eating between meals, over-eating and eating foods that cause dyspepsia, indigestion, heart-burn, constipation, etc., must be regularly avoided.

Chocolates and other sweets, *e. g.*, Indian sugars (gur, shakkar, etc.), eaten between meals are liable to stick in the crevices and depressions in and about the teeth. They decompose and make the teeth and membranes liable to the inroads of all kinds of microbes.

It is necessary to understand also what is the most suitable dietary to be adopted in order to avoid this disease. I must give here one which is useful to all classes of people, rich and poor. I have already mentioned it in connection with constipation, but it will bear repetition, for this dietary would not only prevent the development of pyorrhoea, but would also considerably relieve it if already present.

In the morning seasonal fruit and nuts. Nuts (walnuts, almonds, pistachio nuts, pine kernels, Brazil nuts, monkey nuts, etc.), and dried fruit, *e. g.* dates, figs, etc., can be taken in a larger quantity in winter, while in summer juicy and watery fruit with a small quantity of nuts should be eaten.

At mid-day, salad, consisting of uncooked cauliflower, cabbage, onion, tomato, carrot, radish, *mungra*, and lettuce mixed with a little cream and salt to taste, may be followed by a small quantity of bread and butter, one or two cooked vegetables, curd, or cheese, or any other preparation of

milk. This meal should also end with fruit. The third meal should consist of bread and butter, cooked vegetables, dal, or some milk preparation and lastly, fruit and nuts. Fruit and nuts, it may be pointed out, are the best natural cleaners of the teeth. Neither water nor drink of any kind should, if possible, be taken with any meal. Water should be taken between meals. Meals may be reduced to two if desirable. Other food, *e. g.* sweet puddings, etc., may be added to the evening meal. Simple and cleanly fare taken in this way, together with cleanliness of the mouth regularly carried out, is the best prevention of pyorrhœa and sepsis of the mouth.

It has been definitely stated by eminent authorities that children fed on food deficient in vitamin A are amenable to pyorrhœa, and also that the nursing mother, fed on similarly deficient food, imparts this amenability to her child. Children should take plenty of milk, fruit juices, and vegetable juices, or fruit and raw vegetables, according to the age, in order to escape from this disease in later life.

CHAPTER XXXVIII

RICKETS AND OSTEOMALACIA

Among the common preventable diseases there are, two very important ones which make the life of the victim miserable, often consigning the unfortunate sufferers to an early grave. These are rickets and osteomalacia. The former usually begins in early childhood: the child has slight fever and profuse sweating, especially of the head and neck. He is fretful, has capricious appetite, vomiting green profuse diarrhoea, while flatulence and constipation appear at one time or other, injuring his health and disturbing his growth. Thus his abdomen becomes prominent and his spleen enlarged: his joints grow clumsy and large, the bones of the legs are bent and those of the chest and head are affected causing such deformities as knock-knee, bow-leg, flat-foot, square and large head, and narrow chest or protuberant "pigeon-breast." The first teeth appear late and are irregular. They erode and crumble very easily, this defect being also perpetuated in the second dentition. The child is late in walking and sometimes goes "off his feet" even after. Convulsions, bronchitis, pneumonia, asthma, tuberculosis—one or other intercurrent disease may carry him off at a tender age.

Rickets sometimes appears late and, among girls, during puberty and during, or after, pregnancy

osteomalacia makes its appearance either *de novo* or is superimposed on the early rickets. The patient is pale, anæmic and tired; fractures and deformities of the pelvis and lower limbs are common and child-bearing may prove a terrible, often a fatal, catastrophe. The wretched girl falls a prey to the unbearable agonies and torture of complicated parturition and is fortunate if she escapes with life, even a life of suffering.

Rickets is common in the dark dingy slums of the larger cities of Europe, where the children of the poor live on food devoid of vitamins and where the sun's rays are unable to penetrate. It is unknown in Japan where the children live in the sunshine and take the food prepared for them by the soil and the sunshine. In recent years rickets has not been so common in its severe form in Great Britain, but the majority of investigators are of the opinion that from 30 to 50 per cent. of the child population show clinical evidence of the disease. It is, however, rapidly disappearing in European countries on account of the better housing and better care of the children. There the slums are being cleared away and even those that still exist possess better light and ventilation than the houses of some of the well-to-do in the city of Lahore. The house of a British workman is made of brick or stone, and possesses a kitchen (which serves also as dining-room), a sitting-room, bedrooms, bathroom, pantry, etc. The rooms, heated by open fireplaces in winter, have hot and cold water throughout, are lighted by

good windows and are well-ventilated. The house has a small garden which provides vegetables, flowers and recreation to the occupier.

The children of poor and improvident parents receive free medical advice, nursing and proper food, and mothers are given proper medical care, nursing assistance, and suitable nutrition during expectancy, confinement and convalescence. Thus are the children and mothers of the nation cared for by the State and the people, and the many preventable diseases which used to cause great mortality and ill-health among mothers and children, are being rapidly eliminated from the country. In this way has the infantile mortality fallen from about 150 to 70 per 1,000 births, within the last quarter of a century. The number of still-births is also being reduced, and the deaths of mothers from the accidents and diseases of pregnancy and child-birth are rapidly decreasing. Rickets is therefore declining in Great Britain, where osteomalacia was already rare. There are two causes, unfortunately, which contribute to the slowness of progress in this direction. Of these causes one is beyond the power and control of man. Strange though it may seem, the island which possesses an Empire on which the sun never sets, receives an average of between three or four hours' daily sunshine only. The second cause is man-made. Coal is used as fuel in the houses, factories, workshops and furnaces of Great Britain, and millions of chimneys belch forth smoke which hovers over

the cities like a black mantle, and prevents the passage of even those rays which are the average daily quota of the island. True the agitation begun by medical officers of health and others for the introduction of electricity, gas, and other smoke-preventing devices is daily gaining force. The fact remains, however, that as long as clouds of smoke continue to obstruct the passage of the sun's rays, rickets is not likely to disappear altogether, in spite of ingenious methods of bottling up vitamins and sunshine.

Rickets is now-a-days vigorously treated by the adoption of a suitable dietary and the use of Ultra-Violet therapy, and Ultra-Violet installations are found in all hospitals. even at Child Welfare Centres and School Clinics, where rickety children are regularly bathed in this artificial sunshine. An old employee at the London Hospital who since the commencement of Ultra-Violet treatment there, had seen thousands of children going in and coming out, remarked to me that it was very instructive and astonishing to see tiny, puny, whining, anæmic creatures converted into happy, smiling, playful and rosy youngsters after a few days' treatment. Such is the beneficial effect of sunshine.

But to come back to India—the land of sunshine, where the atmosphere remains surcharged with Ultra-Violet rays for the whole day, and yet where, in the city of Lahore (I lack experience of other cities) hundreds of children may be seen suffering from rickets, and many cases of osteomalacia

occur among young married girls. Doctors Murphy and Hutchinson made careful investigations at Nasik, where the population is divided into two classes—the rich and well-nourished, who impose upon the women and infants the custom of purdah; shutting them up in dark and ill-ventilated houses, and the poor and ill-nourished, who habitually disregard purdah because the women are compelled to work with the men. Almost all the women suckle their babies for at least a year. The doctors observed that in the former class twenty-four per cent. of the children were rickety, while in the latter only 4.8 per cent. were affected. This remarkable observation speaks for itself and has a far-reaching moral, being moreover consistent with the experiments on animal. It was found that if an animal was fed on a diet rich in vitamins, but was kept confined in a close, dark place, rickets developed; whereas an animal fed on a diet devoid of vitamins did not develop it so long as it was at liberty in the open. Experiments are still being conducted by careful investigators, but it is quite clear that lack of sunshine, exercise, fresh air and vitamins, plays an all-important part in the development of this disease. Paradoxical though it may appear, in spite of the downpour of brilliant sunshine from cloudless skies, from year end to year end (except for the comparatively few rainy days) the city of Lahore provides ideal conditions for the development of rickets and osteomalacia. The dark, dismal, ill-ventilated houses are huddled together, and the narrow lanes and alleys (from 3

to 5 feet wide) which provide outlets to the city dwellers and the only playgrounds for the children, are pervaded by the stinking effluvia arising from open drains, cesspools, filth, and accumulation of latrines. The sunshine hardly ever penetrates into the houses or reaches the places where the children play. Their houses are no more than glorified rabbit-hutches, where the youngsters are reared away from the fresh air and sunshine, and in which the women and girls spend their whole day. To make matters worse, when they do come out into the streets, the young, married Hindu girls cover their faces with veils, and the Mohammedan girls (married or single) cover the whole of the body with a long flowing cloak, seeing their way only through its "eye-holes". They thus actually hide themselves from the sunshine and fresh air, breathing over and over again the foul air contained in the folds of their garments. Their food is devoid of vitamins, and milk, fresh vegetables, nuts, and fresh fruits are disliked by those who can afford them, but prefer to live on dal and roti. As to the poor—God help them—their food is indescribable! It is not only devoid of vitamins, but also of other elements which are necessary for the nourishment of the body. These mothers (even of the well-to-do class), who live on an ill-balanced dietary, lacking in vitamins, suckle their babies far too long for their capacity; and the poor mites, living in dark, dirty houses and streets, and fed on sapidless and devitalised milk, fall an easy prey not only to rickets, but to other more deadly

diseases. Such is the physical condition of our women and children who live in the ancient city of Lahore. In other cities probably similar conditions prevail.

The intelligent reader does not need to be told how these diseases may be avoided.

CHAPTER XXXIX

HEART FAILURE

In less than fifteen months two of my oldest and best friends have died of heart failure. Both were highly cultured and hard-working men, and both were middle-aged and stuck to the helm until the last moment of their lives. There have been other similar deaths among persons whom I knew or of whom I had heard, and they also were educated and hard-working in their professional career, and some of them were even younger. All led temperate lives and were comfortably off. It appears to me that in India, heart failure is a fairly common cause of death, far more common than in the West.

It is not profitable to say any thing about the poor, who form by far the greatest bulk of the population. One can hardly expect vigorous hearts in their starving and ill-nourished bodies, and deaths from heart failure among this class must be a matter of common occurrence. These people come into and go from the world unknown and unnoticed. It is easy to understand why in their case the heart fails and cuts short their lives so suddenly.

Preventive measures can however be taken by an educated person if he only understands the indications or signs of the impending calamity, and so these notes may prove of benefit.

The heart is the only organ of the body which day and night, sleeping and waking, continues to beat time like the tick of a watch or clock. The brain, the stomach, the intestines, the muscles, the nerves, etc., may be at rest, but the heart goes on pumping the blood through the small pipes all through the system and keeps the circulation undisturbed in the various organs of the body. It does rest, however, for the muscle of the heart uses up all the nourishment during its contraction or beat, and it needs rest or pause between two beats in order to recuperate its energy. Without this pause its work would lose in efficiency. Thus after each beat the short rest is absolutely essential. The heart possesses, in addition, reserve energy which is called into play when it has to perform extra work, *vis.* during exercise. The person who denies his heart a sufficient amount of rest, and forces it persistently to work without giving it time for recuperation, is heading for disaster. This is true both in the case of a diseased heart and a sound one. Here I am merely dealing with the heart which is otherwise sound, for in the case of a diseased heart the patient consults sometime or other a doctor and is conscious of the possession of an inefficient heart. He is advised to lead a well-disciplined life and to keep himself under observation and treatment. It is not so in the case of the sound and healthy heart.

A healthy heart is capable of great exertion in youth, and can draw a great deal upon its reserve force and display a remarkable power of endurance,

recuperating very quickly with rest. This power begins to wane after the age of forty and slowly the reserve power of the heart decreases as age advances. The work which formerly did not cause any disturbance, now causes exhaustion. One cannot run as far without a feeling of pain in the chest or a feeling of constriction or suffocation which brings one to a standstill. During middle life therefore one should slacken the pace. Exercise should be of a less active kind and work less strenuous; but often the position is not considered and the career continued unmindful of the consequences. This sooner or later brings about the early symptoms of heart failure. Then again worries and anxieties prey a great deal on the mind and cause a strain on the heart which begins to use up the already lessening reserve force.

In India climatic conditions injuriously affect the life of the professional man. In youth it is necessary to work hard in order to pass extremely stiff examinations, especially when teachers expect their students to cram up subjects which have not been properly taught. The hot summers dry up the sap of these young people who walk about unsuitably dressed and insufficiently protected from the burning rays of the sun. Then the struggle for life commences in the same climate with considerable worry and anxiety, and to this must be added exhausting diseases prevalent in this country from which they so frequently suffer. All these circumstances have a devastating effect on the heart, to say nothing of others, such as the poisons caused

by disturbance in digestion, flatulence, constipation, excessive smoking, drinking, etc. Thus a heart which is apparently healthy when examined by the stethoscope, begins to show signs of exhaustion. Breathlessness may appear on the slightest exertion, or even without exertion. This sign, unless pronounced, is missed by the patient and may disappear with rest. He may become breathless after a walk of even a few yards and feel constriction or a sense of suffocation, compelling him to desist. He may be seized with pain in the chest on exertion or even in bed. It is of more serious import when it appears in bed. The pain is deep-seated and is usually situated on the left side of the heart, often shooting down the left arm, or may be in the left arm shooting to the chest, or may occur in the chest only and even on the right side or in the back. It is never wise to disregard this warning, and a competent medical man should be consulted as to treatment, and suitable advice obtained for the prevention of its recurrence. If such advice were rigidly adhered to and followed, the fatal calamity in a large majority of such cases would be avoided.

The third symptom is the sensation of exhaustion. This is the commonest of all. There is limpness and the feeling that the legs will not sustain the body, the brain is exhausted, the patient feels dizzy and finds it sometime necessary to lie down for fear of an attack of fainting. This kind of sensation is experienced when, after an exhausting illness, the patient first gets out of bed. If this

symptom appears frequently when the individual is otherwise in good health and engaged in his daily work, and if it is not removed by rest, it should not be disregarded, but a thorough investigation should be made in order to find out the cause.

These three symptoms in one form or other, appear to give grave warning or signal of an impending calamity, which may be easily averted with care. But there is hardly any escape from the exhausting conditions of life which slowly, but surely, continue to kill men and women of all grades during the most useful period of their existence. Most of the deaths from heart failure are peculiar to this country. One seldom hears, in the West, of deaths of this kind occurring among middle-aged people of sober, diligent, gentle and careful habits.

CHAPTER XL CONSTIPATION

A Preventable Dietary Disease

Infectious diseases which are due to poverty and insanitary conditions abound in India, and take a very heavy toll of young and old every year. They are preventable diseases. The wealthier a country and the better the general sanitary arrangements, the less prevalent are these diseases. In England such diseases as plague, leprosy, cholera, malaria, small-pox, typhoid fever, scarlet fever, and tuberculosis were at one time a dread scourge, but now the first four are extinct; malaria is occasionally imported from the tropics; small-pox is exceedingly mild and has lost its malignancy; typhoid is rare; scarlet fever appears in a very mild form, and the deaths from tuberculosis have considerably decreased. With the exception of scarlet fever, all the other diseases, and many more, are with us in their most virulent form and there does not appear to be any escape from them yet. I have already said something about them in the previous pages.

I wish to write here about another common, and, in a very large majority of cases, preventable disease. It is ubiquitous and is found among rich and poor. In addition to causing general ill-health, neuralgia, headache, pains and heaviness during menstruation, anæmia, piles, gall-stones, etc., it

makes one amenable to all kinds of dangerous and infectious diseases. This disease is constipation, and, in a very large number of cases, it is due to some defect in diet.

Constipation is very common in England and it is rare for a medical man to find that his patient is free from this disease. Chemists' shops contain more remedies for this disease than for any other, and even the remedies for other diseases contain some aperient as a constituent. Newspapers are full of advertisements for drugs useful for the relief of constipation. Crores of rupees are spent in advertising drugs of this nature. In India it is also fairly common. I cannot definitely say how Indians compare with the British in this matter. This, however, is quite plain that the meat diet does not have any wholesome effect on the intestinal action, and the British are great meat-eaters, and rich and poor take some animal food daily. Vegetables are taken, but fruit, being comparatively dear, is considered a luxury.

Sedentary habits bring about intestinal stasis and consequent constipation. So does obesity. Thus exercise in fresh air is essential. The Indian habit of having two meals a day is far preferable to the European custom of taking four or more, though in the former case there is danger of over-eating which should be rigorously avoided, and in the latter case the alimentary canal is constantly at work, and the overloaded and blown up intestines need frequent cleansing by purgatives and enemata.

Food should be well masticated and taken slowly : no water or liquid should be taken with meals, as this dilutes the gastric juice and digestion is thus delayed. Tea and coffee are positively harmful in consequence of their astringent effect on the peptic glands, while their temporarily stimulating effect is needed only during physical or mental fatigue. Water or juicy fruit should be taken three or four hours after meals (earlier if thirsty). All food should not be cooked : too much cooking is injurious, and so is hot seasoning of all kinds. This unnecessarily stimulates the natural working of the stomach.

A salad of uncooked vegetables such as radish, carrot, cucumber, onion, tomato, cauliflower, cabbage, lettuce, etc., should form part of one meal. This can be made appetising by mixing with it a little cream and salt, with or without lemon juice. Fruit and nuts should form part of both meals.

