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61.
HANDBOOK OF
SUGGESTIONS

ON

Health Education

*for the consideration of teachers
and others concerned in the
work of public elementary schools*



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HEALTH EDUCATION.

PREFATORY NOTE.

This Manual on Health Education is complementary to the Board's "Handbook of Suggestions for Teachers" in which its publication was foreshadowed, and it may be considered as replacing the Syllabus of Hygiene for the Training of Teachers. A knowledge of its contents should therefore be regarded as part of the necessary equipment of every teacher. Like the Handbook, it does not seek to prescribe for teachers any particular method, or methods, of teaching ; its purpose is to put before them, for their information and use, a statement of the generally accepted principles of hygiene upon the observance of which, in the ordinary daily life of the individual, the development and maintenance of sound bodily health depends.

AUBREY V. SYMONDS.

Board of Education,
January, 1928.

HEALTH EDUCATION.

INTRODUCTION.

1. The health and well-being of the child is the primary foundation of its education. Physical health is not of course everything, but it is the first thing needful. If we have it, many things are possible ; if we have it not, many things are impossible. It is this fact which brings hygiene into the front rank of the subjects to be taught at school. Like behaviour and conduct, parts of which are themselves part of hygiene, it is the ground-work of all else, for education itself is but the nurture and guidance of the child's nature. Hence hygiene is so essential that it can never be merely a "subject" of instruction but must enter into the total life and experience of the child, for upon the sound practice of hygiene his very existence depends. To live well is good, but it is necessary first to live ; and in order to live we must obey the laws of health.

2. The Board of Education accepted this principle as long ago as 1904, and they reiterate it in their recent Handbook of Suggestions to Teachers. They have consistently taken the view that the school should encourage to the utmost the children's natural activities of hand and eye by suitable forms of practical work and manual instruction. It should afford them every opportunity for the healthy development of their bodies, not only by training them in appropriate physical exercises and encouraging them in organised games, but also by instructing them in the working of some of the simpler laws of health. Hence the bodily requirements of the children should have first claim on the teachers' consideration. The importance of Hygiene and Physical Training, like that of moral training, is so great that the Board suggest that no one

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would propose their omission from the curriculum of an elementary school.

3. Thus the physical health and condition of the child are, in the Board's view, the basis upon which all mental education must necessarily be founded. Not only is the physically unfit child likely to be below the average of mental capacity, but the actual development of the brain and mind is largely influenced and promoted by means of the muscular activities. Moreover, their direct effect includes the influence on the general physique and nutrition of the body, on the prevention and correction of faulty movement and attitude of the body, and on the development of the nervous and muscular systems. Accordingly, the purpose and object of hygiene and physical training in schools are not only to improve the physical condition of the children and to secure the full development of their health and strength, but also to aid in the development of their mental powers and in the formation of character.

4. This paramount educational claim of physiological hygiene is also fortified by necessity. Upwards of twenty per cent. of the children in attendance at school are suffering from acute disease needing treatment, and the practice of hygiene is necessary as a defence measure, a means of cure or prevention. All through their lives, these children, in adolescence, in manhood and in old age, will have to contend with the enemies of health, and therefore they require to learn the laws of life. For health and capacity are not innate, nor do they come by chance or intuition. They have to be acquired. Thus, there are two primary reasons why hygiene should be taught as one of the most important subjects of knowledge. First, it is the practice of physiology, the highest functioning of the human body and brain, the means of growth and development both of capacity and of personality. Secondly, it is the supreme answer to the processes of disease. Yet in the end it is not a victorious answer, for death comes to all. Life is good and death is

good, if each be in its time. It is suffering in childhood and premature mortality which bring sorrow to the world. *It is the neglect of hygiene which costs a nation dear, in money and in life.* It is the inhibitions and restrictions of ignorance in a right way of living which impose upon Great Britain much of its annual burden of disease, its millions of weeks of lost time owing to sickness, its tens of thousands of premature deaths, its numerous lunatics, "deficient" persons and dullards, and its vast company of those who exist and toil far below normal health, capacity and contentment. "The people perish for lack of knowledge."

5. It is generally admitted that the educational systems of western civilisation derive from Greece at its zenith in the fifth century before Christ. But we do not always remember that Plato recommended in the *Republic* as the foundation of education, the teaching of music and training in gymnastic. By *music* he meant all that would make a true rhythm in the mind of man—literature, art and science as well as the musical note and tone. He meant everything that would conduce to the highest and best, "language, harmony and rhythm," the balanced man. By *gymnastic* he meant the two primary things, hygiene and physical exercise. In his view hygiene was mainly a matter of dietary and an open air life, and exercise should aim, he said, not so much at producing mere strength as at the development and education of the spiritual side of human nature. "The conduct of a man in his exercise," he adds, "is a very important test of his character; and those who establish a system of education in music and gymnastic are not actuated by the purpose of applying the one to improvement of the soul and the other to that of the body. They introduce both mainly for the sake of the soul."

6. The place of the physical in all true education is something which begins with infancy, and indeed before infancy, and goes on until the last day of life. No education is worth anything that is not constructed in part at least

of music and gymnastic in Plato's sense of the terms. We all find later in life that one of our greatest needs is an inter-relation of the functions of body and mind so that they may become in fact and experience *harmonious*, the development of the mind because of a well-harnessed and controlled body, the development of the body directed by the mind. It is by this fundamental and enduring verity that we understand the part which the physical plays in the growth and development of man. That is why the physical was the basis of Greek education, and it is instructive to observe that it is becoming increasingly the means of modern education in Western civilisation to-day, not of course its objective or purpose, but its origin and beginning, its way of approach. Indeed, the physical has been the foundation of many of the great systems of education which men have practised, and forms a constituent part of the educational methods of Mulcaster, Locke, Rousseau and Pestalozzi.