Various ideas are in vogue as to the suitability or otherwise of fruit and nuts. Nuts are condemned as indigestible, which they certainly are if taken between meals, as children often eat them. In India lemon and butter are contra-indicated in cases of bronchitis, while in England lemon and honey or glycerine, and sugar and butter are given for a cough. There is some sense in the latter custom, but there does not appear to me to be any in the former. The fact is, that most of these ideas originate from some local coincidence. For instance, one happens to have a fit of coughing after eating buttered bread and the butter is blamed ; similarly

if water-melon is eaten after a heavy meal and indigestion has resulted, the melon is blamed because it was the only fresh article added to the meal. It is not, therefore, surprising that different ideas are prevalent in various parts of the country as to the physiological action of nuts and fruit. In my opinion all fruits and nuts are beneficial if taken in moderation and at meal-times: in other words, they should form part of the meal and should not be taken between meals. Nothing should be taken (except water or lemon water) until three or four hours have elapsed since the previous meal.

Dietary will naturally vary with age, the customs of the district, the seasons, and lastly, the taste of the individual. Supposing an adult takes two meals a day, one may be taken at 11 A.M., and the other at 6 or 7 P.M. The morning meal should commence with salad and finish with fruit and nuts, which should also form a part of the evening meal.

By preference, however, meals should commence at 8 A.M., consisting of mixed fruit, with or without milk, followed at noon by a light lunch of salad, a little bread and cooked vegetables, fruit and nuts. The last meal, which should be taken in the evening, should be the most substantial one, and it is beneficial to have a little walk afterwards and indulge in general relaxation. A period of about twelve hours thus passes before the next breakfast is taken, when all the food has passed on to the colon (large intestine) and is ready for evacuation.

One free semi-solid or semi-liquid motion in the morning should be aimed at, but two or three, if comforting or gratifying, should be welcomed.

A routine dietary, if intelligently adopted and enjoyably taken, coupled with suitable exercise in the fresh air, brings about a natural movement of the intestines, and the system is rapidly cleared of excreta, thus preventing constipation and scores of other diseases.

CHAPTER XLI

AN UNDETECTED LOW FEVER

In England a maximum shade temperature of 80 degrees Fahrenheit is very rare, and when it does occur it is usually in the south. The people soon begin to feel uncomfortable in this heat, and active brain or muscular work becomes difficult. There are cases of heat stroke and some of ptomaine poisoning due to the consuming of decomposed fish or meat, and bottle-fed babies begin to have diarrhœa and sickness, though thanks to the intensive child welfare work carried on all over the country, and the great care taken by the mothers in the cleanliness of bottles and teats, and the purity of the milk, cases of summer diarrhœa are not so common as formerly. One hears from everybody's lips—"beastly hot." Such heat there, however, does not last long.

Many years ago I was asked by the Home Office to make investigations in a small town in Lancashire with regard to the health of the weavers in a factory. The air of this factory was artificially rendered moist so that the yarn would weave smoothly and easily. I do not remember the temperature of the dry and wet bulb thermometers, but, I think, the arrangement was that when the temperature of the wet bulb was about 85 degrees, the manager would summon me to the factory at 1 P. M.,

soon after the weavers commenced work after the mid-day meal. I would pick out about 15 men and women haphazardly without reference to age or constitution, and note their temperature, respiration, etc. and enquire after their general health. At 4-30 P. M. the same persons were examined in the same way. This I did (with the help of an assistant) during the whole summer whenever the temperature rose to a certain degree. The air in the factory being moist and hot I used to perspire freely. The weavers, however, did not perspire so much and in the terrible din of the machinery they worked steadily on. At the end of the summer I made a report. One remarkable thing that is germane to the subject, is that at the close of the work many of the weavers developed a high temperature, a quick pulse and quick respiration, but not many, if any, complained of feeling tired. All of them ate well, slept well and enjoyed good health. One of them, I remember particularly, was a big buxom woman of about 26 years of age, with rosy cheeks and clear complexion, who frisked about her work like a bird on a tree. Her temperature was 101 or over, pulse 110 and general condition excellent. I was so interested in this person's abnormal temperature that I called on her two or three times in order to find out whether she was actually well. She was the picture of health and suffered from no discomfort, aches or pains.

It is quite evident that this fever was brought about by some disturbance in the natural cooling apparatus of the body. This apparatus is situated

in the brain and during the various climatic changes it so regulates the mechanism as to keep the human temperature in health practically always at 98.4 degrees. When, for instance, the atmospheric temperature is much below the body temperature and the heat produced by the organs of the body is unable to keep the normal temperature, the heat-regulating mechanism prevents the loss of heat by constricting the capillaries of the skin. Thus the loss of heat by perspiration (visible or invisible) and convection is considerably reduced. On the other hand when the atmospheric temperature and heat generated in the body both help to raise the temperature above the normal, the skin capillaries are dilated and perspiration is poured out of the skin glands, bringing with it a large quantity of the body heat, and by its evaporation a considerably larger amount of latent heat. The normal temperature is thus maintained by this wonderful mechanism.

In a variety of fevers that invade the human constitution, this mechanism is upset by the poisons which are generated by various kinds of germs. I have often mentioned the numerous fevers that make regular and frightful visitation to our homes. Here I wish to take note of a fever which is brought about by the presence of high atmospheric temperature. By this I do not mean the dangerous fever due to sun-stroke or heat-stroke which suddenly paralyses the heat-regulating centre and causes the sudden rise of the patient's temperature to 105 or 110 degrees, but a fever similar to the one

I found in the weavers. There it was temporary, in consequence of the temporary heat condition, but here in India it is more prolonged.

I often heard in England that the Indian working-man is lazy and wastes his time in talking, smoking, or sleeping. These remarks usually emanated from the lips or pens of the people who spend the five or six months of summer in the cool atmosphere of Simla or some other hill station. I knew that the Indian worker was ill-fed, subject to seasonal fevers and diseases, *viz.*, malaria, typhoid, dysentery, influenza etc., but I did not, imagine what I have found now, that here a working-man works in the scorching sun when the shade temperature is 114 to 120 and the ground temperature 138 degrees. In this heat young women can be seen with a big load on their heads hurrying to their destination, roadmenders crushing stones, builders at their jobs, and servants going on some trivial errand, working from 5 A. M. to bed-time, day in and day out, without a break. When for educated people mental work appears to be hopeless, and sleep is impossible in the afternoon temperature of 98 even under a fan, and broken at night in the minimum of 87, the marvel is that under such hellish conditions these ill-fed unfortunate men and women continue to earn an honest living, and appear to be contented with their lot. It is true that they do not usually live as long as the workers of the West, and all sorts of diseases carry them off whilst still young, but as long as they live they give the very best

account of their lives under the most trying conditions. This, however, is a digression.

These high temperatures and variations in summer and the latter part of winter not only cause temporary fevers but what is more important, delay and prolong the convalescence of various fevers, the reason being that the heat regulating centre, once out of order in a constitutionally weak person, takes weeks and months before it can recover. The temporary rise of temperature which I noticed among healthy weavers and which had apparently little, if any, deleterious effect on their health, appears to affect our men, women, and children in the form of a chronic fever. A person with chronic malaria may develop an irregular temperature for weeks; a child with whooping cough may have it for months; an attack of influenza may degenerate into a long low temperature; typhoid fever may continue for weeks and months without complete recovery; and a simple bronchial catarrh in a child may have an alarmingly long duration of temperature. In consequence of its duration this fever is often confused with tuberculosis and is the cause of considerable anxiety. It is worth remembering that this fever, unlike tuberculosis, does not cause debility, cold sweating, shortness of breath, loss of appetite, etc. In this fever the patient usually wants to eat, is more vigorous, and does not show such lassitude as one would expect in other fevers.

Prevention and Treatment.—In order to avoid the appearance of this fever it is essential that all

fevers be carefully treated. An equable temperature should, as far as possible, be preserved in the sick room and the patient should stay in bed until his general condition has sufficiently improved and his temperature has been normal for at least 48 hours. The careless manner in which fever cases are treated in India is mainly due to poverty and ignorance, retarded convalescence being brought about by the patient's having to walk about. Low fever due to atmospheric conditions, is very common among the poor. Those who can afford, and care for their health, should keep to bed and take all necessary precautions. If, however, low fever has developed, nothing will cure it more quickly than a visit to the hills, where it quickly succumbs to the invigorating climate, and the heat-generating centre regains its equilibrium.

CHAPTER XLII

OBESITY : ITS PREVENTION AND CURE

High living, especially if associated with want of exercise, very often leads to an accumulation of superfluous fat in the body. In England butchers and publicans, who eat and drink freely, are usually very fat, but as a rule the British understand the advantages of fresh air and exercise and take a great interest in health and the development of the body, and now-a-days even greater attention is paid to such things than formerly. In consequence of the Maternity and Child Welfare work which is carried on all over Great Britain under supervision of competent professional men, measures (suitable dietary, etc.) are adopted to prevent maldevelopment, and men, women, and children are growing up healthier and physically better proportioned. At school also the children are under the care of school medical officers, and the habit of taking regular daily exercise in the form of drill, gymnastics, swimming, tennis, basket-ball, hockey, etc., is inculcated in them, so that a Britisher as a rule contrives to take some sort of exercise to the end of his days, and loves to enjoy the fresh air and sunshine whenever he can get it.

The case, however, is different with us. The workers, *e.g.*, servants, porters, labourers, etc., are so hard worked on insufficient nourishment that as a class they are very lean, look underfed, and become

prematurely old. The people who can afford to keep servants form sedentary habits and live a life of laziness. They will scarcely lift a finger to do anything and need assistance even in dressing. A servant must bring the shoes of the master who must not bend to fasten them. Even in the bathroom the servant is in attendance, massaging his master's body with oils before or after the bath. As to carrying a small parcel—it positively is not done, and is resented by the servant who cannot bear to see his master so demean himself. In olden days even wealthy ladies used to spin, sew and do household work, but this is now out of fashion; the girls are educated and must not do household drudgery. According to custom married women often have to stay indoors and thus whatever exercise they used to get by spinning, grinding corn, cooking, etc., is now abandoned by our modern women of the leisured class. It is among this class that one frequently meets persons of abnormal and unshapely dimensions.

It may be noted that obesity like leanness is in some cases hereditary. It is not always due to excessive eating or gluttony, for some stout persons are spare eaters. Women are very prone to it at the menopause. Obesity is no sign of good health and though it may be consistent with great vitality and vigour, it is cumbersome and induces shortness of breath, causes difficulty in breathing and shortens life by embarrassing the heart as age advances.

Some fat people, especially women, seek medical advice and desire a remedy which would remove

the ugly protuberance of excessive fat and restore a handsome and youthful figure and good looks. Since the advent of organo-therapy all kinds of animal glands are prescribed, being finally abandoned in favour of ordinary drugs which after due trial meet the same fate. Animal organs and drugs have failed to produce the desired result : they have not physiological warrant for their administration in a large number of cases, and the sooner this quackery is given up the better. There are however more natural and scientific methods which are sure in their results, and it is possible to remove superfluous fat completely if determined action is taken for the purpose, but this can be done only before the advent of middle age. Suitable exercise of the body, ample fresh air, and the rigid enforcement of a proper dietary are three main factors which can bring about the desired changes in the body. A daily programme should be drawn up and carried out faithfully. The amount of food taken should be reduced and the voracious appetite created by exercise and fresh air should be appeased by the ingestion of a large amount of fruit and water which should be taken freely. The ordinary diet, though much reduced in quantity, should be well balanced. After a few days the patient becomes accustomed to the healthy routine, the unnatural craving for food is reduced, and he enjoys the life which gradually restores him to normal proportions. As the age of fifty is approached the case of the person becomes almost hopeless as this procedure cannot be adopted, for life is not so vigor-

ous and the amount of exercise is of necessity much reduced, as the embarrassment of heart and lungs increases considerably and the habits of eating and drinking and the general mode of life adopted in youth, being fixed, admit of hardly any change. Resolutions will be made only to be broken, as the stout person is usually an easy going one.

The proper development of the body should be the concern of the State and should begin from birth as it does in all civilized countries.

PART III
MISCELLANEOUS PAPERS
APPENDIX A
THE SORRY PLIGHT OF OUR WOMEN

Hindus, Muslims, and other sects vie with each other in bringing forward proofs of their belief that the position of woman in the one society is higher than, or at least as high as, in the other, and parade before the world the idea of the purity of their moral character. They place her on a higher level than her sisters of the West. It is said that Western girls and women, especially unmarried girls, flirt freely with young men and indulge in such bad habits as smoking and drinking, and that they have not such high ideals as those women described in the Hindu epics and history. But if all this is true, at what price have we bought this purity of character! The Indian girl is married before the age of the development of sex love; she is kept rigidly excluded from the society of other sex; and after she is married she hardly ever participates in the social enjoyments of her husband. It is not uncommon to see young girls of 14 or 15 years of age becoming the second or third wives of widowed brutes. Political and social meetings are usually attended by men only; the men indulge in all kinds of healthy games, *e. g.*, cricket, tennis, hockey, swimming, etc., whereas the women usually languish at home. The young bride is under the often harsh and cruel domination of the mother-in-law until she is

about to have a baby, when she is packed off to her parents to be looked after in her difficult time. For years, during the lifetime of his mother, the bridegroom shows no concern in the health or enjoyment of his wife. The cruel exclusion of the widow from all festivals and the social austerity enjoined upon her in the matter of dress, food, etc., is well-known to all. The custom of veiling among Hindu married women in Northern and Central India and even of unmarried girls among Muslims is a relic of the mediæval age and continues to be a prominent feature of our ignorance. A woman thus remains confined within the four walls of the house or wrapped in a veil throughout her life. She begins to have children while still in her teens and looks an old woman before she is forty. A life of neglect, ignorance, drudgery and slavery—such is the price that our mothers, daughters and wives have to pay for their high morality, their unrivalled faithfulness and cheerful affection. Woman in the West has equal opportunities with her brothers as regards education. She enjoys the company, friendship and loving care of the man she loves and participates in the social enjoyments, worries and sorrows of her husband. She plays open-air games, swims, cycles, and enters all suitable professions and occupations. She is, therefore, strong, healthy, self-reliant, diligent and cheerful.

A girl in India has no prospect in life. She is married in her childhood, and, if she is educated, it is usually for the sake of a better bargain in the

marriage market. She dresses in a garment that restricts the free motion of her limbs. She never learns to play and enjoy healthy games, and society itself exercises a considerable amount of restraint over her movements and speech. She thus grows up pale and pasty, and stunted in growth. If well-fed she becomes fat and ungainly, and if ill-fed she is thin and anæmic and benign nature is only just able to fill the bony hollows of her face with ill-spared subcutaneous fat. Often enough she ends her life in her teens a prey to tuberculosis, puerperal fever, accidents of childbirth or some acute infectious disease. She may escape death, but with a legacy of life-long misery, pain and physical and mental torture. By the time she is thirty years of age the subcutaneous filling of hollows disappears, leaving wrinkles, depressions and hollows all over the bony skeleton. Her cheeks and eyes are sunken, her face is wrinkled, her ribs are visible and her breast a loose and shrivelled mass. Her thin arms and legs are devoid of flesh or at best covered with thin flabby muscles. The well-fed girl grows fat and ugly and on the slightest exertion, begins to pant for breath and has to keep up her heavy body by continuous drugging. Subdued emotions, sexual perversities, and cruel mental and physical slavery bring about hysteria and all kinds of mental aberrations.

Thus, with the exception of the Sikh or Jat women, who lead more or less natural lives in the fields and among the cattle; live on milk and its

products, and the produce of the land, observe very little (if any) *purdah*, have scarcely any restrictions as to their movements and are thus physically and mentally strong, and the enlightened Christians and Anglo-Indians who imitate the Europeans in their dress and mode of life, the lot of our women is very sad and miserable. Such is the terrible price they have to pay for the so-called chastity, faithfulness and meek and implicit obedience to their husbands.

Poverty, ignorance and consequent insanitary conditions play a very important part in our women's physical degeneration but the deplorable and disgraceful customs of child marriage, *purdah*, lifelong enslavement and physical confinement have a much greater share in the terrible ruin of their physique and health. Half a century has gone by in which various reform bodies have spent their time, energy and money in working for the progress of the social and physical condition of women, but the influence of their efforts is scarcely perceptible. The reason is not far to seek. India must learn that individual and voluntary effort cannot uplift a nation nor can a disunited nation prosper. All European nations have been rapidly advancing since the conclusion of the war, and all independent Asiatic countries have shown remarkable progress. They are attending to the health and education of their women. *Purdah* is being abolished by law—as is also polygamy and early marriage—and the education of girls is being made compulsory. What

India has not been able to achieve all these years. Afghanistan, Turkey and Persia will attain in a decade, and China, as soon as she is on her feet: and while the educated, alert agile, strong and healthy women of the former three countries, emerging from the sickening and debilitating influence of the harem, the poisoning effect of the veil and the deteriorating and devitalising power of superstition and ignorance, will help to build strong, brave and prosperous nations, our Indian women will continue to languish in their wretched homes, leading a life of perpetual slavery, misery and sorrow. And from this there appears to be no escape unless determined effort is made.

Let women leave the four walls of their houses and come out unveiled in the open air, join their brothers, fathers and husbands in their walks, games and social gatherings. They would soon learn to be self-reliant and diligent, grow up strong and brave and lose their narrow outlook, slave mentality and hysteria, and develop a cheerful and happy life.

APPENDIX B.