7. Some teaching in hygiene has been introduced into the school curriculum in England from the time of the establishment of national education in 1870, and even from the earliest monastic schools and Dean Colet's school at St. Paul's. Since 1907, when the school medical service began, the teaching of hygiene has been directed by special Syllabuses drawn up on physiological lines and issued under the authority of the Board of Education. One of these Syllabuses dealt with the preparation of the teacher in this subject at the Training Colleges, another dealt with the hygiene of food and drink, and a third was concerned with physical exercises. It is satisfactory to be able to record that under these three Syllabuses a large amount of valuable instruction has been given to teachers and students in Training Colleges, as well as to children in the elementary schools. But owing to the growing appreciation of the importance of this subject, and the modern extension of its boundaries, it is necessary to do more rather than less, and that which is to be undertaken now must be better

organised and prepared than in former days. Nothing is being so well done that it cannot be done better.

8. In what does hygiene consist? The pathway to personal health is, first, a sound body at birth and its careful nurture throughout life—a matter of nature and heredity guided by nurture and education. The second requirement is the avoidance of the causes of impairment and disease—the daily conflict between man's body and its total environment, and the avoidance or control of hurtful agencies in such environment. "Perfect correspondence with environment," said Herbert Spencer, "would be perfect life," a harmony instead of a disharmony. Thirdly, there is the necessary and prompt relief or amelioration of the "reactions" of the body to such agencies, in other words, the early and effective treatment of deficiencies and diseases in the body as they occur. It is at the beginning of disease, in childhood, that control and cure are most practicable. These three elements constitute the way of hygiene. There can be no dispute as to their validity. *For these are the Laws of Life.* It is obvious that guidance and direction are needed by the uninitiated child if it is to find and follow this pathway. He cannot find it by chance nor can he follow it by guessing. To provide the guidance and knowledge is the task of the school teacher, though much of it is hidden in the wisdom of the body itself. Hence it is nurture rather than instruction which is required. Yet there is a science as well as an art of Nurture, and it is the office of the teacher to make himself familiar with both.

9. There are three principal ways in which health may be both acquired and taught, in youth, (a) by habit-training, (b) by learning the truths of biology, chemistry and physics, and (c) by understanding the principles and practice of good living itself. They are three aspects of one study, each appropriate to different age periods or degrees of experience. In a young child under 10 or 11 years of age, hygiene should

be taught, as a rule, by habit-training. Thus, in infancy, did we all learn. The little child will learn by doing and not by hearsay. But when the growing child has acquired the elements of science or housecraft, some degree of reasoned explanation and interpretation of hygiene becomes practicable. It may indeed be woven into several collateral subjects of the curriculum, and the intellectual curiosity of the child enlarged and in some degree satisfied. All school teachers should study the principles set out in these Health Suggestions in order that, whatever subject they may be teaching, they may gain a liberal understanding of wholesome living, and become both its practitioners and interpreters.

10. The contents of the Suggestions are divided into two parts. The first section, entitled "Subject Matter for Health Practice and Health Talks for Young Children," deals with health exercises which, day by day, should be carried out by the child under 10 or 11 years of age. A brief explanation may be added as to the way in which it may be used. There is little need or place for instruction except in the mode of presenting such health axioms and practices, whether it be acts of personal cleanliness or bodily exercise, the care of the body and its sense organs, the ventilation of the classroom, or the eating of a meal. Apart from such individual oversight as circumstance calls for, five to ten minutes a day may well be assigned to the practical habit-training in hygiene, the method adopted varying with the age and requirements of the child. One teacher may choose to make a daily inspection of the children first thing in the morning; some particular lesson such as drawing may be utilised as an appropriate opportunity for dealing with clean hands; lunch or a mid-day meal may furnish the occasion for a talk about the care of the teeth; simple physical exercises in the classroom on a wet day provide a natural opportunity for discussing fresh air and open windows; and nature study readily leads to brief practical applications of physiology.

HEALTH EDUCATION

11. However and whenever taken the health lesson should not be haphazard or diffuse, but clear cut and particular. It should be simple, direct, personal and individual, designed to the formation of healthy *habit*. For instance, the teacher should require the children to have clean faces and hands, clean hair, clean teeth ; and cleanliness should be repeatedly " drilled " into the children until it has become a habit. The teacher can accustom the children to fresh air in the school room—its necessity for the lungs and the blood, the ways to obtain it, the advantages of the open air life, the value of exercise in the open air, the health-giving virtue of sunlight. The teacher can provide every day a suitable class breathing exercise ; much of the prevalent mouth-breathing, so predisposing to disease, is merely due to bad habit and ignorance. Or again, the children can find by practice the relation of activity and rest, of exercise and sleep, the peacefulness of quiet conduct and silence. There is often too much clatter and restlessness for young children to grow and ripen, and nervous conditions may be the result of ceaseless and meaningless activities. Let them learn that composure and rest are conducive to health and mental stability. The children can be trained in their proper seating, their right posture in their seats, the personal use of their own pens and pencils, suitable habits of hygiene in the cloakroom, and the ventilation and cleanliness of the classroom. It should be remembered that the health of a nation is in large degree dependent upon the habits of the people. What they need in order to live well is not abstruse knowledge but to practise the knowledge they possess already. Most people know a great deal about the value of cleanliness, fresh air and simple food, but they do not always practise what they know. *They have not in youth contracted the habit of doing so.*

12. The second section of the Suggestions, entitled " Outlines of Health Lessons for Older Children," indicates the kind of actual instruction which should be given to

children over 11 years of age, though teachers would do well to draw upon this section also for the simple health talks given to younger children. This kind of instruction may be presented to the pupil in subject form as "Hygiene"; or it may constitute part of the general science course of the school, or even be a branch of nature study or of a course in simple biology. Some of its substance will appropriately come into the periods devoted to history, geography and other subjects; while in the case of girls much of the instruction will naturally form part of the teaching of domestic subjects and housecraft. Whether the course be labelled Hygiene or included with other subjects, a definite range of instruction to be covered during each term should be prepared and mapped out for a given group of children. The Suggestions have been drafted in very simple terms and much of them is common knowledge, but the teacher must not therefore assume that its presentation to the child needs no preparation and may be casual and incidental. Let him remember that the subject is the Science of Life, the great art of living well, and that it needs and deserves competent and skilful interpretation. Many centuries ago it was written, "Health and a good constitution are better than all gold; and a strong body than wealth without measure."

13. In all forms of health education it is important to avoid undue self-consciousness on the part of the child, or introducing to its mind medical or morbid ideas. It is the child's prerogative to live the life of joyous impulse, to be forgetful or careless of itself; it would be a misfortune if health education were to result in the child continually thinking about its body or in losing its spontaneity or naturalness. Hence, in dealing with minor delinquencies in hygiene in children a sense of proportion and good humour should be observed, and special care should be taken not to blame the child for conditions or upbringing for which it is not responsible. The singling out of children for reproof,

the drawing of unfavourable comparison with other children, the public questioning of children as to their habit or custom at home, call for friendliness, discretion and good understanding. Further, it will be understood that the sanitation and equipment of some schools, as of some homes, do not offer a good example of the principles of Hygiene as set forth in this handbook. Possibly, indeed, circumstance deters, or even prohibits, an effective practice of the principles commended in these Notes. This does not, however, make the principles less true, though it makes further demands on the skill of the teacher in turning his losses into gains.

14. Finally, the teacher should lose no opportunity of securing the child's active co-operation in all matters of health at school. This can readily be effected through a prefect or monitor system, and if proper regard be paid to the capacities of individual children a considerable degree of responsibility can be delegated to elder boys and girls in connection with practical hygiene and its application to school life. Within the school the teacher will embrace opportunities for health education in connection with the medical inspection of the child, the provision of lunch or the midday meal, the ordinary discipline and good ordering of the school, the training in domestic science, or the instruction in physical exercises and games. But the occasion is wider yet. For much may be done by the true teacher of hygiene in linking up the school with the home, in awakening the interest and responsibility of the parent, and in cultivating a larger health relation with the community as a whole. It is his privilege, in fact, to lay the foundations of a health-conscience in the minds of the English people of the next generation, and to teach the children the deeper motives of healthy living both for their own needs and for what one generation owes to another.

GEORGE NEWMAN.

Board of Education,

January, 1928.

HEALTH EDUCATION.

PART I.

SUBJECT MATTER FOR HEALTH PRACTICE AND HEALTH TALKS FOR YOUNG CHILDREN.

(It will be understood that the headings and notes which follow are not drawn up as a series of lessons to be given to young children but are intended simply to indicate the subject matter which may usefully be included as part of the child's health habits and the teacher's practical talks. This section should be supplemented by material taken from Part II of the Suggested Syllabus suitably adapted for young children.)

- A. CLEANLINESS OF THE BODY.
- B. CLOTHING : CHARACTER, TIDINESS, CLEANLI-
NESS.
- C. WHOLESOME FOOD AND EATING HABITS.
- D. FRESH AIR AND SUNLIGHT.
- E. BREATHING : USE OF HANDKERCHIEF.
- F. SLEEP : IMPORTANCE OF REST.
- G. CARE OF THE EYES AND EARS.
- H. CARE OF THE TEETH.
- J. CLEAN SCHOOL AND PROPER USE OF SCHOOL
EQUIPMENT.
- K. VISITS OF SCHOOL DOCTOR AND SCHOOL
NURSE.
- L. SAFETY FIRST.
- M. PHYSICAL EXERCISES AND GAMES.

A. CLEANLINESS OF THE BODY.

The face, hair, ears and hands of the children should be inspected regularly.

Children should be clean for their own sakes and for others ; appearance ; danger of uncleanness to cuts and sores ; spoiling of books, needlework, etc. ; objectionable smell from dirty children ; unpleasant to handle food with dirty hands ; desirable to wash before eating.

Care and appearance of the hair ; advantages of short hair ; need for frequent brushing, combing and washing ; unpleasantness and danger of unclean heads ; use of fine comb ; each child should use its own cap and hat only.

Lessons in how to wash and dry properly. Warm water best for cleansing purposes, cold for tonic ; face, neck and hands need most washing.

Special care of nails ; to be kept short and clean ; nails not to be bitten.

Whole body should be washed at least once or twice a week ; or a daily sponge and rub down with rough towel.

Need for cleanliness of body inside as well as out ; bowels should be moved at least once a day, at a regular time each day (preferably early in the morning).

B. CLOTHING : CHARACTER, TIDINESS, CLEANLINESS.

Clothing and boots of children should receive consideration.

Need for keeping clothing dry ; overcoat or mackintosh for wet weather ; drying of wet clothing.

Need for weekly change of underclothing (twice a week if necessary) ; no clothing worn during the day should be worn also at night.

Children should not wear too many clothes ; value of wearing simple clothing ; clothing to be of washable material whenever possible ; brushing of clothes ; cleaning of boots and shoes ; importance of tidiness and prompt mending ; buttons and tapes properly sewn on ; stockings and socks kept mended ; proper hanging-up of garments in cloakrooms.

Special danger of wet feet ; good boots ; utility more important than appearance ; changing and drying of wet boots.

C. WHOLESOME FOOD AND EATING HABITS.

Adequate nutrition is the best protection against illness and ensures a better and quicker recovery from fatigue.

Children should be encouraged to like such foods as milk, butter, eggs, bread that is not too new (crusts), fresh fruit, green vegetables ; avoidance of faddiness over food.

Meals should be regular in period of time ; no food between regular meals ; eat slowly, chew food well ; not too many sweets.

Children should not eat dirty food, the remainder of what someone else has partly eaten, or unripe or over-ripe fruit.

Advantageous to drink water when thirsty and between meals ; young child better without tea or coffee ; never drink with food in mouth ; not to share glass or cup with another child.

Hands should be washed before meals.

Food should be eaten sitting down to the table in orderly fashion ; lunches and school dinners to be eaten with attention to manners.

Young children can be taught to serve meals, to wait on each other, and to clear away.

D. FRESH AIR AND SUNLIGHT.

The value of fresh air and sunlight. Fresh air vital to the lungs ; they need *pure* air. The best air is out of doors. Hence children should play out of doors whenever possible, running about, skipping, taking part in games ; children should contract the habit of being out of doors, in the parks, etc.

Children may help in the opening of windows.

Do children sleep with open windows ?

The best way to get warm is to run about, not to sit over the fire ; the best way to keep warm is to put on a coat.