MAHATMAJI'S LATEST EXPERIMENT IN DIETARY

Mahatma Gandhi's latest experiment on diet is remarkable for the fact that it is unfired and milkless. His dietary consists of sprouted wheat, pounded almonds, whole almonds, green vegetables, (marrow, cucumber, etc.,) raisins, lemons, and honey. It may be seen that this dietary is based on the latest experiments of science all over the world, and gives the lie to the superstitions and ignorant ideas spread abroads by voids and unanis, who have assigned to fruit and vegetables certain inimical properties, and have prohibited their use in various seasons, and various diseases. There is scarcely an article of food which is not banned by these self-styled specialists. It is to be hoped, therefore, that Mahatmaji's experiments will help to dispel the hopeless ignorance which is prevalent all over the country on matters of diet.

Mahatmaji's diet is that of an ascetic. It lacks variety, palatability and sufficiency of vitamins, and would certainly be improved by the addition of milk and butter. In England in the early part of this century, the vegetarian had often enough to live on a very frugal diet. In making out a regular diet table, however, one must consider the occupation, habits and constitution of the person concerned. It

may be said at once that in India one can live easily and well on a vegetarian dietary, which meets all the requirements of the body and which is the best both in health and sickness.

Let us first consider the different classes of people one finds in the Punjab. In the hills many men and women are employed in carrying on their backs planks of wood about 10ft. long weighing from $\frac{1}{2}$ to $\frac{3}{4}$ cwt. This they do daily between 5 A. M. and noon for a distance of 6 or 7 miles, and it is pitiable to see their wan, exhausted faces as they rest every few yards of the journey. They earn from nine to twelve annas a day, according to the number of planks carried (3 annas per plank). Others carry heavy baskets of charcoal, in many cases the woman even bearing a double burden, for, beside the basket on her back, she carries her baby in front in an improvised hammock, made of a cloth slung from her neck and shoulders. All these people—both men and women—in spite of the healthy climate, are pale, emaciated, and look prematurely old. Their food is Indian corn or rice, and a little cooked vegetable.

In the plains the men work 8 hours a day and 7 days a week under the hottest sun or in the coldest weather on wheat chapatis and dal, vegetable, gur, or salt. This monotonous work and monotonous food they endure to the end of their days. They also earn from 12 annas to a rupee, on which income wife and children have to be kept. Even the young men and girls are devoid of youthful vigour

APPENDIX B.

MAHATMAJI'S LATEST EXPERIMENT IN DIETARY

Mahatma Gandhi's latest experiment on diet is remarkable for the fact that it is unfired and milkless. His dietary consists of sprouted wheat, pounded almonds, whole almonds, green vegetables, (marrow, cucumber, etc.,) raisins, lemons, and honey. It may be seen that this dietary is based on the latest experiments of science all over the world, and gives the lie to the superstitions and ignorant ideas spread abroads by vaids and unanis, who have assigned to fruit and vegetables certain inimical properties, and have prohibited their use in various seasons, and various diseases. There is scarcely an article of food which is not banned by these self-styled specialists. It is to be hoped, therefore, that Mahatmaji's experiments will help to dispel the hopeless ignorance which is prevalent all over the country on matters of diet.

Mahatmaji's diet is that of an ascetic. It lacks variety, palatability and sufficiency of vitamins, and would certainly be improved by the addition of milk and butter. In England in the early part of this century, the vegetarian had often enough to live on a very frugal diet. In making out a regular diet table, however, one must consider the occupation, habits and constitution of the person concerned. It

may be said at once that in India one can live easily and well on a vegetarian dietary, which meets all the requirements of the body and which is the best both in health and sickness.

Let us first consider the different classes of people one finds in the Punjab. In the hills many men and women are employed in carrying on their backs planks of wood about 10ft. long weighing from $\frac{1}{2}$ to $\frac{3}{4}$ cwt. This they do daily between 5 A. M. and noon for a distance of 6 or 7 miles, and it is pitiable to see their wan, exhausted faces as they rest every few yards of the journey. They earn from nine to twelve annas a day, according to the number of planks carried (3 annas per plank). Others carry heavy baskets of charcoal, in many cases the woman even bearing a double burden, for, beside the basket on her back, she carries her baby in front in an improvised hammock, made of a cloth slung from her neck and shoulders. All these people—both men and women—in spite of the healthy climate, are pale, emaciated, and look prematurely old. Their food is Indian corn or rice, and a little cooked vegetable.

In the plains the men work 8 hours a day and 7 days a week under the hottest sun or in the coldest weather on wheat chapatis and dal, vegetable, gur, or salt. This monotonous work and monotonous food they endure to the end of their days. They also earn from 12 annas to a rupee, on which income wife and children have to be kept. Even the young men and girls are devoid of youthful vigour

and vatility, while the older men have wrinkled faces and thin legs, and the children are "pot-bellied".

Take next the clerks, teachers, etc., whose diet improves according to the increase in salary. They usually take chapatis, cooked vegetables, milk and its preparations, some of the men also taking eggs and meat. Their women folk are usually vegetarian, but almost invariably anæmic and devoid of vitality on account of poor food, lack of exercise and fresh air and lastly, exhausting and frequent child-bearing. Those men who take to exercise may show a better physique.

Lastly the wealthy class—they rely upon vegetables, cereals, milk, eggs, fish, meat, etc., which the Indian culinary art, with the help of innumerable spices, converts into unrecognisable delicacies, devoid of all vitamins. They are more or less permanently injurious to the organs of digestion and also to the teeth, stomach and intestines, causing dyspepsia, constipation, liver trouble, diarrhœa, hæmorrhoids, insomnia and various nervous disorders. These people have large, distended abdomens, thin legs and pale, bloated, expressionless faces. This leisurely class (especially the women) detest exercise and fresh air and only take it under protest and on the advice of the doctor.

Mahatmaji's dietary would hardly suit any of these people. The man who is engaged in heavy manual labour needs more milk, ghi, and vegetables and in fact a much more liberal diet. He has plenty of exercise and fresh air which burn up his fat and

muscles and leaves him a mere skeleton before he is forty. The wealthy man needs more fresh air and exercise, more uncooked food and fruit, and far less of the cooked niceties which have distorted his natural taste and undermined his constitution.

India possesses a large number of articles of food which would provide variety, palatability and all the ingredients of a wholesome diet. Some of them may be enumerated here. There are grains and cereals, *e. g.*, wheat, barley, oats, Indian corn, rice, peas, beans and dals; vegetables of which tomatoes, lettuce, cabbage, cauliflower, cucumber, *tar*, carrot, radish, onion, *soya-ka-sag* watercress (*pani-ku sag*) can be eaten raw; nuts and dried fruit, of which walnuts, almonds, pinekernels, pistachio nuts, monkey nuts, dates, figs and raisins may be mentioned. Almonds and pinekernels (*chilghoza*) especially the latter, provide the best and most easily digestible fat and proteid, and dates and raisins the best sugar. Fruit, which can be procured in all seasons in all varieties, provides sugar, salt, some carbohydrates and sterile water, while milk (or its products) which contains practically all vitamins, is a perfect food for children and invalids, and a most wholesome adjunct to the diet of adults. These and many more would form a delicious, salubrious, invigorating and body-building dietary of enormous variety, if one could only banish the superstition of the unintelligible properties of "vat, pitt and kaff", which will either have to be discarded altogether or made intelligible in the light of science.

Advice is often sought by correspondents as to the best dietary suitable to the needs of their constitution. I cannot undertake to enter into correspondence with them. but for their information, I herewith give a rough outline of the diet which has been adopted in my own household for many years.

Morning Meal—about 7-30 A. M.—A variety of fruits, especially fresh and seasonal and milk.

Mid-day meal—about 1 P. M.—Salad, consisting of uncooked vegetables seasoned with salt and cream; dahi, with or without sugar or honey; one small chapati with one or two cooked vegetables, seasonal fruits, nuts, raisins, figs and dates. Salad and fruit are the most important articles of this meal.

Evening Meal—about 8 P. M.—Cooked vegetable, one dal and two or three small chapatis, milk pudding and seasonal fruits, nuts, raisins, etc.

It will be seen that this food can be varied in the matter of the cooked vegetables and chapatis in the second and third meal, but fruit and milk and its products are provided for all meals, and a large plate of salad for the second meal. The first meal may be discarded and the second meal taken earlier if necessary. In my opinion in this way most people can live and be free from the various diseases mentioned above, to the end of their days. The only people in the Punjab who come as near as possible to the prescribed dietary are the Sikhs and Jats, who till the land, and they are probably the strongest and best built people.

APPENDIX C

LAHORE CITY—A DEATH-TRAP

The ancient city of Lahore is to-day the premier city of the Punjab. According to the Census of 1921 its population was 257,295*. It is the seat of the Punjab Government and the Governor resides here during the winter months. It has its High Court, University and various institutional colleges, and naturally a very large number of educated professional and business people reside in the commodious bungalows situated along miles of smooth, dustless, damp-proof roads, where also lovely parks are provided for the recreation and enjoyment of these people.

This, however, is not the real city, where the workers, the workless, and the petty tradesmen live. These people live in dark, dingy, dismal and unventilated houses, which are dirty and structurally uncleanable, and are the haunts of rats, mice and reptiles. Flies, mosquitoes, gnats, bugs, wasps, spiders, ants and other insects, swarm in these houses in seasons favourable to them. The sanitary accommodation is of a very primitive kind. The excreta is either removed by hand labour or allowed to decompose on the roof or, in many localities, even in the vicinity of the houses. The streets are usually 4 to 6 feet wide and on each side an open channel conveys an offensive stream of slop water, bath water, urine, excreta, and all sorts of refuse from the houses.

*This article was written in 1928, before the recent census.

These channels are the favourite conveniences for the men and it is no uncommon thing to see a row of men urinating in a squatting position in full view of passing women and children.

The business quarters—or bazaars, a word introduced into English for want of a more expressive word—are loathsome; and the combined stench of the open drains, and the foul atmosphere laden with dust, smoke, pulverised human and animal excreta, germs, etc., pervades the still air. This stench is very characteristic and once experienced is not easily forgotten. The shops are nothing more than “glorified” boxes (glorified as to size alone) in which the goods are stored, while the counters on which the articles for sale are displayed and where the business is conducted, are planks of wood fixed across the open end of the “box” at a convenient height for passers by and immediately above the drains. The articles thus displayed, no matter whether they are articles of food or not, receive their full quota of dust, stench and insects. There can be seen the favourite sweets of the people simply black with flies, and milk containing floating dung, straw, dead flies and other insects. These shops are handy resorts for rats and mice, the holes being ready-made and food abundant. The quantity of mud that lies in the bazaars, dried and blown about by the movement of the people and animals, can be imagined from the fact that in time of rain, the mud is often sufficiently deep to cover naked feet up to the ankles. The bazaars are smeared with both fresh

and old dung, expectorations, nasal mucus, straw, the skins of fruit and sugar-canes, rags, etc., and a motley crowd of men, women, children and animals rub shoulders with each other. It is not surprising if a cleanly dressed person passing through a bazaar returns with soiled garments emitting the characteristic bazaar stench.

The city is surrounded by gardens, but right through the gardens and close to the walls, run large open channels which receive the sewage and storm water of the City. Close by runs the canal also containing all kinds of filth and in some places even receiving sewage: and the poor people bathe, wash their clothes and even their mouths in this dirty water, (for where else shall they bathe and wash their clothes?) When dry, the canal is filled with slimy mud and rotting organic matter of all descriptions, and this and the sewers in the hot weather emit foul odours which pervade the surrounding gardens. Unfortunately the air is very still during the greater part of the year, and dust, smoke, and bad smells linger day and night in the atmosphere within a few feet of the ground. I doubt if even a hurricane, sweeping through the unventilated shops and houses of the bazaars and alleys of this great city, could clear its atmosphere, for the surrounding walls seal the already imprisoned air. The city thus in summer becomes an extensive oven roasting its inhabitants in a shade temperature of 110 to 120 degrees F., and provides warmth in winter to the thousands of naked or half-naked workers and workless.

There are hundreds of open wells in the city both shallow and deep, which receive their quota of dead rats and birds and are freely polluted by people bathing on and about their parapets. Water is also obtainable from the Municipal waterworks.

Lahore, as I understand, and as is to be expected, has the best Municipality in the province. It has its water and sanitary engineers, sanitary inspectors, and a highly qualified medical officer of health. There are other public health officers such as the director of public health and his assistants. These are well-trained and well-paid men who advise the Government and the Municipality in various matters of health. The appointment of the health officers is subject to the sanction of the Government, and the director of public health thus can and does exercise a considerable amount of power over the health matters of the city. Thus supervision of the health affairs of the city is modelled on the same plan as in English towns. There the appointment of a medical officer is subject to the sanction of the Ministry of Health, and once appointed he can carry on his duties untrammelled by the idiosyncracies, prejudices and ignorance of the Council. To give the reader some idea of how it is possible to overcome them, I quote from my annual report for the year 1924 on the health of the English town of which I was medical officer of health. Writing on the subject of the abolition of pail closets and the introduction of fresh water closets I remarked:—"Now that the relics of antiquated

hygiene are on the point of being dispensed with, it is interesting to look back to the early efforts of the department to improve the sanitary conveniences of the district. They were frustrated year after year by the indifference of successive Councils, but thanks to the assistance of the Local Government Board and now the Ministry of Health, persistent endeavours have at last borne fruit." The year after in my report for 1925, on the subject of Child Welfare Work I had some unpleasant things to say to my Council: "When comparing the quinquennial periods 1916-1920 and 1921-1925, one cannot help noticing the change in the attitude of the Council towards the movement. During the first period the members vied with each other in giving proof of their patriotism and social service by their active interest and enthusiasm in the work, while during the period under review not only has their interest gradually declined and their enthusiasm flagged, but apathy and even discouragement have been observed."

Even in enlightened England it is not easy to carry out sanitary reforms: self interest, prejudice, ignorance, zeal for economy, and politics, sway the Council's opinions against important projects of sanitation. In India of course the problem is further accentuated and when it is considered that the Government officials are chary of exercising their power of controlling and supervising the sanitary work of the Municipality and leave them masters of the situation, the consequences are evident enough.

The work loses in efficiency and the Municipality continues to turn down all projects for sanitary reform. Officials become apathetic, bribery and corruption become rampant, and the Municipal commissioners, instead of learning and carrying out civic duties and engaging in social service, lose all sense of self-respect and use their position for selfish ends. It is pathetic to see men who have spent years in gaining a knowledge of medical and sanitary science, losing it bit by bit by their inaction and indifference. They draw fat salaries and, after many years' enjoyment, retire on equally fat pensions. They appear to have no interest in serving the country or advancing science, and no ambition to emulate their colleagues of British towns. They have here a field of work and research unobtainable in any other country. They might become Rosses, Mansons, Leishmans, in their own sphere and leave a mark on the annals of this most beneficent and humane science.

I contend that from a sanitary point of view the last half century has brought about no appreciable change in the sanitary condition and environment of the people of Lahore and if there is any change at all, it is for the worse. It has been stated as evidence of the sanitary improvement that whereas formerly the people rebelled against anti-cholera vaccines and anti-plague inoculations, now they submit willingly. These measures however, cannot be called sanitary or hygienic: they are merely preventive measures of meagre utility and do not

reflect the slightest credit on the Health Department of the country. Let the medical health officials enter the gates of the city of Lahore and point out one important sanitary improvement in the houses, bazaars and streets, or even in the life of the lacs of living skeletons imprisoned in its poisonous atmosphere.

The consequences are patent to any observer. Let us first glance at the meagre health report of Municipality for the year 1926-27. Out of about 8,900 deaths 2,155 or about 25 per cent. were caused by fevers; add to these 533 due to diarrhœa or dysentery, 717 from phthisis, 70 from enteric fever, 378 from smallpox, 5 from cholera, 52 from plague, 112 from puerperal fever, and 152 from measles, which makes a total of 4,172. It must be remembered that patients are attended by all kinds of people from a competent medical man to a goldsmith, wandering faqir or advertising quack, and many deaths from other diseases must be due to preventable causes. Taking the lowest estimate in the city of Lahore, about half the deaths are due to preventable infectious diseases, and this in more or less normal years. A more shameful and disgraceful record it is difficult to imagine! There are 717 deaths from phthisis: what about the deaths from other tuberculous diseases? There must be a much larger number suffering from tuberculosis. 378 deaths were recorded from that loathsome disease smallpox, how many lost their sight or were disfigured and disabled for life we are not told. Puerperal

fever carried away 112 young mothers, but how many have become invalided for life we shall never know.

It would be interesting, were it not so sad, to observe the crowd emerging from one of the gates of the city—young people pale and anæmic, some with sunken eyes, withered cheeks and limbs like mere bones, and others blind, maimed and disfigured. Women of 30 or 40 look about 60 or 70 years old, having never had the colour, flesh and brightness of youth. Fevers of one kind or another are common enough, and weary and distressed creatures with a temperature of 103 or 104 degrees can be seen dragging weary limbs. It is not uncommon to find cases of pneumonia, pleurisy, typhoid and advanced tuberculosis walking to the hospitals.

In no civilised country in the world does one come across such deplorable sanitary conditions and their inevitable consequences. I say "civilised country" in the sense that here (as in London, Birmingham, Sheffield, etc.), money is available for first class medical officers, public health directors, sanitary engineers, etc., and yet the city groans under a burden of loathsome, debilitating, exhausting and mortal diseases; and loses its men, women and children by diseases which are more or less extinct in other countries.