E. BREATHING : USE OF HANDKERCHIEF.

Children should be taught how to breathe ; deep breathing is best and it comes naturally when children run about ; breathe through the nose. Nose to be kept clean and with air passages quite free. Danger of mouth breathing ; function of nose to warm and filter air.

Every child should have handkerchief and be taught how to use it properly ; (value of handkerchief drill and clean handkerchief). Each child should use its own handkerchief only.

Practise breathing exercises before singing lesson.

F. SLEEP : IMPORTANCE OF REST.

Importance of rest and sleep in childhood. Early to bed : how many hours sleep are the children getting ? (Should have about 12.)

Advantage of well-aired room ; open window ; important to have through current of air.

Darkness and quietness induce sound sleep.

Value of rest in horizontal position in middle of day for young children.

G. CARE OF THE EYES AND EARS.

Children should at once tell their teacher if they are unable properly to see words in books or on writing paper or on the blackboard.

Need for getting a good light on all work : not to read or sew in a bad light at home.

Habit of bending over work or straining eyes by "fine" work should be avoided.

Danger of putting anything hard into ears ; children should not strike each other, or be struck by anyone, on the ears.

Ears should be kept clean (well rinsed and carefully dried).

The interest of the children should be cultivated in the testing of the eyesight and hearing ; if spectacles are worn, their daily cleaning should be practised.

H. CARE OF THE TEETH.

The ivory gateway : beauty of clean set of white teeth (something to prize) ; the more teeth are used the better for them.

How to keep teeth in good condition. A lesson in cleaning the teeth : how to use the tooth-brush ; up and down movement of brush ; use of soap, simple tooth-powder or disinfectant ; thorough rinsing of mouth.

Teeth to be cleaned at least once a day, best just before going to bed (no food or drink afterwards) ; harmfulness of sweets and biscuits just before going to sleep.

Dentist should see children's mouths periodically ; this may save much pain and trouble later on ; do not wait till teeth ache ; any tenderness to pressure, sensitiveness to sweet things or hot and cold drinks, are danger signals.

Value of certain foods in cleansing the teeth (crusts, fruit, fibrous foods).

Breathing through the mouth is harmful to the teeth ; always breathe through the nose.

J. CLEAN SCHOOL AND PROPER USE OF SCHOOL EQUIPMENT.

Children should be taught to take pride in their classroom and in the school generally.

Dusting : keeping desks and cupboards tidy.

Children should use their own school materials—especially pens and pencils ; pens and pencils should not be put into the mouth.

Hands should be kept clean so that school books and papers are not soiled.

Children will assist in keeping floors clean by wiping their boots on mats and changing into school shoes in wet weather.

Instruction should be given where necessary in proper use of sanitary closet ; importance of privacy and decency ; need for scrupulous cleanliness of body after use of closet (use of toilet paper).

K. VISITS OF SCHOOL DOCTOR AND SCHOOL NURSE.

The visits of school doctor or school nurse are opportunities for health education of the children.

Train the child to look upon doctor or nurse as part of the ordinary school staff and as wise and practical advisers for their health.

Advantage of taking height and weight at the beginning and end of each term : it will interest the children and help to make them do all they can to keep in good health.

L. SAFETY FIRST.

Children should learn the right way to cross streets ; the special dangers to avoid (motor cars) ; dangers of " lorry riding " and " last across."

Young children should be warned against getting too near a fire or meddling with kettles, etc., on the fire ; of the risk of throwing orange and banana skins about ; of the danger of eating unknown berries ; of the careless use of scissors, needles, knives, forks, etc., and of walking on slippery surfaces or ponds covered with thin ice.

M. PHYSICAL EXERCISES AND GAMES.

Children should be trained to play together, to use their limbs freely with increasing control, to move quietly and to develop balance ; a sense of rhythm may be fostered by music and dancing.

Games should be free and unhampered but not aimless. They should be simple, but children must learn to keep to the rules and to play "fair." Games should lead to alertness, independent action and a ready response to unexpected directions.

Physical exercises and games should develop in the child a bright, happy, fearless, independent spirit. The children should be encouraged to make effort, though detailed perfection in young children should not be expected.

In all physical exercises and games correct breathing is important ; one of the chief advantages of physical exercises is the development of breathing capacity.

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PART II.

OUTLINES OF HEALTH LESSONS FOR OLDER CHILDREN.

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NOTES ON LESSONS.*

(Numbers of Sections refer to Numbers of Part II of Suggested Syllabus.)

I. THE HUMAN BODY.

(a) The Form and Functions of the Body.

Though man is higher than the animals his body belongs to the animal kingdom, and its structure follows the type of other mammals. Thus it consists of head, trunk and limbs. The skull (brain case) is at the top of the back-bone (spinal column) which itself contains the spinal cord, the continuation downwards of the brain. The trunk is divided into the thorax, which contains the heart and lungs, and the abdomen, which holds the stomach, alimentary canal, and its ancillary organs. The arms and legs are designed for movement. The skeleton is jointed together as a frame-work of bone and cartilage, supported and moved by muscles. It gives position and protection to the vital organs of the body by which we live.

The lungs, which are connected with the open air by the windpipe and nasal passages, are composed of air sacs, the thin walls of which are covered with a network of blood vessels. Here there is a circulation of air; by means of the respiratory movements of the chest which ventilate the whole of each lung, used air is breathed out, fresh air is breathed in. The blood gives up its waste products to the air in the air sac, and in return receives fresh oxygen to carry to all parts of the body. The blood circulates by

* These Notes are not provided to serve as lessons to be read to the children. They are designed as suggestions for the information and guidance of the teacher.

the force of the heart, a four-chambered hollow muscle; the right side of the heart receives the used blood from the body which it pumps to the lungs for purification, the left side receives the oxygenated blood from the lungs and pumps it through the whole arterial system—arteries, capillaries, veins—from which it returns to the right side of the heart. Thus a circulation is maintained of air in the lungs and of blood in the circulatory system, the purpose of which is to carry to the tissues of the body the oxygen which is necessary to their life. The blood also carries nutriment, which it obtains from the alimentary canal as a result of digestion.

The digestive system consists of mouth, teeth, muscles of mastication, salivary glands, stomach, intestines and accessory glands. Food taken into the mouth (*a*) becomes, in due course, part of the body tissues, and (*b*) is stored by them to form an available source of energy. To reach them it must first be digested, in the mouth, stomach and intestines, where it is not only churned up but is changed by ferments and other secretions as it passes down the alimentary canal. From the walls of the intestine some of it is absorbed into the lymph vessels and thus reaches the blood stream through the "thoracic duct," some of it gains direct access to the blood vessels of the intestinal wall, and some of it indirectly passes to the liver. But, in whatever way food reaches the circulatory system, it is the blood which carries it to the tissues. Such part of the food as is not nutritious is cast out of the bowel daily. As the blood must obtain both the oxygen and nutriment which are necessary to the life of the body, so also it must get rid of the waste products which it gathers from the tissues. The organs which "excrete" these waste matters from the blood are the lungs, kidneys and skin—all three should be kept clean and active.

The nervous system, consisting of the brain, spinal cord and nerves, has control (though in an unequal degree) of all parts of the body; it serves to link up and connect

them and ensures harmonious working between them. The brain, in which every portion of the body is represented, is the central authority. It receives messages and sensations from the skin or other parts by way of the nerves or the spinal cord. It translates them, despatches the answering messages to the muscles, and controls and regulates the resulting actions and co-ordinations. The nerves, which conduct messages to and from the brain and cord, form a complete system among the tissues, somewhat similar to that of the blood-vessels. The brain has also control over involuntary muscles and movements, affecting the heart and circulation, respiration, and the processes of digestion.

The Senses include, besides the five senses of *sight*, *hearing*, *touch*, *taste* and *smell*, the senses of *heat* and *cold*, of *pain* and of *muscular* activity. The organs of sense contain specially modified cells, e.g., in the skin (touch-corpuscles), in the tongue (taste-buds), in the retina (the layer of rods and cones), which are connected up by means of fine processes and nerve fibres with an appropriate central group of cells in the brain.*

(b) Nature and Nurture.

It is important to remember that the form (morphology) of man's body and its functions (physiology) form two subdivisions of the one larger science of Biology, the study of life as a whole. Man is a part of the universe, of the unity of all things, and he is therefore subject to the great natural laws. He is one with the plants and animals, all of which consist of *protoplasm*, built up as a superstructure of *cells* (as a house is built of bricks), which by differentiation become tissues, organs and systems. Men differ from animals, and from each other, owing to their *nature*, and the up-bringing

* The teacher is recommended to study Huxley's *Lessons in Elementary Physiology* (Macmillan) for further study of the structure and function of the body.

or *nurture* to which that nature has been subjected. The nature of man is what he inherits from his ancestry of man and animal; *heredity* and variation together have made him the species he is. The practical applications of the knowledge of heredity can be made of much interest to children, e.g., the securing in certain varieties of potato of immunity from potato disease, the production of varieties of plants and fruits, the increasing of eggs in fowls and milk in cows, or the breeding of birds, dogs, horses, and cattle, the value of which is enhanced by "pedigree." Children may learn that good and bad qualities are both passed on from generation to generation, physical, mental and moral. They can do much to encourage and make habitual the good qualities and discourage the bad ones. Nurture is the impress upon man's nature of all the factors and influences which affect him, principally what we call his *environment*. This moulds him or he adapts himself to it; there is mutual reaction. He acquires skill or habits in order to survive; characteristics which though not usually inherited are continued by education. In practice, it is expedient that the opening minds of children should be directed both to the value of the principles and methods of nurture, and to what they owe to the past as a debt, and to the future as an obligation. Every advantage and privilege of their lives is a debt to the children who follow them.

These Lessons concern the health aspect of Nurture. Five things are essential to life, nutrition, air, cleanliness, exercise, and warmth. Close behind them comes the care of the senses and the mind, for by these faculties man may partly control his body. Whilst a sound physique and its normal functioning are the foundation of health it is also necessary to avoid or combat disease. Speaking generally, there are three main channels of infection or gates of entry, the mouth and alimentary tract, the nose and respiratory system, and the skin by contact. It is these three gates we must safeguard against infection.

2. NUTRITION.

(a) Practical Considerations.

Good nutrition is of fundamental importance from the point of view of ensuring sound health during childhood and later life. The need for inculcating, both in practice and in theory, a right understanding of foods and feeding should be present in the mind of the teacher through all stages of the child's education, from infancy to adolescence. The two-fold method of all health education, namely, habit-training and informative instruction, has special application to nutrition.

Though the proper selection and eating of food is the most important of all forms of health habit-training, it is perhaps the most difficult one to deal with at school. The child can only learn what are the suitable foods to eat, the appropriate time to eat them, the right way to prepare and serve them, by actually doing these things. Unfortunately, in many homes training in these matters is seriously neglected. It is left to the school to make up these deficiencies in training. The majority of schools offer little opportunity in the case of younger children and only limited opportunities through domestic courses for the girls in the case of older children. In rural districts it frequently happens that a number of the children remain at school during the midday and an opportunity for a certain amount of practical teaching is thus presented. In Open Air Schools and other kinds of Special Schools it is usual for the children to have their midday meal, and sometimes also breakfast and tea, at school, and full use should be made by the teachers of the special opportunities for training which these schools offer. In schools where little or no scope exists for practical instruction in foods and feeding, as close an association as possible should be established with the homes of the children through the agency of the teachers, health visitors and school nurses.

As regards the subject matter of the informative instruction, older children require the same kind of practical training as that outlined for younger children, but it should be supplemented by means of the homecraft courses for older girls and science for boys. Where provision is made for teaching domestic subjects the children can be associated with the choice, selection and purchase of the food materials as well as the preparation, cooking and serving of the food. The fullest advantage should be taken of the opportunity for health education thus afforded. In addition to this practical basis, or in substitution for it where no domestic courses exist, much direct and indirect instruction in regard to nutrition can be given to older girls and boys, though it must be admitted that some of the value of the instruction will be lost where it is not founded upon or associated with the actual provision of meals.