I may here record the experience of to-day's visit to the hospital. The first three patients I examined were cases of phthisis or tuberculosis of the lung. Two were men aged 50 and 25 and the third

a married woman of 19 years. Take the case of the man of 50 years of age, 12 years ago he came from his village and tried to earn his living by selling *pakouras* and *bhallas* (besan and lentil fritters) : he married twice and both wives died childless. He has been ill for the last 9 months, sleeping in someone's verandah and eating whatever he can get from any kind neighbour. The measurement of his forearm at the thickest part was $6\frac{3}{4}$ inches, of the arm at the centre 6 inches, just above the ankle $6\frac{1}{2}$ inches and the calf $7\frac{1}{2}$ inches. One of his wives most probably died of tuberculosis, while he himself is a living skeleton hastening to his death from the same disease. The other two patients will not live many months. This, then, is an every-day experience in this great city of our unhappy land. I have seen village people going to live in the city and coming out infected with the diseases, for the prevention or cure of which no provision has ever been made, Lahore is thus a veritable death-trap for young and old, where slowly but surely their life-blood is sucked until life itself is extinct.

APPENDIX D

OBSERVATIONS ON WEATHER CONDITIONS IN LAHORE IN 1929.

After a severe epidemic of malaria during the last three or four months, December commenced with very bracing weather. The days were very pleasant and refreshing and the nights cool and invigorating. Malaria was dying down and the sick convalesced rapidly. The shade temperature ranged between 70° and 55° F.

The winters in Lahore are very healthy and delightful for English people and those who can and do live in the European way.

Their dress is conducive to the comfort and warmth of the body, their feet are kept warm and they indulge in exercises such as walking and riding, while at night they sleep in lofty, well-ventilated rooms, the cool fresh air having a very refreshing effect although the temperature often falls very low.

With us the case is different. A very large majority of people cannot afford any footwear and walk about barefoot, apparently as unconcerned in winter on the icy ground as in summer on the burning plains. They wear dhotis, loin cloths, or thin trousers, turbans of varying sizes being used as cover for the head, while the body is clothed with some material according to the means

of the individual. Many people cover the mouth and nose, not realising that they are breathing their own foul breath instead of fresh clean air. The poor have very spare covering at night, and sleep with their knees tucked up to the chin in order to preserve the maximum quantity of heat under unfavourable conditions, and provide warmth to the body by covering the head and face, thus preventing the warm expired air from escaping.

In winter this method of dressing and living proves most injurious. The poor have hardly any resisting power against disease. Many succumb to malaria unattended and uncared for, and those who escape from its exhausting attacks fall an easy prey to cold. In India chronic catarrhal conditions of the air passages are extremely common, especially among the poor, because of their dusty environments, and they easily develop bronchitis, pneumonia and pleurisy on the sudden approach of winterly weather.

The second week of December brought in damper weather, and rain and cloudy spells have exaggerated the cold. Coughs and colds are quite common and infectious catarrh and influenza are spreading rapidly from one household to another. In the congested community of a city such as Lahore where myriads of germs, moisture, and dust float about in the stagnant air of alleys and bazaars, and where the people cough and sneeze all round, it is scarcely possible to avoid infection.

Epidemics of these diseases are therefore very frequent.

It is not difficult to understand the preventive measures which should be adopted. Warm clothing is very essential for children, old people, the weak, and the sick. The feet and legs should be kept warm by wearing warm trousers, sock and shoes. The nose should be kept free to breathe the fresh air instead of being buried under the bed clothes at night and covered by something or other during the day. Brisk exercise (for the young) and gentle walks (for the old) should be taken daily in the fresh air. It is very important that infection be avoided with great care, for once admitted to the household it rapidly spreads among the family. Food should be well masticated and taken in a moderate quantity and at regular intervals, and should consist of milk, butter, bread, vegetables (both cooked and raw) nuts, *e. g.*, walnuts, almonds, pinekernels, cocoanuts, etc. and dates, raisins and seasonal fruit. The digestive system then keeps fresh and vigorous and there is hardly any accumulation of refuse to produce toxins or cause toxæmia in the system. It is worth the while of anyone who can afford it to follow carefully these simple rules of life in order to escape suffering and ill-health and save others from the unpleasant and dangerous consequences of infection.

But to the poor this is hopeless counsel, for they can neither feed nor clothe themselves properly. It takes all their time to keep the body warm even by

hugging their knees and breathing into the enclosed atmosphere. The compulsory exercise of work adds further injury to the exhausted and ill-nourished system. These are the children of the soil, our kith and kin, and warm clothing and good food—the barest necessities of the Punjab winter—are their birthright.

APPENDIX E

ORGANOTHERAPY—A PANACEA

Organo-therapy (the treatment of disease by the administration of the organs of dead animals in some form or other) or vaccine or serum therapy (the treatment or prevention of disease by the use of vaccine or serum) are so frequently employed in India that there is hardly a disease for which they have not been used. When a medical man is at his wits' end and finds himself unable to give his patient relief, he resorts to organo-therapy and prescribes pluri-glandular preparations which contain practically all the organs. This ludicrous state of affairs has gradually dawned on me when carefully preserved prescriptions have been brought to my notice by various patients. It is not uncommon to find unwary vegetarian Hindus, who never tasted meat or even eggs in their lives daily swallowing tablets made of the extract of cow's liver. Similarly, extracts of other organs, *e. g.*, kidney, ovary, thyroid, brain, etc., are administered by the mouth or injected by a syringe into the blood. The organs of pigs are likewise prescribed, and many a devout Mussalman has to submit to their administration. "Opojex" and "Opocaps" are the proprietary names of the substances derived from the pig's spleen and are freely prescribed for their patients by the devotees of organo-therapy.

English medical men are not so fond of prescribing these substances as are their Indian colleagues, and I was not surprised, when going through the advertisements of these and similar preparations in three medical journals, to find that their number was much larger in the Indian than in the English ones. These advertisements in the *Indian Medical Gazette*, a monthly journal mainly circulating in India, were 50 in number, while those in the *British Medical Journal*, a weekly journal of the British Medical Association were only 10, and in the *Practitioner*, a monthly British medical journal, there were only 17. Various European firms not only advertise, but also send samples and literature to doctors practising in India. This literature is usually of the business type and indicates that their preparation is the best and has been found very useful in all kinds of diseases. The medical men who read these advertisements and receive samples and literature become accustomed to using and prescribing their articles. European drug-houses introduce alluring modifications in their preparations and, through their representatives, their excellence and usefulness are placed before the doctors, who are given literature and samples with the assurance that further samples will be gladly supplied. Practitioners are thus taken in and begin to prescribe extracts of kidney for kidney diseases, of intestinal glands for constipation, of spleen for anæmia, malnutrition, etc., and of the brain for nervous disorders, and a mixture of all glands, both male and female, in difficult cases, with a lurking hope that this heroic treatment may bring fame to

them. It is indeed a sad commentary on the education and intelligence of the votaries of a noble profession. It appears that no thought or care is devoted to the diagnosis of the disease, or to the study of its pathology.

This mode of treatment is not only injurious to the reputation and dignity of the profession but it is very unfair to the patients. Animal organs are prescribed haphazardly to credulous and unsuspecting patients, who are unaware of the ingredients of the tablets or injections they are given. These are many a time taken for months, or as long as the pocket of the unfortunate patient permits, being given up without relief to the sufferer. This is what one would expect from such empirical and unscientific treatment.

It is important here to mention two diseases, *viz.*, osteomalacia and rickets, which arise from a paucity of sunshine and from unsuitable dietary. In England, where the sun is seldom visible, or only through the mantle of smoke which, hovering over the towns, cuts off its useful rays, the incidence of rickets is becoming less and osteomalacia is rare, if not unknown; in India, and especially in Lahore, cases of rickets and osteomalacia are quite common. In both these diseases cod liver oil owes its curative properties to vitamins, which are derived from diatoms and other sun-baked substances on which the cod lives. The imported oil, it may be noted in passing, loses very much in potency with regard to its

vitamin contents. Why the thymus gland is given no one knows.

Medical men should explain to mothers that it is necessary to take good milk and suitable food which would have a beneficial effect on the constitution of the child through the mother's milk. She should also be taught to bathe its body in sunshine or ultra-violet rays in a certain way and for a certain time. This is the best and most natural treatment, both preventive and curative.

Similarly Hindu and Muslim women who, during the child-bearing period, develop that insidious and dangerous disease called osteomalacia, a disease which causes so much suffering, makes the patient miserable, and often enough proves fatal, should be told that the cause of this illness is to be found in their unnatural mode of life, *viz.*, in their living within the dark and dismal walls of the house, their avoidance of sunshine and fresh air even when out of doors by the wearing of veils and *burqas*, their unsuitable food, and the lack of proper healthy exercise. Instead of which, thymus gland and cod liver oil are often prescribed. The use of thymus gland is purely empirical, useless and probably injurious, while the latter might give some relief but no cure. Such a patient would probably grow fat, with a large amount of adipose tissue causing a much greater strain on the heart and lungs, and making existence very miserable with aches, pains, shortness of breath, dyspepsia, hysteria, and all sorts of nervous phenomena.

All investigators agree that there is hardly any necessity of manufacturing vitamins, and that excessive dosing with manufactured vitamins has definitely proved injurious. Unfortunately, however, there is no check to the greed and enterprise of the world's drug-houses, and we have the disgraceful spectacle of the public buying useless, if genuine, articles containing all sorts of vitamins from the glands, blood, brain, and sundry organs of various animals, for real or imaginary diseases. This uncontrolled and misguided consumption must have a deleterious effect on the health of the people.

The profession is in such a disorganised condition that one does not know how to sound a note of warning to medical men whom one would wish to dissuade from the growing practice of resorting to organotherapy as the panacea of all ailments.

APPENDIX F

*MILK ITS USES AND DANGERS

Although human milk is a highly interesting subject for study in relation to the feeding of infants, and the milk of the goat, camel, ass, and other mammalia has been used in various countries as food for human beings, involving problems of public health of peculiar interest to those countries, I will confine my remarks to cow's milk. Cow's milk is almost a perfect food and contains all the essential substances required in a well-balanced diet. It is the best single food; is palatable and very easily digestible, and contains all the vitamins, two of which are in extremely stable condition. It is, therefore, a food which has a highly protective action against diseases called deficiency diseases, *e. g.*, certain bone diseases, and diseases of the eye, etc.

Cow's milk is one of the cheapest articles of diet, and provides a large quantity of proteid and fat in a very digestible form. It is the best substitute for human milk, and those infants who, for some reason or other, are prevented from feeding on mother's milk, find in it a most congenial and wholesome diet. As an article of diet in disease, milk occupies a unique position. It quenches thirst and supplies at the same time sufficient nourishment to the body in fever and feverish conditions. Being in a fluid condition it is easily swallowed by even

*A lecture delivered in England.

the most debilitated patients and its quantity can be easily regulated by simple measurement. The large quantity of water it contains is a great advantage in many diseases, e. g., heart and kidney diseases, in gout, rheumatism and neuritis. The presence of a small quantity of sugar called "milk sugar" makes it a very useful article in the dietary of certain cases of diabetes, and the presence of calcium in combination with proteid (casein) makes it a valuable diet for growing children, while in dilated and ulcerated stomach it reduces and has a highly restraining effect on the acidity of the gastric juices. It has been used as a main article of diet in the East from time immemorial. In the Hindu scriptures, which date back to from two to six thousand years before the Christian era, the virtues of cow's milk have been repeatedly described, and rice and milk entered into the daily dietary of the great sages of the East as a chief article of food.

Hippocrates, Celsus, and Galen recommended it in phthisis and gout while mediæval writers such as Van Swieten and Hoffmann recognised its great virtue. Dr. Karell, the late physioian of the late Ozar, strenuously advocated its use. He recommended a trial of the milk cure in dropsies, asthma, neuralgia of intestinal origin, cases of malnutrition, and some diseases of the liver.

It is thus clear that the subject of cow's milk is one of very great importance from the public health point of view, and sanitarians all the world

over agree in recommending its use. Milk consists of :—

1. Proteins—two to three per cent. of the total weight of milk. The white opalescent appearance of milk is in part due to the casein which is found dissolved in the form of neutral calcium salt. In its passage through the human system this protein yields no uric acid and no carbohydrates when split up, hence it is that milk is so useful in the diseases of gout and rheumatism, and is of peculiar value in those severe cases of diabetes in which protein is split up into sugar.

2. Milk Sugar or Lactose—four to five per cent. This sugar is practically tasteless and serves more as a food than as a condiment in milk, where its freedom from sweetness is an advantage, as it does not pall on the palate as readily as it would, were it not for this property.

3. Fat—4%. The fat varies in quantity according to the need of the animal for which it was designed, and according to various conditions and periods of life, *e. g.*, feeding, the period of lactation, etc. It exists in the milk in the form of an emulsion, of extraordinary perfection, *e. g.*, one drop of milk contains 1,500,000 separate globules. Hence it is that the digestive juices can easily get at them and milk fat is most easily digested.

4. Mineral matter—about 7% of the ingredients. It is interesting to observe that these ingredients are present in the milk in the same

proportion as they are found in the body of the young animals which it is designed to feed. Now the chief tissues of which the animal is made are muscles and bones, and for these phosphates of potash and lime are necessary and are found in abundance in the milk.

5. Vitamins.—Good fresh milk contains all kinds of vitamins, but their quantity varies probably considerably with the species and constitution of the animal, the quality of food given, the season, the temperature of the milk, and the duration of boiling, etc. It may be noted here that a considerable deterioration of the vitamins in milk takes place in boiling—especially of vitamin C. This subject requires still further investigation and elucidation.

6. Water.—Water forms the largest proportion of milk, from 87 to 88 per cent in quantity, and holds all the ingredients in more or less complete solution.

As I have said before, cow's milk is a perfect article of diet in a large number of diseases, and a very useful and valuable food in many others. It is the best diet for children and is one of the cheapest foods. It is estimated that a quart of milk is equal in nutritive value to a pound of beef steak. Skimmed milk, which contains less fat than whole milk is a still cheaper source from which to supplement a lack of protein in any diet. Milk is rather lacking in carbohydrates, but in conjunction with bread it forms a perfect food for any one who desires to practice economy.

I will give you an interesting practical illustration of the great nutritive and economic value of a combination of skim-milk and bread as compared with an ordinary meal. As the calculation was made before the War there will be some difference in prices :—

Lunch of skim-milk and bread. Restaurant lunch.

Ingredient.	Amount.	Cost.	Food value in calories.	Ingredient.	Amount.	Cost.	Food value in calories.
Bread	10 ozs	1 $\frac{1}{2}$ d.	755	Soup	8 ozs.		75
Milk.	1 pint.	$\frac{1}{2}$ d.	170	Beef	2 ozs.		275
				Potatoes	2 ozs.		100
				Turnips	1 oz.		15
				Bread	4 ozs.		300
				Butter	$\frac{1}{2}$ oz.		100
				Coffee			
				Milk	1 oz.		20
				Sugar	$\frac{1}{2}$ oz.		55
Total ...		2d.	925	Total		8d.	940

A haymaker in summer, working all day in the fields, can live and preserve his health much better on a daily ration of 8 pints of milk than on 3 or 4 meals consisting of various articles of diet—meat, bacon, etc. and several pints of beer. A sick person can continue to gain weight on 3 or 4 pints of milk a day. It will be observed that milk is not only of extreme value to the community as a diet, but it has also a highly economic value. No wonder therefore that sanitarians encourage the use of pure milk, as the use of polluted milk has been known to convey disease even to healthy people.

Milk is a happy hunting-ground for bacteria or germs of all kinds. They like it and live and propagate in it, multiplying so rapidly that in a few hours each cubic centimetre of milk contains many millions of germs. Most of them die at boiling water heat, and lose their activity and power of propagation below 45°C . Lukewarm milk is the best medium for their activity. It is therefore easy to understand that if fresh, clean milk is boiled immediately after it is received and quickly brought down to 45°C . and kept at that temperature until it is consumed, it will be free from any injurious effect due to the presence of microbes. It has been observed that many strains of these germs, when consumed with milk, produce no symptoms, but there are some which do cause various diseases in the consumers. Among them are :—

Tuberculosis.—The germ of this disease is derived directly from the cows' udders which may be affected with this disease, or indirectly through the manure. In the latter case the germs are coughed up by the cow, swallowed and passed in the faeces, and as all milk contains cowdung, it is easy to understand this method of contamination. Milk may become contaminated by a milker who himself is suffering from tuberculosis of the lungs, but this is rare.

The milk from the tuberculous udder of one cow may contain a sufficient number of germs to infect seriously the mixed milk of 25 or 30 cows.

The late Professor Sheridan Délépine reported in the Journal of State Medicine in 1914 that the mixed milk of Manchester, collected at railway stations or other places than farms, contained these germs as follows in the samples examined from:—

1897 to 1899	...	17·2%	Samples
1900 to 1904	...	10·3%	"
1905 to 1909	...	6·8%	"
1910 to 1913	...	9·0%	"

The danger to health from the consumption of unboiled milk is very great, especially in the case of children, who have been known to develop the disease in this way.

Typhoid Fever.—Epidemics of this disease have been caused by milk more often than those of any other disease. Typhoid germs may swarm in milk without altering its taste, odour or appearance. Milk may become infected by a convalescent from the disease, who, although himself quite well, still continues to discharge germs through his excreta for many months afterwards.

In Padiham I was able to trace an epidemic of typhoid fever affecting 17 cases in Padiham and many others in neighbouring villages, which was caused by a carrier, convalescent from the disease, and it was not until this carrier sold his farm and broke all connection with the milk supply, that the epidemic disappeared.

Scarlet Fever and Diphtheria.—These diseases have been known to be carried through milk

having become infected by patients residing on the farm.