(b) Food Requirements of the Body.

Our bodies are made up of countless minute cells which can be seen only under the microscope. These contain protoplasm, the physical basis of life. While the child is growing the cells of the various tissues and organs of the body are multiplying and the protoplasm must necessarily increase in quantity. The first food requirement of the body is material which will be suitable for the building up of this living substance, protoplasm. Moreover, apart from growth, protoplasm once formed is continually breaking down and requires to be renewed. Thus we arrive at the need for what we may call *body-building foods*. These are principally *proteins* and they form a very important part of such foods as meat, fish, milk, bread, cheese, eggs and pulse foods, e.g. peas, beans, lentils.

The protoplasm and tissues of the body have work to do. They are not static but dynamic in purpose. They require the food materials from which power and heat can be derived. Therefore secondly, such *energy-producing* foods

are needed. These are represented by two classes of substance known as *fats* and *carbohydrates*. The former occur in cream, butter, suet, lard, dripping, olive oil, etc. ; the latter in all the sugars, bread and foods composed mainly of starch (e.g. potatoes, rice, parsnips and other root vegetables, oatmeal). Thirdly, there are the *salts* or mineral substances needed by the body ; these are plentifully contained in milk, cheese, vegetables and fruit, the last two also furnishing a considerable bulk of indigestible fibrous material, which is of value in stimulating movements of the bowels. Fourthly, there are certain substances essential for growth and nutrition known as *vitamins* present in extremely minute quantity in various foods. Several principal kinds of vitamins are recognised, and are called vitamins A, B, C, D, etc. Vitamin A, found especially in milk, butter, cheese, yolk of eggs and green vegetables, is necessary for growth and the maintenance of body resistance against infective disease. Vitamin B, found mainly in cereals, pulses, and yeast, is also necessary for growth and for the maintenance of nervous stability. Vitamin C, found in various fruits and leaves, but especially in lettuce, cabbage and oranges, is effective in the prevention of scurvy. Vitamin D occurs richly in cod-liver oil, oily fishes (such as herrings) and egg-yolk ; it is concerned in the proper development of bone and teeth, and its absence may lead to rickets. A plentiful supply of sunlight to the skin will make up for certain deficiencies. Vitamins may be destroyed by overcooking. In addition to these various requirements of living protoplasm we must add *water*. The transmission of all nutritive substances to parts of the body is done by "water transport." So, too, excretion of waste.

Above all, food must be provided for the human body in the form of a *mixed* and *varied* dietary, from which the body will draw for the supply of its particular needs. The advocacy of any special article of diet may be misleading and even fallacious if this fact be disregarded, On the

other hand, dietaries should be neither too ample nor too varied ; " for in multitude of meats there shall be disease."

It should always be remembered that *nutrition* involves much more than merely supplying the body with food. The food must be digested and assimilated, becoming an integral part of the body, and this assimilation is dependent upon the healthy functioning of the whole body and its several parts, which in its turn depends upon the physical constitution of the child, its heredity and upbringing, and upon fresh air, exercise, rest, and the daily and moderate use of the body and removal of its waste products.

(c) What Foods we should Eat and Why.

It is a somewhat strange fact that, with all the experience of the individual and of the race upon which to draw, many people know neither from experience nor from instinct what is the best diet at the different stages and in the differing circumstances of their lives to ensure sound health. Unsuitable feeding and overfeeding whether due to quantity or quality of food are both very common and produce their characteristic ill-results. Broadly speaking, the simpler and plainer the food the better. Not everything that tastes nice is good for the body. In the selection of food the following are the chief points to bear in mind :

- (i) *A sufficient supply of body-building food or protein.* This is most readily obtained from animal foods such as meat of all kinds, fish, milk, cheese and eggs. Other foods such as flour and bread also contribute protein. A diet containing the above substances and which is otherwise adequate in amount will almost certainly meet the body's protein requirement.
- (ii) *A daily supply of vegetable food.* In addition to potatoes, some other vegetable and preferably a green one should be supplied daily ; some kind of salad or fruit is desirable.

- (iii) *Not less than half-a-pint of milk daily.* Butter should be given at one meal at least ; margarine is equally good for the supply of fat but contains little or none of the Vitamins essential for proper growth.

(d) Quantity and Quality of Food Required.

This will depend upon :—

- (i) *The age of the child.* If the amount of food required by an adult is taken as 100, a child under six requires 50 ; between six and ten, 70 ; between ten and fourteen, 80. Boys and girls over fourteen require as much food as an adult, and adolescents may sometimes require more than adults. After middle life the quantity of food should be reduced.
- (ii) *Personal idiosyncracies.* People of similar size and occupation may require different quantities of food because one person digests and assimilates better than another. A food that agrees well with one person, e.g., cheese or strawberries, may disagree with another. One person will dislike food that is preferred by another. In the case of children it is important to take note of these individual idiosyncracies ; but not to talk about them in the hearing of the child. Ascertain how far they are genuine or merely “fads.”
- (iii) *Climate and season.* Less protein and more fruit is required in hot countries, and more fat and less fruit in cold. In winter rather more fat is needed than in summer for maintenance of body heat.
- (iv) *Cost, and financial resources of purchaser.*

(e) How and When we should Eat.

Nutrition is not merely a matter of getting so much protein, carbohydrates, vitamins, etc., into the stomach,

it is a question of getting sustenance absorbed and assimilated by the blood and tissues. The conditions under which food is taken have much to do with the benefit the body derives from taking it. A meal whenever possible should be a social episode. The quantity and quality of the digestive juices are influenced by the emotions associated with a meal. There is a sound physiological reason for the orderly serving of a meal, the proper appointment of the table, the display of flowers and reasonable refinement and amenities. Thus a meal should be a leisurely and sociable affair. Nothing is worse for food digestion than hurrying over a meal, apart from the fact that under such conditions the food will not be properly masticated. So far as practicable, meals should be taken at regular intervals. People vary as to their requirements in this respect: some thrive on two meals a day, some on four. For most children, three good meals a day is the best arrangement. The habit of taking food between regular meals (whatever they are) is responsible for much indigestion and ill-health. So many children are brought up to take their meals with little regard to any of the conditions mentioned that the school and school teacher should take every opportunity of impressing these facts upon their minds. Most important of all is good cooking which makes food attractive, palatable and digestible; the nutritive value of food, good in itself, is often impaired by lack of care and attention in this respect.*

(f) Relative Cost of Foods.

It is true that some of the most essential foods, the body-building foods, are among the most expensive, e.g., meat and fish, especially the fatty fishes, but generally speaking the cheaper qualities of meat and fish are fully as nourishing as the more expensive. A herring supplies

* On the whole subject of food the teacher is recommended to consult *Food and the Principles of Dietetics*, by R. Hutchison, M.D., 1927 (Edward Arnold & Co.).

nearly as much body-building food as the same weight of salmon and at one-tenth the cost. The cheaper kinds of cheese contain as a rule rather more body-building material than the more expensive sorts, and are as easy to digest. There is no better or cheaper green vegetable than a cabbage. An orange may be as good a food as a peach.

(g) Source, Distribution and Protection of Food Supplies.

Emphasis should be laid upon the necessity of food being *as fresh as possible*. Thus the best meat is usually fresh meat, the best fish, fish recently caught, the best milk is clean milk and fresh from the cow, the best eggs new laid eggs, the best vegetables and fruit those straight from the garden. The conditions of living to-day make it extremely difficult for people to obtain this wholesome fresh food and we have often to be content with food which has been some time in reaching us from other countries. In order that such food may remain good it has to be kept sound by canning or cold storage. When food is subjected to such processes there is, from the point of view of health, probably always something lost due to subtle changes in the composition of the food when no longer fresh. The canning of foods of all kinds is a skilled industry and it is often a convenience to have tinned meats, fish, milk and fruit, and dried vegetables. (Reference may here be made to the fresh-food value of the home and school garden and the allotment.)

There are many Acts of Parliament and Regulations designed to prevent and control the use of *preservatives* in food and its *adulteration*. Any foreign substances added to food may be harmful and, in any event, the resulting article purchased is not what is demanded. Local Authorities are charged with the duty of maintaining the purity and wholesomeness of the food supply.

Something about the distribution of food may be learnt from visits paid to local markets. The main point in distribution is to prevent contamination of food by exposure to dirt and dust, insects, unnecessary handling. A special illustration may be made of the distribution of milk.

Milk is easily contaminated and many opportunities for this are presented on the farm, during transit to the dairy, at the dairy, during transit to the home, in the home. Milk drawn direct from the udder of a healthy cow should be germ free. Whenever it is exposed to the air it runs the risk of being contaminated with germs that cause it to turn sour, with disease germs such as those of scarlet fever, diphtheria or epidemic diarrhoea to which infants are specially liable. Accordingly on the farm the cows and their surroundings should be kept clean, the milkers should be clean, especially their hands, and the milk should be cooled, because the cooler the milk the less readily do any germs multiply. It should be kept covered up (or bottled) and cool during transit and while in the dairy. Special care should be taken in the home to keep the milk covered up in a cool place and protected from *dust* and *flies*. Wherever practicable, older boys and girls should see for themselves the working out of the problem of a pure milk supply by visits to a farm and dairy.*

(h) Water, Alcohol and other Beverages.

Man can live a long time without food but only a very short time without water. Most foods contain a large proportion of water, especially some vegetables and fruit, but not enough to sustain life. Children should have access to a supply of pure water and may safely drink it whenever they are thirsty. The less tea and coffee taken

* On all public health questions the teacher is recommended to study the *Outline of the Practice of Preventive Medicine*, a special handbook issued by the Ministry of Health. H.M. Stationery Office, 1926, 1s.

by children the better and quite young children should have neither. Any tea taken should be weak and freshly made. Cocoa with milk is usually better for children than either tea or coffee. Milk itself is an admirable drink for children, but it is a food rather than a beverage. "Fizzy" drinks are not satisfactory, but lemonade and lemon squash made from fresh lemons are refreshing.

It is generally agreed that alcohol in any of its numerous forms is unnecessary for children and may be harmful. Its potential ill effects on the well-being of the adult, the family and the community, and on industrial and social life, are widely recognised. Education can play an important part in preventing excessive consumption. Boys and girls should receive appropriate instruction, as part of their general training in health, in the danger of the misuse of alcoholic drinks, in the current fallacies about the action and alleged benefits of alcohol, in the results of some of the simpler modern investigations showing its influence on different types of people and work, and in the inestimable advantages of sobriety to the individual and to the nation.* The teaching should be based on the ground of health and fitness, efficiency in work and play, manly self-control, consideration for others, and good workmanship. The experience of athletes, of armies on the march, of competitors in shooting competitions, and of explorers should be explained. The increased need to-day for people with steady nerves may be emphasised (motor-cyclists, drivers of motor vehicles and aeroplanes, engine drivers).†

* See, "*Alcohol : Its Action on the Human Organism*," Medical Research Council, 1924, H.M. Stationery Office, Price 1s.

† Suggestions on the subject of Food and Drink, as to the matter to be dealt with and the mode of its presentation, are contained in a separate syllabus of the Board of Education, entitled "*The Hygiene of Food and Drink*," which the teacher should take as a guide in preparing his course of lessons in this subject. (H.M. Stationery Office, 1926, Price 2d.).

(i) Principles of School Meals.

The Education Act empowers a Local Education Authority, subject to certain conditions, to incur expenditure in providing school meals for children attending public elementary schools who are unable by reason of lack of food to take full advantage of the education provided for them. The purpose of school meals is educational, medical, preventive ; it is not intended to be a form of poor relief, and, in fact, a charge for meals is made to the parents, unless circumstances make it impossible for the parent to pay. School meals are intended to furnish supplementary food for children who are malnourished and who should be selected on physical grounds.