Septic Sore Throat.—Milk becomes infected by a patient and the spread of epidemics through milk have been well known. Scarcely a year goes by in which there are no outbreaks of sore throat or tonsillitis due to milk or cream.

There are in addition slight attacks of so-called "milk sickness", foot and mouth disease, dysentery, and diarrhoea, which assume epidemic form through the infection of milk.

Boiled versus fresh milk.—There is no doubt that certain changes take place in the constitution of milk when it is raised to boiling point, but it has been proved that they cause no detrimental effect on the growth of the infant or the health of the sick or aged. One, therefore, has no fear that the great advantages of boiling have been purchased at the cost of any diminution in digestibility or absorption of milk.

In addition to the danger of infection from patients mentioned before, milk is liable to contamination from germs of all kinds in the various stages of production, handling, distribution, storing, etc. The following may be regarded as the more common sources :—

1. *From the cow herself.*—Either from the udders or from other parts. It is well known that cows, unless well cleaned and groomed daily, have their hindquarters and tail covered with

cowdung and urine. Their fæces dry in large irregular buttons on the hindquarters and, during the process of milking the friction and shaking caused by the milker tend to loosen the particles, which together with numbers of hairs, find their way into the milk. Some of this dung becomes dissolved in the milk, distributing germs all through it, but part of it can be seen either as a solid piece in the form of a yellow or brown stain seen on the sieve, or on the pad of cotton wool through which the milk is sieved.

2. From the milker.—The milker's hands are a great source of danger. I have seen a milker whose hands were covered with dry dung, carrying his dung-covered milking stool from cow to cow and with the same unwashed hands milking the cows, in this way washing a good deal of dung clean from his hands into the milk. Dirty milkers have a habit of moistening their hands with saliva. These revolting and dirty practices clearly contaminate milk with germs from the manure and from the mouth of the milker, who may be suffering from pyorrhœa, caries of the teeth, abscess of the mouth, sore throat, or consumption of the lungs.

3. From Cowsheds.—There are a large number of organisms in the straw and bedding and, unless a cowshed is cleaned daily, its walls, stalls, and floor will be covered with dry cowdung, particles of which are blown about by the circulating air and find their way into the milk.

4. From the Milk-pails.—Milk pails, unless thoroughly cleansed with clean water and well scalded with hot water, very often contaminate the milk. Dirty milk pails also add considerably to the contamination of the milk.

5. Conveyance from the farm to the customer.—The milk may be cooled in a yard where germ-laden dust is being blown about, and this adds another source of contamination. The milk kits, their transit to dairy or town by train, the handling and distributing of the milk with dirty hands, etc., are a frequent source of infection and contamination.

6. Finally, contamination in the home of the consumer.—The source of contamination is frequently overlooked when the milk for infants is under consideration. Milk of the greatest purity introduced into a dirty home may become seriously contaminated before it reaches the child for whom it is intended. In some houses there is no suitable storing place and the milk, which may or may not have been cooled by the time it reaches the householder, may attain the temperature in which bacteria flourish rapidly, or it may stand in a cup-board near the fireplace. A small degree of contamination in the original milk may thus produce highly contaminated milk before it is consumed. The consumer may manipulate the milk with dirty hands, pour it into a dirty vessel and leave it uncovered and exposed to contamination from air. Houston thus sums up the results of investigation upon the examination of milk

for bacteriological contamination :—

“ The whole history of milk from start to finish, from the secretion by the cow to ingestion by the human being is fraught with potential risk to the consumer. The influence of time and temperature on the microbial qualities of milk is most important. Milk is not generally consumed fresh, and commonly many hours elapse between the time of milking and the time when the milk reaches the consumer. During this period bacteria multiply in the milk at a rate which is governed by the temperature. It follows that milk which is comparatively clean in the beginning, after a lapse of time and under the influence of a high temperature, will yield worse results, as judged by the ordinary bacteriological test, than milk containing initially an excess of filth but which is maintained at a low temperature, or which has been examined shortly after milking.”

The milk which we consume daily, thus keeps hidden from view millions of *hosts* of innumerable micro-organisms and fortunately for us most of these do not appear to cause any disturbance in the body. In spite of the numerous dangerous pollutions to which it is subjected, it continues to be used with beneficial effect in every household in the country. But the dangers are there and a large number of people suffer from the ill effects of this preventible contamination.

In the first place, the various laws and regulations to which the production and distribution are

subjected are faulty and are easily evaded. In the second place, public opinion is not educated enough to influence the judiciary to bring the law-breakers to stern justice. If a sanitary authority prosecutes a dairyman on a charge of milking a cow with dirty hands, or having for sale milk containing cow dung, the offender is let off with a small fine of say 10s. though his germ-laden milk may have been the means of causing ill-health to hundreds of infants and old people. A magistrate would much sooner fine a motorist whose lamps were not lit at a certain time, or who happened to forget to renew his license from mere oversight, than a dairyman whose cowsheds and cows were habitually dirty and whose milk swarms with bacteria.

Of recent years the investigations which have been carried out by hygienists and agriculturists have shown the methods which it is desirable to adopt in order to produce wholesome and clean milk. The American Medical Milk Commission led the way about 30 years ago. They came to the conclusion that there should be a certain standard of milk which should be tested bacteriologically and should not contain more than a certain number of bacteria when delivered to the consumer, and in order to procure milk of this standard numerous precautions would have to be adopted.

A separate shed should be used for milking, but if the same shed be used for milking in which cows remain during the rest of the day, it should be washed down just before milking and the bed-

ding in this case should not be of straw but of sawdust.

The cows must be free from disease and for this purpose they should be under the supervision of a veterinary surgeon, and should be tested with tuberculin for the presence of tuberculosis every six months.

The cows' udders and hindquarters should be washed down with clean water and then dried down with a clean cloth before milking.

The milkers should be free from disease and should be regularly examined by a doctor. Any case of suspected illness in a milker should lead to his prompt exclusion from milking until the danger is eliminated. They should wash their hands with soap and water and brush the nails clean before milking. They should not handle the stools after they have washed their hands and the hands should be washed before the milking of each cow. The milkers should wear clean overalls and caps and should not be permitted to push their head against the side of the cow.

Milk pails should be hooded or should have a side aperture. The ordinary open pails harbour dust, which may fall from the roof, from the cow, or from the air.

They should be thoroughly cleansed and sterilised and kept covered. As soon as one cow is milked, the pail should be removed to the dairy in order to subject it to filtration and cooling, which

should be carried out in a clean room and in clean apparatus.

These and various other precautions are necessary in order to procure clean milk for the consumer. The point now arises, can this be done? In the first place there is the question of cost. Surely clean milk would be a boon to society and I feel sure society would not grudge the cost. In America a good number of dairymen have fallen in with the arrangements of the Milk Commission and receive a certificate which designates the quality of milk.

The main difficulty is the dairyman himself. As long as he can sell his dirty milk it is difficult to move him. The Ministry of Health should take the matter up and Agricultural Schools should be provided to train young men in the art of producing clean milk.

Not many years ago any old woman attended on expectant mothers, and thousands of infants died on account of the ignorance of these women and many a mother fell a prey to puerperal fever. A great deal of saving of life has been accomplished since the Midwives' Act came into operation, and duly trained midwives are gradually replacing the untrained ones. In a few years puerperal fever will be unknown and infants will be protected from preventible illness and death.

Similarly, no one should be allowed to milk or handle the milk, who is not duly trained, and the Ministry should make regulations so that all the

processes of milk production and distribution should be hygienically carried out under the careful supervision of veterinary surgeons and sanitary inspectors.

The milk producers can thus be gradually trained to their duty of providing clean milk to the public and the public can be enlightened to the necessity of demanding this unique and most useful article of diet in its purest form. Such milk will provide strong, vigorous growth to the infant and child, give a robust constitution to the adult and prove a boon to the sick and aged.

Milk, you will thus understand, presents a problem of great magnitude to the sanitarian.

Note.—Since the above was written, considerable improvement has been made in England in the production and distribution of milk, on lines similar to those suggested above.—N. B. D.

APPENDIX F

INFANT FEEDING*

The subject of infant feeding may appear to some of you very uninteresting and unworthy of discussion by the members of the British Medical Association, but as one who had to study the difficulties of the management of infant life, first in my capacity of Medical Officer of Health and then as Medical Officer to a Child Welfare Centre in a district where artificial feeding at one time was, among working women, the rule rather than the exception, I consider that a general practitioner should possess a sound knowledge of the proper feeding of infants as well as of the diseases which affect them. As far as I am aware no systematic teaching in this subject is given to medical students in this country. It is only in recent years that it has been given serious attention even in the West. I hope, therefore, that my remarks may stimulate among you a scientific interest in the subject.

The study of the diseases of infants is fraught with great difficulty, for the child itself can give one no help in the way of history. Information on this point can be gathered merely from the parents' observations. No description is forthcoming of the nature, site, quality, etc., of the pain, nor are subjective

*A paper read before the Punjab Branch of B. M. A.

symptoms available, and the evaluation of temperature, pulse and nervous disturbances must be proceeded with on somewhat different lines than in the case of adults.

It has been estimated that 80% children come into the world healthy and free from defect but in spite of the fact that their food is simpler than in later life, their troubles begin soon and a large number die before they are a year old.

The mortality among our children varies very much according to the status of the mother, but taking as a whole Punjab figures for 1926, out of every 1,000 babies born alive, 203 lost their lives before they were a year old whereas in England the mortality rate is only about 65 per 1,000 births. There too in the later years of the last century the infant mortality was nearly 150, but a gradual improvement has been brought about by a rapid amelioration of hygienic conditions in the life of the people, and latterly by ante-natal, natal, and post-natal work vigorously carried on all over the country. The education of the present and future mother in mothercraft goes hand in hand with a business-like tackling of all problems concerning the saving of infant life.

Before describing the methods of feeding, I may give you the record of 254 consultations at our Child Welfare Centre. It should be noted that the weight of all the infants concerned was below the average, that no medicine was prescribed, dietetic treatment alone being resorted to. No patent food

was prescribed, and if any mothers were already giving patent food, they were advised to give it up.

REASON FOR CONSULTATION.	No.
Constipation	... 74
Constipation & vomiting	... 4
Constipation & crying	... 5
Malnutrition	... 96
Vomiting and diarrhoea	... 1
Diarrhoea	... 15
Vomiting and crying	... 16
Incessant or frequent crying	... 28
Flatulence	... 4
Symptoms of Rickets	... 11

254

Let me here state that I have selected these cases, as the symptoms or troubles for which the mothers sought treatment were due to starvation caused by insufficient or improper feeding. It is therefore necessary to describe the symptoms of starvation among infants.

Symptoms of starvation.—To begin with, if the food is only just sufficient to supply the energy needed to carry on the vital functions and nothing is left for growth, the child's weight may remain stationary or may even decrease. The baby may sleep a little after food, but the sleep is usually very light and the child wakes up whining. Nothing may be apparent beyond the stationary weight and the child may even sleep and appear contented, but if the food is not sufficient to supply the necessary energy

for all purposes but growth, it will sleep very little, commence crying soon after food, and lose weight rapidly. In these cases constipation is the rule. There is a small stool but its appearance is not normal, and it consists usually of intestinal secretions, bacteria, desquamated epithelium, and food residue. It is dark green in colour and is known as the "hunger stool". These stools are usually infrequent, but sometimes they are frequent, appearing after each feed, and are liable to be mistaken for the stools of enteritis. Vomiting is often a symptom, especially when the infant takes a larger amount of milk mixture than its stomach can comfortably hold. When this occurs along with the green hunger stools the danger of its being mistaken for a case of gastro-intestinal irritation is even greater. If the vomiting is frequent and of a forcible nature, it may be mistaken for pyloric stenosis. That these mistakes may easily occur is apparent from the two following cases. The first had been diagnosed as one of gastro-intestinal irritation and in the second pyloric stenosis was suspected.

Case 1.—The child, four or five months old, was bottle-fed. History:—Began to vomit food; advised to dilute milk—vomiting, constipation and crying the result; milk still further diluted without any improvement; milk was then given up and patent food tried, and when it was first seen by me, the child was being given nothing but brandy and water. It was a whining, puny little object with a wrinkled face and a dropsical body. The legs and

arms were swollen, and the pulse was almost imperceptible.

Case 2.—This child, of about the same age, was brought to the Centre with the history of incessant crying, constipation and vomiting. It would take a bottleful of milk quite greedily, but vomited it back in a few minutes in a forcible manner, almost all the feed pouring rapidly out of its open mouth. This child's face was also wrinkled all over and the rest of its body similarly emaciated.

Both these cases recovered completely, and, in the course of time, achieved a weight which was considerably above the average. I may just mention that on account of the peculiar circumstances in the treatment of children, certain clinical methods should be frequently used for the purpose of diagnosis and observation of progress, *vis*:—(1) Examination of stools—the microscopical and chemical examination of infant's stools is of limited value, but a macroscopic (naked-eye) examination gives most of the information required. The inspection of the baby's stools, therefore, should never be neglected. The quality, general appearance, colour, consistency, and even reaction, should all be noted.

Broadly speaking the stools of a breast-fed infant are yellower, more frequent, and softer than those of the artificially-fed child. The former are slightly acid, while the latter are alkaline. One should be able to recognise the brownish green viscid meconium; the "soap stool" firm, grey and

putty-like, due to excess of fat and overfeeding with milk lacking sufficient sugar; the small dark green "hunger stools" and the stools of diarrhoea, due to indigestion, green in colour, acid to litmus, and containing white curds consisting of fats, fatty acids, and soaps, etc.

(2) The weight of the child should be carefully noted weekly. In my experience a normally growing baby gains from $4\frac{1}{2}$ to 5 ozs. a week, or $1\frac{1}{8}$ lbs a month. Weighing is often necessary in order to find out the quantity of food taken by the child. The child is first accurately weighed and then fed and weighed again, the increase in weight giving the amount of food consumed. This is done when the baby is losing weight, vomiting, etc., and showing symptoms of starvation in spite of regular feeding.

Mother's milk is of course, the natural food of the infant and should be given from the very start at regular intervals. The child with regular habits is contented, sleeps well, and thrives normally. So far am I convinced of the utility of regular habits in children, that I would advise the mother to wake up her baby if he is inclined to sleep beyond the time of his feed, or if he goes to sleep before he has taken a full feed. Overfeeding and under feeding can easily be checked by weighing. Night feeds should be discouraged. With just a little care and judicious feeding the child will sleep between feeds, sleep well at night, and grow uninterruptedly.

It must be remembered that even a breast-fed baby may have rickets and other avitaminous and

starvation diseases if the mother's milk is not suitable. Such cases are often found among Indian children who are usually fed at the breast for two years or more. Mothers should have nutritious food, exercise and fresh air and no baby should be breast-fed for more than eight or nine months, as mother's milk begins to deteriorate after that, and moreover the appearance of teeth is the signal for the addition of a variety of food, e. g., starches, fruit, etc.

Artificial Feeding is a calamity both for the baby and for the mother. In this connection I may quote from my Report for the year 1918 :—

"When, on account of some trivial cause, such as sore nipples and early insufficient milk, the mother resorts to artificial feeding and deprives her offspring of the natural article of diet, she little knows the amount of sickness and disease she brings to the child, and misery, trouble, anxiety, and wakeful nights to herself. No pains, therefore, should be spared in seeing that the child is breast-fed, and it is the duty of midwives and doctors to impress upon the mothers the advantages of breast feeding and to assist in its management in every possible way. Fortunately nature is a great healer and the infant's innate vitality overcomes numerous pitfalls and indiscretions in artificial feeding. One does come across instances of babies lying in the cradle merrily sucking, through a long tube, milk diluted three or four times with water, or consuming boiled bread and milk at the tender age of two or three months, but these are exceptional cases, and very

few infants would survive on a diet of this description,

The golden rule in artificial feeding is to keep as near as possible to the condition of breast feeding. Patent foods should be looked upon with distrust. The quality of milk, which should be clean, and which should be diluted according to the age of the child; the quantity which should vary according to the age of the child; a clean bottle without tube; and feeding, as far as possible, at regular hours, are the essentials."

Let me give here the comparative composition of human and cow's milk:—

	HUMAN MILK.	Cow's MILK.
Water	... 88'0 per cent.	87'0 per cent.
Salts	... '2 "	'7 "
Protein	... 1'2 "	3'5 "
Casein	... '7 "	3'0 "
Lactalbumin	... '5 "	'6 "
Sugar	... 7'0 "	4'5 "
Fat	... 3'5 "	4'0 "

Besides the apparently slight differences shown in this table, there are others which are very real indeed. We know that proteins owe their best qualities to the amino acids of which they are composed, and these differ very much in the two varieties of milk. The proportion of soluble proteins (albumins and globuline) to caseins is much higher in human milk than in cow's, and it is not only

the higher proportion of casein in cow's milk, but its different chemical composition that causes difficulty in digestion. As to salts, calcium and magnesium salts are in greater proportion in cow's milk, and potassium and sodium salts are more in human milk. Such fundamental variations, it is needless to say, are impossible to correct and the term "humanising cow's milk" is a misnomer.

It may, however, be said that as far back as 20 years or so ago, these differences were not so well understood and the humanising of cow's milk was done by diluting it with water and adding more sugar and cream. It was soon found that even the most rigid rules in the humanising of milk did not bring about the desired result. The rules that I adopted myself are as follows:—

1. The milk (sterilised or boiled) is diluted by twice the quantity of water (also boiled), and this is sweetened with sugar. The quantity of the feed is slowly increased from 1 ounce to $2\frac{1}{2}$ ozs. at the end of the first month.

2. The proportion of milk and water is gradually made equal by the end of three months when each feed is $4\frac{1}{2}$ ozs.

3. At four months the proportion is raised to 2:1, each feed being 5 ozs. Thus by the end of 6 months full milk is given and the quantity increased to $6\frac{1}{2}$ ozs. per feed.

During the first month after birth the child should be fed every three hours, but after that the

interval is increased as soon as possible to 4 hours, usually at 3 months. It is not necessary to follow these rules rigidly, as each case must be studied individually, but a careful observation of the following points is very essential:—

1. The milk should be given slowly, each feed taking from 15 to 20 minutes.

2. The quantity of the feed should not be increased beyond the capacity of the infant's stomach according to its age.

3. If the baby is constipated, and begins to cry before the feeding time, the quantity of water should be decreased. There have been cases in which by the time the child had reached its third month it was found necessary to put it on full milk.

4. Contentment, comfortable sleep, the normal appearance of stools, and a regular increase in weight are the criteria on which reliance may be placed as to the suitability of the food.

This method I have employed for many years without ever finding a need for alteration. I have studiously discarded all dried milks and patent foods as one has to rely on the directions given by manufacturers in the preparation of the feeds and must remember the chemical composition of the various brands. I have, consequently, dissuaded mothers from the use of these patent foods and dried milks in cases of trouble in feeding, finding that a judicious adjustment of quality, quantity, and time, always met the case.

The method of weighing the infant before and after the feed has been employed by various observers in order to find the average daily quantity of milk consumed by a normal infant, and the following figures give the quantities which may be given according to age:—

1st week	... 16 ozs.
2nd "	... 17 "
4th "	... 20 "
8th "	... 27 "
14th "	... 28 "
20th "	... 30 "
20th onwards	... 35 "

By converting these quantities of milk into their caloric value Rubner and Heubner have established the following formulæ as to the average nutritional requirement of the normal infant:—

NUTRITIONAL REQUIREMENT.

PERIOD.	CAL. PER KILO	OF CAL. PER LB.
1st 3 months	... 100	... 45
2nd 3 months	... 90	... 40
3rd 3 months	... 80	... 35
4th and last 3 months	... 70	... 30 to 32

From these caloric requirements and the caloric value of the milk mixture one intends to prescribe, it is easy to estimate the daily amount. One important question, however, should be decided, *viz.* whether an infant weighing say 8 lbs at 3 months should be given proportionately less milk than one of the same age weighing 12 lbs. Rosenstern work-

ing in Finkelstein's clinic noticed that infants recovering from malnutrition often did not improve when fed on the quantity of milk estimated according to the weight, not in fact until they were given the quantity they should have had, had they been the usual weight for that age. Fleming, working in the department of Dr. Leonard Findlay, Professor of Pædiatrics in the Glasgow University, estimated the energy production at complete rest in infants of various conditions of nutrition, and found that until a child had lost 35% of its normal weight for its age, its nutritional requirement was not diminished. These investigations prove that a child should be fed not according to what it weighs but according to what it should weigh at that age. If the child is very much emaciated, feeding should be commenced at a little below the rate for a normal child, but should be brought up to the maximum amount as soon as possible.

Professor Findlay considers that the physiological powers of an infant are not only able to digest and assimilate from the diluted cow's milk, but also from the undiluted milk, the various constituents, *e. g.* protein, fat, salts, etc., which are chemically and biologically different from human milk. He asserts that good results are usually obtained by the use of undiluted milk from the very beginning, provided a sufficient quantity of milk is administered.

He calculates the quantity of milk which should be given in undiluted form thus: take for example a child of 4 months. Supposing the average weight

of a child at birth to be 7lbs., at 4 months it will be $7\text{lbs} + (4 \times 1\frac{1}{8}) = 12\frac{1}{8}\text{lbs.}$

The total calories required per day $= 40 \times 12\frac{1}{8}$
 $= 493$ calories.

Since 1 oz. of milk represents 17 calories, a child should be given $\frac{493}{17} = 29$ ounces.

If a child is given 5 feeds daily, each feed will be $\frac{29}{5} = 5\frac{4}{5}$ ozs. As each feed will require one teaspoonful of sugar, which has caloric value of 16 calories and is thus practically equivalent to 1 oz. of milk, the feed with the addition of sugar will be $4\frac{4}{5}$ milk and one teaspoonful of sugar.

In view of the idea which is generally prevalent, and which I have adhered to all these years, that starch should not be added to the child's diet until it is 7 or 8 months old, I give you here the observations of Dr. Donald Paterson, the well-known London physician. He considers that the addition of starch to the infant's diet allows carbohydrate digestion to take place more slowly and there is less tendency for fermentative diarrhoea to occur and explains his view as follows:—

“In the artificial feeding of infants during the first few weeks of life, sugar should supply its carbohydrate requirements quite satisfactorily. As the infant, however, grows and requires a large supply of food, and therefore of carbohydrate, a point is quickly reached when the quantity of actual carbohydrate necessary is such that if administered as sugar, a fermentative diarrhoea rapidly follows.

This is especially true in hot climates. To avoid this it has been the custom of many to administer a portion of the carbohydrate as sugar and the remainder in the form of well-prepared starch. Instead of the blood stream being suddenly flooded with carbohydrate and its absorption being extremely rapid, such starch must first undergo hydrolysis, and is then absorbed over a period lasting almost until the next feed. This would appear to be an obvious advantage."

Dr. Paterson also maintains that the cooked solutions of starch constitute a simple and extremely adequate method of preventing curd fermentation, and if thoroughly cooked may be used from earliest infancy.

The points raised by Professor Leonard Findlay and Dr. Donald Paterson *viz.* that undiluted milk may be used as a satisfactory substitute for the so-called humanised milk, and that cooked starch may be added to the feed from the beginning, constitute an advance on the methods of artificial feeding. I, for one, would hesitate to adopt them in practice, as, undiluted cows' milk is so very different in its constituents from human milk that its use in the early days of infant life would be liable to cause gastric irritation, while the use of cereal such as wheat might tend to neutralize the effect of vitamin D in producing perfect calcification and cause rickets and caries of the teeth later on as the investigations of May Mellanby and others appear to suggest. Thus, further investigation is necessary before the suggestions of Professor Findlay and Dr. Donald Paterson are universally adopted.

APPENDIX G

THE HOPELESSNESS OF INDIAN PUBLIC HEALTH ADMINISTRATION

The infantile mortality of England and Wales was, in 1928, 65 per 1,000 births, and that of Norway, Holland, Sweden, America and New Zealand was, 48, 58, 63, 71, and 38 respectively. Dr. Bentley has estimated the infantile mortality of Calcutta at 340 per 1,000 births. This means that out of every 1,000 infants born in the City of Calcutta 340 were lost before they reached the age of one year, while out of 1,000 New Zealand infants only 38 succumbed, and English infants died at the rate of 65 per 1,000 births. We know also that in some Indian cities, and villages the infantile mortality is as high as 500 per 1,000 births.

Reckoning the average birth rate at 36 per 1,000, about ten million children are born every year, and calculating the infantile mortality of India at a low figure, *via.* 300 per 1,000 births, every year in India three million infants die before they are a year old. This is a terrible loss and shows that, climatic conditions apart, if the country could have provided the same educational, medical, and economic advantages and facilities as England has been doing for her people, there would have been a saving of two million and four hundred and fifty thousand infants in India in 1927.

One of the greatest causes of the high mortality among the infants of industrial districts in England is that the mothers do not usually suckle their babies, but leave the task of feeding them to grandmothers or to the ignorant women who earn their livelihood by looking after the children while the mothers are at work. Here in India, working women take their infants with them to their daily toil, and continue to suckle them for two or three years until their breasts are dry, mainly because, in the first place they cannot afford to pay for pure or impure milk, and secondly because they have neither the time nor the training to undertake the complicated task of artificial feeding. Thus in India the cause of this appalling infantile mortality is not artificial feeding, but rather, I believe, breast-feeding.

The infants of the working people weigh about 6 lbs. (often under) at birth, while those of the English working class weigh about $7\frac{1}{2}$ lbs, though I have known them weigh as much as 10 lbs. The diet of Indian infants is mother's milk which is poor in almost every food-essential except water, for she hardly ever takes milk or butter, and her food at best consists of *chapatis* and *dal* or some vegetable. Her milk thus contains very little fat, proteid, and hardly any vitamins. The infant continues to pull at the mother's breast day and night in its attempt to satisfy its appetite. It keeps thin and its average weight and vigour is far below the average in any civilised country. It is easy to realise why these infants fall a prey to diarrhoea, dropsy, pneumonia, tuberculosis, rickets, anæmia, and starvation diseases.

It is common to see the little mites with thin arms and legs. They have proportionately big heads and still bigger bellies. They are pale and suffer from avitaminous starvation diseases which, for want of a proper name, are called malnutrition and marasmus. Those who survive and struggle through their childhood cannot be expected to form strong and vigorous people. Their youth is short-lived and their old age comes early.

This working people is a dying race. There is no cure for the chronic starvation which continues from infancy to old age. Poor mothers give their best to their babies for two or three years, but their "best" does not feed them; when they grow older they eat the best food they can procure with the means at their disposal, but it does not nourish them. They are ignorant, for they cannot afford education; they are dirty, for they are born in dirt and are compelled to live in it.

What can Public Health Officers do even if they are multiplied tenfold? They are hampered in their work (and it is these working people who block the way) and cannot apply the principles of hygiene which they learnt in the West. In the West, the artificially-fed infants die more than the breast-fed, but here the reverse is the rule. There the people build their houses of stone or of brick, with efficient lighting and ventilation, with waterclosets to carry off excreta, with beautiful bathrooms, comfortable bedrooms with iron bedsteads and clean bedding, while here the working people live in mud houses,

huddled together on the floor, or on bug-ridden *charpais*, in rooms without lighting or ventilation and without any provision for drainage, or sewage, etc. One can apply up-to-date rules of Public Health for cleanliness and the prevention of disease in the former case, but never in the latter. Similarly, everything in India appears topsy-turvy to sanitarians. Their energies are wasted in office-work, and the prevention of infectious disease, the means of reducing infantile mortality and high maternal mortality, the best measures for the disposal of sewage and excreta, proper scavenging, the building of hygienic houses, the provision of clean food and of a pure milk and water supply, the construction of dustless roads, the prevention of dust—these, and numerous health problems cannot be taken up for the benefit of those who are suffering from chronic starvation. Our sanitarians, however, will have to make a start somewhere, sometime.

APPENDIX I

SANITARY CONDITIONS IN THE PUNJAB*

In my oral examination for Public Health the late Colonel Nutter said to me that India was a very poor country, and expensive up-to-date Western methods were not easily available, and asked me if I had thought out the best and most economical methods of disposing of sewage in that country. My reply was in the negative. He urged that we should apply ourselves to the solution of this problem, for, said he, how otherwise could such diseases as typhoid, cholera, and dysentery be prevented in India. Twenty-three years have passed since then, and now many a municipality employs a Medical Officer, fully trained in sanitation. There is a department of the Government, with a Director and Assistant Directors of Public Health, which, I understand, co-ordinates the health problems of the various districts, directs and guides the policy and procedure carried out for the improvement of sanitation, and educates the people in sanitary matters. This department is under the supervision of a Ministry, which represents the English Ministry of Health. There is an Institute which is engaged in the investigation of

* A paper read at a public meeting held in the S.P.S.K. Hall, Lahore, in 1928. Lt.-Col. Gill, D.P.H., I.M.S., who was at that time Director of Public Health, was in the chair.

the various problems of malaria control. Army Medical Officers too do a considerable amount of work in one way or the other for the improvement of general hygiene.

It will thus be seen that very important and, to all appearances, scientific, up-to-date machinery is employed in order to safeguard the health of the province, to prevent such harrowing and devastating calamities as epidemics of cholera, typhoid, diarrhœa, plague, small-pox, malaria, etc., such insidious diseases as tuberculosis, chronic fevers caused by mixed infections, such disfiguring and gruesome maladies as leprosy, Lahore and Delhi sores, and such debilitating diseases as ankylostomiasis and schistosomiasis. I have deliberately avoided mentioning such elusive diseases as measles, influenza, infectious catarrhs, and cerebro-spinal meningitis, which have not yet been besieged by the remarkable forces of sanitary science. The former have been practically starved out of existence wherever scientific laws have been definitely and diligently applied. In England, where I had the good fortune to study at close quarters, for more than a quarter of a century, the progress of sanitary science, and where most of the former diseases existed at the end of the last century, their virulence has now been made well-nigh innocuous or the diseases have disappeared altogether.

Can the same be said of our province? The vital statistics are a very poor show. In the report on the Public Health Administration of the Punjab

for 1926 (the whole of which scarcely covers 19 pages) the infectious diseases that have received notice are cholera, small-pox, plague, and "fevers"—influenza, relapsing fever, dysentery, and diarrhœa. Among "fevers" and "all other causes of death" no mention is made of such important causes of death as malaria, puerperal fever, typhoid fever and tuberculosis. These have probably been put together as "fevers". Thus, cholera, small-pox, plague, and fevers alone claimed a death rate of 28 per 1,000 (out of a total death rate of 36.52), plague claiming 108,000 and small-pox 17,000 victims. This is an appalling death rate from diseases which are easily susceptible to ordinary measures.

In India our personal hygiene has fallen from its one-time high level of efficiency. The daily baths in clean water, the cleaning of the teeth with the twigs of trees, which are wholesome, bitter, and in some cases, even mildly antiseptic, the washing of soiled parts after defecation, the washing of the hands and mouth before and after meals, the cleansing of utensils with clean ashes or burnt earth, the custom of not allowing shoes to enter the kitchen, the prohibition of several persons eating and drinking from the same vessel, and the cremation of the dead, were remarkable sanitary practices in vogue with the ancient race inhabiting this province. When, however, the English came to India, they found the people bathing in dirty ponds, first polluting the water by washing the parts smeared with fœces, and then washing their mouths in it: they

found them rubbing hands and utensils with filthy earth or slimy mud, polluting the wells with dirty buckets, micturating and defecating in the streets and all over the countryside (often within the sight of women and children) and spitting in the houses, etc. Sweets were prepared by dirty people in dirty utensils and handled by dirty hands. These and other abominations and many social incongruities were sufficiently loathsome to those accustomed to better sanitation.

Thus there developed in the Punjab (and, for that matter all over India) two distinct systems of sanitation—one on the line of modern sanitary science which has for its object complete isolation from social contact with those who live in the Indian style. This is a very expensive method. Houses are built outside the towns or cities, with plenty of land, they are well ventilated and suitable for both summer and winter. The ordinary slop and bath water is disposed of in the grounds, receptacles are kept in a room set apart for sanitary convenience, and these receptacles are emptied, washed and replaced by a sweeper as often as necessary. The excreta is disposed of either by the municipality or by private arrangement, and the garbage is burnt or otherwise disposed of. In order to keep out the flies chicks were used, but now-a-days they are being replaced by gauze doors which keep out mosquitoes as well. Servants, trained for various duties, are accommodated in quarters a little apart from the house and thus close contact is avoided and the danger of

infection from the servants is eliminated to some extent. Even the barbers have been trained to keep their tools in a cleanly manner. For its milk supply each household keeps a cow, or, as in Lahore, Military Dairies produce milk under strict medical supervision, the milkers and delivery men being medically examined in order to find out if they are carriers of any infectious disease. Clean milk, cream and butter can thus be had by both the civilian and military population. The water, if at all suspicious, is boiled, filtered or chlorinated before use. Some houses have their own wells and others are supplied by the municipality. Many kinds of food (*e.g.*, biscuits) are imported in sterilised tins, and chocolates, prepared under ideal conditions, wrapped in clean paper and enclosed in sterilised cardboard boxes or tins, are imported and preferred to Indian sweets. The large towns have first-class hotels and Rest-houses or Dak bungalows usually provided with good sanitary arrangements. The Europeans and those Indians who prefer to live in European style, thus live in a world of their own and manage to escape many of the infectious diseases which infest the Indian population.

The second system of sanitation that is chiefly prevalent, with more or less modification, may be described as the indigenous system and has undergone scarcely any change within the last quarter of a century. There are hardly any bye-laws regulating the building of houses, drainage, lighting, ventilation etc., or, wherever they do exist they are not

enforced. There is no arrangement for sanitary conveniences nor any supervision of water, milk, or food supply.

The houses are therefore built haphazardly without any regard for ventilation, lighting or drainage. Overcrowding is no offence and animals may be kept in the house, even in the bedroom. In the villages both men and women use the country for their convenience and during emergency or illness the motions are deposited on the roof or in some part of the house, sometimes there are even cemented places set apart for these occasions. The sweeper removes the refuse once a day together with other sweepings or ashes. The slop water, urine, and in fact all dirty liquid matter, finds its way out of the house into a cesspool which usually contains bluish-black, offensive, decomposing matter and which often overflows into the middle of the street into a deep rut made by monsoon waters. Often the streets become muddy and slushy. They are scarcely ever swept and the dry part is strewn with all kinds of things from straw to dried dung, nasal mucus, phlegm, and even human excreta. Atmospheric conditions are usually very calm and in the Punjab, except during the monsoon, dust, smoke, offensive and decomposing effluvia linger long in the roads, streets, and houses. The need for thorough ventilation in houses is thus much greater than in countries such as England, where the air is hardly ever still and high winds are very frequent. This stillness of the air in large towns, *e. g.* Lahore

makes the atmosphere irrespirable, offensive, and very injurious. The outskirts almost hermetically seal the air within and there is no ventilation outside the houses. Even ventilation inside the houses cannot improve their condition as there is no pure air available with which to ventilate them. In the villages there is still some fresh air available as the houses are not so crowded together and their number is small.

Here in the towns the sweepers still collect the nightsoil, but it is placed in covered (or uncovered) carts and sold to farmers for manure, street sweepings being similarly disposed of.

The streets are usually from 4 to 6 ft. wide, and carry drains from the houses on each side in deep open channels into which men may be seen micturating at any time. The bazars are also narrow without any footpaths, and the roads are covered with dung, mud, and refuse of all kinds. Men, women, children, and animals here literally rub shoulders with each other. The emanations from the drains and the dust from the roads are irritating to the throat, nose and eyes. What mixture of organic matter is contained in the air of these bazars, would be an interesting study for a chemist or bacteriologist, but its effect on human life may be judged from the fact that in Lahore an average of at least three persons daily die of tuberculosis—about 1,000 per year.

Water in the villages is brought by water carriers from the wells in skins or earthen vessels.

These wells, being open, are constantly polluted by the dirty buckets of bathers and the washing of their bodies from above, and by the water from the muddy puddle around the parapet percolating into the water below. It is not uncommon to find dead mice and rats in the wells.

In the towns some attempt is made to carry the sewage in badly built sewers to farms or fields for irrigation purposes. I have seen the level of the sewage in the sewers higher than in the tributaries by which it flows back into the streets, houses and open lands. The sewers in Lahore even enter the canal water in which people bathe, wash their clothes, and even their mouths. It is not easy to describe the terrible bungle the sanitary engineers have made of the problem of sewage disposal. This is simply a negation of sanitation.

The water supply in the towns varies and in accordance with the vigilance or indifference of the municipalities it is unpolluted or liable to pollution.

The milk and food supply, as I have already said, receives no supervision. The milk, milked into dirty vessels, by dirty hands, from dirty udders, in a dirty atmosphere and often adulterated with dirty water, contains, in addition to all kinds of bacteria, cow dung, hair, dust, straw, and all kinds of both soluble and insoluble organic matter, to say nothing of flies, wasps, mosquitoes, etc. No by-laws exist to ensure the purity of the milk supply, or if they do, they are never enforced.

The supervision of the food on sale is similarly nil. The sight of delicious sweets and savouries placed above an open drain, infested by flies and wasps, exposed to the dust of the bazar and handled by people whose hands and clothes are equally dirty is both revolting and saddening.

It is thus evident that a certain system of sanitation has been evolved by those who realised and appreciated its importance, in spite of the fact of their having to incur much greater expenses than should be necessary. The more complete the isolation required from the indigenous system of sanitation, the larger is the retinue of servants needed; and the larger the colony of servants, the more danger is there of this very isolation breaking down, for the servants are provided with unsatisfactory sleeping and sanitary accommodation, and continual supervision of them is difficult. Thus a master may be bitten by a mosquito infected by a malarial servant, or may contract typhoid or dysentery from a servant who is a carrier. Even cholera vibrio has been known to find its way into the family and carry off its bread-winner.

The question arises—What have the municipalities done to improve the sanitation of the province and educate the public in sanitary ways of living, and what indeed has the Government and its Public Health Department done to direct and guide the municipalities and co-ordinate sanitary work? Evidently no deliberate attempt has been made, but the policy of drift reigns supreme. Instead of emulating the

municipalities of England and their energetic and patriotic Ministry of Health, an attitude of *laissez faire* is adopted. The rate of progress (if any there is) is so slow that it is impossible to anticipate any improvement in the near future; but here I may say that you cannot live in sealed compartments. The country must move together and real progress will commence only when the whole system is unified. My considered answer to the late Col. Nutter's question to day would be that it is not possible to find any other solution than the one practised in the West. In industrialised and urbanised India the problem of sanitation will become more and more formidable. It will not be possible to keep a whole class of people to the loathsome and degrading work of handling excreta: neither is it to be expected that enlightened people will continue to tolerate the pollution of the countryside with its attendant danger to the food and water supply.

In conclusion, one word to my friends the Health Officers and other Public Health Officials. I consider that their profession is without exception the noblest and the most benevolent in the world. They are highly trained people and can work behind the scenes, away from the limelight, and gradually help to shape and model sanitation on modern lines. It is a thankless and, hence, a sublime task. Slowly and surely the work bears fruit in the prevention of all kinds of diseases and in brightening the homes of the people by securing for them increased health and happiness. Let them not lose this great oppor-

tunity of service, so that when the time comes for them to lay down their office, they may have the satisfaction of realising something done, something achieved.

Since the above paper was read, no real improvement in the sanitary condition of Lahore has come to my notice. Numerous houses have been built on various sites around the city without any attempt having been made to develop a proper drainage and sewerage system. Thus it happens, that these houses, called new *abadis*, stand during the monsoon season, in huge lakes of dirty water into which all their sewage flows. Two instances of an attempt at sanitary improvement, have been noticed recently. One is the work of the water department: some of the mains were so rotten that for many years they have suffered frequently recurring bursts. The bursts were closed by resourceful plumbers, or *mistris*, as they are called, who plugged the holes with improvised wooden plugs wrapped round with any dirty rag, the whole being then plastered over with cement. This year, as the bursts were too numerous and too large to cope with in this way, the old pipes were replaced by new ones, jointed by the *mistris* in some fashion or other. They left the overlying earth so loose that many unpleasant accidents have occurred, though fortunately not dangerous. The whole surface is uneven and full of holes, varying in depth from a few inches to two or three feet.

The other instance concerns the sanitary department, *vis.* the watering of the roads. This is

done in a stingy fashion, especially in summer, an hour or two after the sweepers have finished their daily business of raising clouds of dust which settle down on the adjoining houses and which is inhaled by the unsuspecting sleepers who have come out in the open to sleep in the cool fresh air. This is a case of "putting the cart before the horse" and very much worse in its effect.

The fact is, that the officers attend mainly to office work and place their reliance on their staff of artisans and sweepers, who have probably never had the commonsense of sanitation explained to them.

APPENDIX J

DALHOUSIE—A HEALTH RESORT

In the 1928-29 session of the S.P.S.K., Lt.-Col. Gill, Director of Public Health presiding, I read a paper on the sanitation of the Punjab and described in detail the deplorably insanitary conditions prevailing in our cities and villages, and the chaotic state of the Public Health Administration by municipalities, and of preventive measures against infectious disease and general sanitation. I pointed out that within the last forty years of my knowledge and memory there has been no improvement in the sanitary condition of the Punjab.

I have now had occasion to study at close quarters the sanitary affairs of a hill station—Dalhousie—which is becoming very popular among the healthy as well as the sick. By reason of its natural beauty, purity of air, invigorating sunshine and dry, sandy soil, it is an ideal health resort and probably second to none in tropical countries. It is situated between 6,000 and 8,000 feet above sea-level, faces the snow-covered range of the Himalayas in the north, and commands a view of the great rivers of the Punjab in the south. Its glorious sunsets surpass any in grandeur and beauty, while innumerable birds, such as the cuckoo, blue-tit, finch, king-crow, blackbird, and many a nameless one, delight the lover of nature with

their wonderful plumage and beautiful songs. There are wildflowers which decorate the woods and steep mountainsides with kaleidoscopic colours of unsurpassing beauty, though hidden in a rich and innumerable variety of plants and herbs. Here nature has provided wholesome water of exceptional purity and everything that she can give for the health and vigour of man. No wonder that on these cool shady mountains the healthy seek shelter from the scorching heat of the plains, and that in its clean ozone-laden air and in the invigorating rays of its sunshine, the sick a cure for tuberculosis and other fevers.

When a visitor to Dalhousie meets the natives of this land he sees that the men are well-built and the women handsome and stately. They have no purdah, and work at home and also as labourers, but on account of poverty and overwork they become prematurely old. Both sexes act as beasts of burden, carrying, on back and head, fuel, stone timber, vegetables, etc. The men give cheap service as chaukidars, water-carriers, general servants, etc. They are builders, masons, joiners, in fact generally good artisans. They are honest and humble workers, and so gentle, that no one need be afraid of robbery or molestation. Three hundred of these people are penned together on about an acre of land in a village, called Lohali, on a southern slope. The houses are built in tiers with their backs against the hill. The side walls are common to adjoining houses, like the stalls of

a shippon, but unlike them, the only opening in each house is a single door. They have no windows for ventilation or light. Most of the families eat, sleep, cook, bathe, and live in the same rooms in which they also store their wood, and sometimes keep their hens or a goat. There are no streets and no water-channels, and the roof of the house below is the playground for the children living in the house above. Sanitary conveniences are conspicuous by their absence, the inhabitants using the lower slopes of the hill. The clay, stones and bushes from the woods which they employ in the building of these huts (for they can scarcely be dignified by the name of "house") have to be paid for. This money, together with the sum of Rs. 2 per year for every house, goes to the municipality. Neither the village nor the road leading to it has any provision for lighting. The sun may shine all day and the moon and stars shed their eternal light on this picturesque village by night, but none of their rays ever enter the dark and dismal interiors, nor can the pure air of the mountains ever penetrate these miserable dwellings. No wonder that these people have a high death rate from tuberculosis, and provide a ready source of infection to the visitors whom they serve.

The municipality still continue to allow them to repair and build their homes in the same old fashion. They have no scheme for better housing: in fact, they will neither sell nor lease land to those inhabitants who would like to build better houses.

Dalhousie's bazar is a narrow rough lane with primitive drainage. In one house, which I had occasion to visit, there were about 15 people living in two rooms, and at least one of the fifteen was a sick person. At a meeting of property owners, called, I believe, by the President in order to restrict the admission of tuberculous cases, it was stated that 48 people were living in a two-roomed house. It is easy to understand that in these and the other houses mentioned above, no privacy, decency, or cleanliness can exist. In these bazar houses there are no visible signs of any attempt on the part of the municipality to improve the sanitary condition round and about them.

Dalhousie possesses circular roads round the hills, and there are other public roads on the mountainsides, but they are often rough, uneven, and irregular, with drains similarly built and unattended, in which mud and dirt lodge, and from which the water overflows, gradually washing the road away. Heavy rains and snow play havoc with these ill-constructed and ill-maintained roads which readily fall out of repair, losing shape, level and slope, etc. The sewage from overflowing cesspools, latrine areas, etc. and the pollution of the countryside by both visitors and inhabitants are so evident to sight and smell, that in the dry season it is difficult to find a road which is not disgustingly offensive, and were it not for the rains and snows, the mountain would become uninhabitable.

The houses, which are scattered up and down, are

no credit either to the builders or the owners. The floors and walls are damp, the roofs are leaky, the drains are neglected, and the ventilation and lighting are defective. The servants' quarters are usually the hotbeds of disease and spread infection to the employers. They have no properly made floors, and there is no attempt at ventilation, lighting or drainage. Their latrines are usually made of rough stone and the filth not only accumulates and decomposes on the premises, but even overflows down the hillsides.

Fleas, house flies, sand-flies, and various biting and other insects abound, causing irritation and sores on the skin, infecting also the food of the inhabitants.

The excreta from the latrines is collected in buckets and carried on the heads of sweepers to incinerators provided by the municipality. This and the open air defecation which thousands of visitors are permitted to indulge in, and than which the inhabitants of Lohali have no alternative, appear in the eyes of the municipality to be ideal methods of the disposal of excreta. As far as I am aware no attempt has been made to acquire power in order to lay water on to the houses so that W.Cs. might be introduced. In fact, the installation of this system is more or less discouraged.

The Municipal Committee strikes a superficial observer as a remarkably good collection of members. The President is usually a young energetic I. C. S., while the Vice-Presidents may be a retired Col. of I. M. S.; an Army Officer, a Civil Surgeon, etc., and

among the members are magistrates, business men, and property owners. As officials there are a secretary, a medical officer of health, a forest officer, and overseer, etc. An imposing array as compared with the members of any small municipality in England, where the committee may be composed of a butcher, a greengrocer, a weaver or two, an undertaker, a collier, and occasionally a medical man or a retired schoolmaster. The chairman, who is elected yearly by the members, by right of this position acts as an honorary magistrate. He conducts business meetings, but has no executive powers. A clerk, (or secretary), a surveyor and a medical officer constitute the main officials. On closer examination, however, the difference is quite apparent. At Dalhousie the President is usually a young man with little experience of municipal administration or of sanitary or building affairs, probably sent there to gain experience. He acts as an executive officer and first-class magistrate, who may arrogate to himself the powers of the committee in any emergency. He may dismiss petty officials and discard the opinions of such officials as the M. O. H. He is the Government nominee and so are three or four others. Business men, and experienced men and women have to take a back seat, and the work is mainly conducted by the President, or in his absence, by the Vice-President. In England the Chairman of the Council is a person duly elected by the members, and he has at least some experience of municipal affairs, and commands the respect of the majority of the members. The Council carry on

the administration through their officials and by their Council. Thus the sanitary administration and general municipal work goes on efficiently and smoothly, whereas in the former case, the President and the Government nominees rule the municipality and administer the municipal laws in the manner which suits their taste and whim. In England the mental outlook of the members is moulded around the idea of social service and the performance of civic duties. In the former the atmosphere is inimical to the development of social service. Thus it is that in England not only an Englishman, but a foreigner who develops an infectious disease such as tuberculosis, is at once sent to the nearest sanatorium without any charge, or at a very nominal one. In Dalhousie, however, the President or the committee invited property owners to discuss and devise means to prevent the admission of tuberculous persons into the municipal area. The President and others explained that the committee had no power to prevent the influx of tuberculous patients, and that property owners should form a committee themselves and, acting conjointly, refuse to let houses to such people, assuring them that the M. O. H. and other officers would help them in this benevolent work!!

In England detached and semi-detached cottages have been built for workmen with all up-to-date sanitary requirements, but in Dalhousie the municipality would not let the village people have a piece of land to build better houses on, for love or money.

In the former case general sanitation is almost perfect and administration is highly efficient, and even in the smallest villages sanitary work goes on smoothly, whereas in the latter case, the whole administration is top-heavy. People are actually threatened with prosecution for cutting down a tree on their own land, even when the information regarding it is false. Nor is anyone allowed to remove sand even from choked drains, so I am told, unless they pay for it. The poor people are afraid of touching sand, clay, or a piece of stone without permission, for fear of heavy fines.

Beautiful Dalhousie is being converted into a hotbed of disease. There are cases of typhoid, diphtheria, dysentery. Cases of tuberculosis are found among the mountain folk acting as servants, spreading infection among the visitors. Their houses are unfit for human habitation and it is impossible to disinfect them by ordinary means. Insanitation is general, and enlightened members of the committee seek to prevent tuberculosis by refusing their countrymen admission to these hills. Strange and unintelligible are the methods of the city fathers of Dalhousie!

APPENDIX K

FOOD

The various articles of our food, besides containing a large quantity of water, consist of proteins, fats, carbohydrates, vegetable and mineral salts, and vitamins. Food serves three main purposes. In the first place it supplies material for the growth of the body which continues until about the age of 25: secondly, it repairs and renews the tissues wasted by the wear and tear which is constantly going on: and thirdly, it supplies energy both for involuntary work, *e. g.*, respiration, digestion, and pumping of blood by the heart; and for voluntary work, *e. g.*, the performance of various movements in walking, swimming, writing, etc.

Many foods contain almost all the constituent parts, but in varying quantity. White sugar is probably the only substance which contains cent per cent carbohydrates; milk contains all the ingredients; ghi and vegetable oils contain mainly fats; while nuts, eggs, and cheese contain both fats and proteins. Our carbohydrate need is supplied mainly by wheat, rice, sago, potatoes, *etc.*, and proteins are derived from meat, fish, dals, peas, beans, milk, nuts, and eggs.

Proteins are digested in the stomach and intestines; fats in the intestines; and carbohydrates in the mouth and intestines; and all are then

absorbed into the blood and utilised in the system.

The proteins are the main body-builders. A man doing ordinary work needs 100 grammes (about $3\frac{1}{2}$ ozs. or $1\frac{3}{4}$ chhatanks) proteins daily in order to keep him in health and vigour. Animal proteins are found in milk and its products, *viz.*, curds, cheese, *laasi*, milk, sweets such as *barfi*, *peras*, etc., and in eggs, meat, kidney, liver, fish, etc., and vegetable proteins in peas, beans, dals, grains, and nuts, etc. The animal proteins are called first-class proteins, as they have a higher biological value than the vegetable proteins, and it is necessary, for the proper assimilation and utilisation of the proteins by the system, that 50% be animal proteins. Among the animal proteins, milk and its products possess even a higher biological value than any other proteins; hence it has been found that anyone taking milk would not need more than 37% of this first-class protein, the remaining 63% being made up from the vegetable proteins of wheat, dal, peas, nuts, etc.

With regard to proteins of wheat, it has been found that these "are a little more efficient for the promotion of growth than are the same amount of proteins from milk and eggs. No cereal grain has yet been found which contains proteins superior to those of wheat." (McCollum and Simmonds.)

Thus wheat and milk would form an ideal source of protein for growing children.

With regard to wheat germ, "it forms 1.5% of the entire kernel. Its proteins are abundant and the

mineral elements are much greater than in flour. It is exceptionally rich in Vitamins B and E and contains some Vitamin A. Bran—its proteins are even superior to germ, but it is poor in Vitamin B.” (McCollum, and Simmonds.)

The proteins of maize have a slightly lower nutritional value than those of wheat. In other respects, *e.g.* the presence of mineral and Vitamin B, they are alike.

“One ounce of any of the dals contains as much protein as one ounce of meat, nearly twice as much as one ounce of egg, and seven times as much as one ounce of whole milk.” (McCarrison.)

Fat is also required in the same quantity as protein, *viz.* 100 grammes. Milk fats, *viz.* butter and ghi, are the best, as they contain a good quantity of Vitamin A. Besides these, eggs, cod-liver oil, and fish contain Vitamin A. Vegetable oils contain very little vitamin, and in order to make up the deficiency of Vitamin A in vegetable oils, those who cannot afford butter or ghi should take tomatoes watercress (*pani ka sag*), spinach, carrots, or other leafy vegetables.

Carbohydrates are found in sugar, honey, and gur in the largest amount, also in sago, tapioca, all cereals, *e. g.*, rice, wheat, maize, potatoes, green vegetables, and fruits (both fresh and dry).

In their disintegration in the body, proteins combine with oxygen and form urea, which is excreted from the system in the urine; and CO_2 and

water, which are also the end products of fats and carbohydrates, and which are removed from the body mainly by expired air and perspiration.

If any of these substances are consumed in a larger quantity than required, they accumulate as fat or adipose tissue, besides causing injury to the system in the form of disease.

Vitamins and Mineral Salts. Vitamins have not been as fully investigated as other constituents of diet ; but this we know, that if the food given to an animal is freed of vitamins, the growth of the animal stops and it dies. Similarly, a lack of vitamins in the food has produced various diseases in human beings; but this subject has already been dealt with in a previous article. It may, however, be stated here that all investigators agree that there is no need for commercial vitamin preparations.

Mineral salts, *e. g.*, phosphates, common salt, lime, etc. are most of them required for the formation and repair of the bones and teeth, but they are also found in our muscles, soft tissues, blood, and other body fluids. These salts are made up of alkali-forming elements, *e. g.*, calcium, potassium, sodium, iron, and magnesium ; and of acid-forming elements, *e. g.*, phosphorus, sulphur, and chlorine. Some food-stuffs, *e. g.*, green vegetables and fruit, are rich in the former class of element and poor in the latter ; while others, *e. g.*, meat, dals, nuts, cereals, grains, and pulses, are rich in the latter and poor in the former. Vegetable acids are converted into carbonates and help to make the blood alkaline.

These mineral salts must be taken in sufficient and proper proportion for the preservation of health. The following remarks of Col. Robert Mc. Carrison should be carefully read and remembered:—"If our food consists of milk, milk products, whole cereal grains and *plenty* of green leafy vegetables and fruit, it will contain all the mineral salts we need and in the right proportion. But if it consists of cereal grains with meat, eggs, nuts, and *boiled* vegetables, with only a little milk, a little fresh fruit and a little green leafy vegetable, then it will not contain all the mineral salts, and it will give rise to a state in which the blood, fluids, and tissues of our bodies are too acid for the more vigorous health."

Among vegetables, iron is found in spinach, onions, strawberries, peaches, almonds, water melon, cucumber, tomatoes, potatoes, head lettuce, radish, dals, and whole cereals; and in the animal foods it is found in meat, eggs, and liver. Similarly, phosphorus is found in milk, eggs, dals, nuts, wheat, spinach, cucumber, carrot, watercress, cauliflower, and also in meat and fish.

Calcium is another important mineral and is found in milk and its products, in nuts, dals, fruit of all kinds, green leafy vegetables, and eggs.

Below is given the percentage composition and the vitamin contents of a few articles of diet used in India, and it may be mentioned that the composition varies a little according to various circumstances.

Table showing approximate percentage composition of some of the ordinary articles of diet and their vitamin contents.

Article of diet.	Proteins. %	Fats. %	Carbohyd- rates. %	Vitamins.			
				A	B	C	D
Cow's milk	3.8	3.6 to 4	4.5	++	++	+	+
Human "	1.3	3.5	6.5	+ to ++	+	+	+
Cream	2.5	18.4	4.4	++	..	..	+
Cheese	25	30	2.4	++	±	..	::
Condensed milk	8.8	8.3	54.1	+	+	o	|
Goat's milk	4.2	3.9	4.2	+++	+	+	+
Buffalo's milk	4.7	7.7	4.3	+++	+	+	+
Goat's meat	25	2.6	...	o	+	±	o
Lean mutton	21	7	...	±	+	±	+
Poultry	20.7	8.3	...	+	+	..	:
Eggs	11.9	9.3	...	++	+++	..	++

Article of diet.	Proteins. %	Fats. %	Carbohyd- rates. %	Vitamins.			
				A	B	C	D
Animal Fats.							
Butter and Ghi	I	85	::	+++	::	::	+
Cod Liver Oil		98	::	+++	±	::	++
Vegetable oils.							
Cocoanut oil		98	::	+	o	o	±
All other oils	very similar						
Nuts.							
Almonds	21	54.9	17.3	±	++	o	::
Walnuts	18.5	64.0	11.7	±	++	o	::
Cocoanut	5.7	50.6	27.9	+	++	o	::
Brazil nuts	17.0	66.8	7.0	±	++	o	::
Chestnuts	6.2	5.4	42.1	±	++	::	::

Sugars and starches.

Honey	.4	..	70	±	±	0	..
White sugar	..	0	100	0	0	0	..
Gur	.3	0	88	0	±	0	..
Tapioca	0.17	.03	87	0	0	0	..
Sago	7.0	.12	77	0	0	0	..
Sugarcane	1.5	.5	21	..	+	+	..

Cereals.

Wheat flour (<i>Ata</i>)	11.4	1.0	75.1	+	++	0	..
Maize (yellow) <i>Makki</i>	7.5	4.2	65.9	++	++	0	..
Rice	8.0	.3	79.0	±	+	0	..*
Semolina (<i>Suji</i>)	14.4	2.4	50.0	+	+++	0	..

Peas, beans & Dals.

French beans (fresh)	2.0	.1	4.8	+	++	++	..
Peas, beans and lentils (dried).	24.3	1.3	60.3	+	++	0	..

Article of diet.	Proteins. %	Fats. %	Carbohyd- rates. %	Vitamins.			
				A	B	C	D
Dals	23.0	3.5	57.0	+	++	o	..
Grains	20.0	4.6	54.0	+	++	o	..
Root vegetables.							
Potatoes	2.4	.13	17.6	±	+	+	..
Onions	.55	.11	6.0	±	++	..	..
Carrots (<i>Gajar</i>)	.9	.11	7.9	++	++	++	..
Radishes (<i>Muli</i>)	1.0	.11	3.4	±	+	+	..
Turnips	1.2	.11	4.4	±	++	+	..
Cabbage	1.3	.21	4.4	+++	++	+++	..
Spinach	1.7	.21	3.0	+++	+++	+++	..
Lettuce	1.1	.21	1.9	++	+++	++	..
Other vegetables.							
Tomatoes	.7	.11	4.4	++	+++	+++	..

Cucumber (<i>Khira</i>)	.6	.08	2.0	..	+	++	..
Pumpkin (<i>Kaddu</i> or <i>Ghia</i>).	1.0	.11	5.2	..	+	+	..
Aubergine (<i>Baingan</i>)	1.2	.33	5.1	..	+	+	..
Cauliflower	1.9	.22	5.9	..	+	+	..
Lady's fingers (<i>Bhinditori</i>)	2.0	1.1	6.0	—	+	+	..
Fruit.							
Strawberries	1.0	0	7.7	..	..	++	..
Apples	.3	.3	10.8	..	+	+	..
Bananas	1.5	.1	8.0	±	+	+	..
Oranges	.88	.1	9.5	+	+	+++	..
Grapes	.6	.1	14.0	..	+	±	..
Lemons	.5	.5	3.1	..	+	+++	..
Pomegranates	.63	0	.67	..	+	+	..
Pears	.32	.1	8.0	..	+	+	..
Peaches	.63	.1	9.4	..	..	++	..
Pineapple	.38	.32	9.7	..	..	++	..
Watermelon	.38	.22	6.7	..	..	+	..
<i>Lichee</i>	3.0	.24	6.7	..	+	++	..
Mango	.14	.77	18.0	+	..	++	..
Guava	1.3	.76	8.0	..	+	+	..

Article of diet.	Protein. %	Fats. %	Carbohyd- rates. %	Vitamins.			
				A	A	C	D
Dried fruits.							
Dates	1.5	.11	70.0	..	+	o	..
Raisins	2.2	.33	61.0	..	+	o	..

*Only unpolished rice contains these vitamins.

+++ = rich in vitamins

o = none

++ = moderately rich

.. = not estimated.

+ = rather poor

± = very little

A.

Adenoids & enlarged tonsils, 150, 151

Alcohol, 155, 156

opinion of Control Board
on the consumption of,
157

Animal parasites (worms),
90

mode of invasion of, 90,
91

Ankylostomiasis, 37

Ants

kinds of, 83

preventive measures
against
the invasion of, 83, 84
symptoms of bite, 83
venom of, 83

B.

Bhang, 158, 159

Bugs,

Carriers of disease, 89

habitat and life history of,
89

preventive measures, 89

Butter, 345

C.

Carbohydrates, 344, 347

Castor oil dosing of infants
with, 124

Cholear

cause of, 173, 174

symptoms of, 175

preventive measures,
175, 176

pre-epidemic precau-
tions, 176, 177

personal precautions,
178

public preventive mea-
sures, 179, 180

Clothes

their uses, 59

cotton, silk, & woollen,
60, 61

hand-spun & hand-woven,
61

advantages and disad-
vantages of Indian,
62, 63, 64

Coffee, 51, 52

Constipation

in infants, 142

causes of, 243

treatment and preven-
tion of, 250, 251

D.

Dairies (Government), 47

Dalhousie, 336

bazaar of, 339

circular roads of, 339

natural conditions of,
336, 337

- D. (continued.)
- Lohalin, 337, 338
- municipality of, 341, 342, 343
- original inhabitants of, 337
- Dals, 340, 346
- Dengue Fever
- cause of, 193
- symptoms of, 193
- prevention of, 194
- Diet, 12 (see also Food)
- factions in the Arya Samaj on, 41
- McCarrison's view on, 43, 44
- advantages of mixed, 33
- percentage composition of articles of, 349, 350, 351, 352, 353, 354
- vegetarian, 35, 39, 40, 45
- varieties in India of, 270, 271, 272
- Dysentery,
- cause of, 182, 183
- prevention of, 184, 185
- E.
- Eggs, 5, 345
- Excreta
- disposal of, (in the West), 70
- primitive methods of disposal of, 65, 67
- natural method of purification of, 59, 74, 75
- septic tank method of disposal of, 70
- trench latrines for disposal of, 71
- Exercise, 94, 95
- F.
- Fasting, 20
- Fat, 344, 346
- Feeding of infants, 122, 306
- artificial, 131, 132, 133, 312, 313, 314
- breast, 122, 123, 128, 312
- principles of, 123
- irregular, 128
- diseases caused by, 128, 312
- dried v. fresh milk for, 132, 133
- Fever (low)
- high temperature one of the causes of, 256, 257
- prevention of, 258
- Fish, 5, 345
- Flies,
- breeding places of, 112
- kinds of, 77
- life history of, 77, 78

- F (Continued.)**
 spread of disease by, 68,
 78, 177, 185
- Food, 12**
 constituents of, 344
 how disposed of in the
 body, 344, 345
 importance of, 38
 cause of epidemics, 12
 purpose of, 344
- Fruit, 349, 350, 351, 352,
 353, 354**
- G.**
- Ghi, 346**
- Grains, 345**
- H.**
- Habits**
 clean, 110, 111
 dirty, 111, 112, 114, 115,
 116, 117
 European, 118, 119, 120,
 121
- Health authority, 13, 15, 16,
 73, 165, 179, 187, 208, 211,
 215, 221, 276, 279, 332,
 338**
- Heart failure.**
 symptoms and causes of,
 242, 243, 244, 245, 246,
 247
- Heat**
 dangers of excessive, 104
- stroke, 105
 prevention of injury from
 excessive, 105
 plantation of trees, a pro-
 tective measure, 108,
 109
- Household pests and ani-
 mal parasites, 76**
- Houses, 54**
 healthy and unhealthy,
 55
 wire netting of, 57
- I.**
- Infant feeding—see Feeding**
- Infants**
 adenoids and enlarged
 tonsils in, 150, 151
 convulsions in, 145
 crying in, 140
 causes of crying in, 141
 constipation in, 142
 diarrhœa in, 144
 food diseases in, 138
 jaundice in, 145
 rickets in, 152
 scurvy in, 153
 tuberculosis in, 146, 147
- Infant mortality, 137**
 of England & Wales,
 Norway, Holland,
 Sweden, America, &
 New Zealand, 320

- I (Continued.)
of Calcutta, 320
causes of, 321
- Insects
history and breeding
places of, 113
- K.**
- Kidney, 345
- L.**
- Lahore city
insanitary condition of,
273 to 281
weather conditions in,
282 to 285
- Liver, 345
- M.**
- Malarial Fever, 161 to 167
association with other
diseases, 161
after effects of, 161
- Malarial parasite
life history of, 162, 163
- Malnutrition, 229, 230
- Malta Fever, 195
causes of, 196
characteristics of, 196
prevention of, 196, 197
- Milk, 5
diseases caused by, 13,
49, 296
proteins of, 345
production of pure, 48,
362, 303, 304, 305
- cow's
chemical composition
of, 131, 293, 294, 313
mother's
chemical composition
of, 131, 313
- Mineral salts, 344
foods containing, 347,
348
- Mosquitoes, 79
development, life his-
tory, and mode of
biting of, 80, 81
destruction of, 81, 82
protection from, 82
- Municipality (Sanitary Au-
thority), 13, 15, 16, 73, 165,
179, 208, 211, 215, 221,
276, 279, 332, 338, 340
- N.**
- Nasal Catarrh
acute, 224
cause of, 226
prevention of, 227, 228,
229
- O.**
- Obesity
cause and cure of, 259,
260, 261
- Opium, 158
- Organotherapy, 286 to 290

O (Continued.)

Osteomalacia—see Rickets

Overeating, 17, 18, 19, 20
diseases from, 19
in Tuberculosis, 29

P.

Paratyphoid—see Typhoid

Personal hygiene, 326, 327

Plague

cause of, 189

prevention of, 189, 190,
191

Proteins,

disposal in the body of,
346, 347

Pyorrhœa

causes and prevention
of, 232 to 235

R.

Rats, 189

destructive habits of, 84

life history of, 85

diseases conveyed by, 85

Rat week, 188

Refuse

disposal of, 72

Rickets & Osteomalacia,
152, 236 to 242, 288, 299,
311, 319

Rivers, 7

pollution of, 7

purification of, 7

S.

Sanitary Authority—see

Municipality

Sanitation

2 systems in India, 327
to 331

Scurvy, 153

Sleep, 96, 97, 98, 99

want of, 97

Small Pox in India, 218

symptoms of, 219, 220

incubation period of,
219

preventive measures
against, 221

Starvation, 48

voluntary (fasting), 20

chronic, 31

occasional, 31, 32

of infants, 308

Stools

hunger, 309

of artificially-fed babies,
310

of breast-fed babies, 310

soap, 310

of diarrhœa, 311

Sweets

danger to health from,

15

pollution of, 15

T.

Tea

action on human body
of, 51, 52

Temperature

normal, 101
nature's mechanism for
keeping normal, 101,
102
difficulty in keeping nor-
mal, 102, 103

Thrush, 148

Tobacco, 159, 160

Tonsils—see adenoids

Tuberculosis, 198 to 216, 296

abdominal, 212
cause of 198, 199
difficulty of diagnosis
of, 201
prevention of, 202
dust in, 205, 206
in infants, 146, 147
Sir Arthur Newsholme's
view on, 210

Typhoid and paratyphoid,
167, 181, 297.

association with malarial
fever of, 167
infection of, 168
preventive measures
against, 169, 170, 171
carriers of, 168, 169

V.

Vaccination, 223

Vegetables & Fruit, 349,
350, 351, 352, 353, 354

Vitamins, 22, 345, 347

A, 23
in butter and ghi, eggs
and fish, 346
B, 24
C, 24, 25
D, 25
in vegetable oils, 346
Vitamins in some arti-
cles of diet, 349, 350,
351, 352, 353, 354

W.

Water

soft and hard, 6
mode of pollution, 6, 7
supply of pure water in
nature, 6
sources of water supply,
6 to 9

Wells, 6, 9
shallow, 8 9Wheat, 345
germ, 345

Winds

usefulness of scorching,
107

Women in India, 263 to 267

Worms, 9

thread
method of invasion of, 91
round, 91
prevention of, 91
preventive measures
against, 92

tape

mode of invasion, 92

Corrigenda.

<i>Page</i>	<i>Line</i>			
37	20	... district ...	should read	districts
42	21	... these	" "	their
57	26	... alleys.	" "	alleys,
67	6&7...	from whence	" "	whence.
80	10	... larvae	" "	larval
132	last	... atth ...	" "	that
187	23	... Ports	" "	Port
192	20	... Theres ia	" "	There is a
193	2	... After the		After the
		... bite it,	" "	bite, it
200	19	... Fromt he	" "	From the
225	28	... tube	" "	tubes
230	6	... mangoes,	" "	mangoes, etc.
240	10	... animal	" "	animals
284	7	... sock	" "	socks
300	14	... The	" "	This
306	1	... Appendix F	" "	G
320	1	... " G	" "	H
345	8	... milk, sweets	" "	milk sweets