As regards the food to be provided for school meals, three factors are important, (*a*) the quantity and quality of the food, (*b*) the manner of its preparation, and (*c*) its service. The quality should be determined, as far as practicable, by present knowledge of the nutritional value of various foodstuffs. Probably the foods which all children need (e.g. fresh milk, butter, cheese, eggs, fish, fresh fruit, green vegetables and salads), are among those which, on the ground of expense, they do not get regularly. There is a tendency to substitute for the more expensive proteins and fats the less expensive carbohydrates, in the form of starchy foods and sugar. There is the further tendency only to supply food of a "sloppy" character, such as soups, which call for no powers of mastication and produce little or no flow of saliva.

From the educational point of view, the provision of school meals affords a useful opportunity of training the child to take its food in a proper manner, a pleasant and wise discipline in dietetics. For, as already indicated, almost as important as the total ingredients of a diet are (1) their suitable selection and presentation ; (2) unhurried mastication—food should not be bolted like posting letters ;

FRESH AIR AND SUNLIGHT

it needs breaking up, chewing and churning, mixing with the important ferments of the saliva ; (3) appropriate hours and intervals of feeding and not feeding (no food between meals) ; (4) cleanliness before taking food and a rest of body after ; (5) the necessary adjustment of beverages without excess, and without "washing down" the food. Further, the school meal is, if we would make it so, a peculiarly valuable occasion of education in domesticity. It brings the day elementary school a little nearer in character to the residential secondary school, and introduces the important element of social obligation, of nice modes and manners and even a sense of family relationship. The full value of school feeding is only obtainable where all the meals are provided for the day, as in open-air schools, nursery schools, special schools, etc.

3. FRESH AIR AND SUNLIGHT.

(a) Value and Need of Fresh Air.

Other conditions being equal, life lived in the open air and sunshine makes stronger men and women than life lived indoors. In spite of the many advantages of the town dweller in the direction of higher wages, good sanitation, and better housing, he often does not live so long as the dweller in the country. Many men and women of uncivilised peoples have a fine physique. Their diet is of the simplest and they have few amenities of civilisation, but they live a natural life in the open air and sunlight. In brief, fresh air conveys oxygen to the body and blood, increases metabolism, and stimulates the appetite.

(b) Physical Properties of Fresh Air.

It is the oxygen and the physical properties and purity of fresh air that are valuable. For its proper functioning the skin must be continually cooled, and this does not take place

if the body is surrounded by an over-heated, moist, stagnant atmosphere, the results of which are that the tone and vitality are greatly decreased, pallor is increased, the muscles become flabby, and resistance to disease is lowered. Movement of air is vitally necessary. From the point of view of health, changes in the chemical composition of air are of less importance than those associated with its physical properties. In freely moving pure air, there is considerably less likelihood of infection.

(c) Supply of Oxygen to the Cells of the Body.

The living processes carried on in every cell of the body require oxygen. In very simple forms of life, such as the amoeba, which consists of only one cell, there is no need for oxygen to be carried to it as the cell simply takes what it needs from the water in which it is immersed. In higher forms of life, e.g. insects, whose bodies are built up of a large number of cells most of which are beneath the surface and so unable to absorb oxygen directly, there are special contrivances through which the air can pass, and thus reach these deeper cells. In higher animals and in man the air is drawn into the lungs and oxygen enters the blood (through the tiny blood vessels spread all over the lung) by which it is carried throughout the body. In this way oxygen is brought into contact with each individual cell of which the body is made up.

The same living processes which require each cell of the body to take up oxygen produce also a waste gaseous substance to be cast out, carbon dioxide. The amoeba simply discharges it into the surrounding water, but the millions of cells in the human body cannot of course do this, and it is accordingly carried to the lungs by the blood stream just as the oxygen was brought from the lungs to the cell. Reaching the lungs it passes into the air passages and is breathed out.

(d) Need for Ventilation.

Where many people are in a room together the air is continually being robbed of oxygen with each breath taken in, while at the same time carbon dioxide is being added to it with each breath breathed out. However, even in an ill-ventilated room, there is always plenty of oxygen left and very seldom an additional quantity of carbon dioxide sufficient to act as a poison. As stated above, it is the stagnant over-heated air; loaded with moisture and organic impurity, that produces the ill effects, not the diminished amount of oxygen or the increased carbon dioxide.

It is now clear why we have to ventilate a room and what our arrangements for ventilation must be if it is to be effective. Briefly stated, these arrangements must (i) allow for ample admission of fresh air; (ii) keep the air moving in the room by *cross ventilation*, inlet and outlet being opposite to each other, or some other device to ensure a *through current of air*; (iii) maintain a proper temperature; (iv) ensure that the moisture is neither too much nor too little; (v) remove the disagreeable odours which arise when people are crowded together; and (vi) prevent pollution of the air by dust and germs. The aim should be to secure in each classroom fresh, clean, cool, moving air.

(e) Temperature of a Room.

The hotter we think it necessary to keep a room, the more difficult does it become to ventilate it, partly because the cold incoming air lowers the temperature and partly because of the draughts caused. Formerly, class-rooms were kept warmer than is now thought necessary or desirable. In some countries, a temperature of 65° F. or even higher is the rule; in this country 60°—62° F. is considered to be the maximum necessary, but many people think that it is more healthy for the child to work in a temperature of between 56° F. and 60° F.

(f) Process of Breathing.

As explained above, the purpose of breathing is to introduce fresh air and oxygen into, and expel carbon dioxide and used air from, the body. The wind-pipe divides into two branches, one for the right lung, the other for the left. These branches subdivide until they form an intricate ramification of smaller tubes, which terminate in minute air sacs. Small blood vessels surround these air sacs and oxygen can readily pass from them into the blood stream. Similarly the blood stream delivers up its carbon dioxide. The air is drawn into the lungs and again forced out of them by the expansion and contraction of the chest wall.

Breathing should always be through the nose; this is necessary in order that the air may be properly filtered and dust particles removed, and that it may be warmed before reaching the lungs. Mouth breathing is a common habit among young children. It may be due to over-developed adenoids which obstruct the back of the nose so effectively that it is almost impossible for the child to breathe through the nose. Frequently it is due to the continuation of a habit formed as the result of the nose becoming blocked from nasal catarrh and from failure to keep the air passages properly free by the use of the handkerchief. Children should therefore be encouraged to use the handkerchief regularly and in a proper manner. The nose passage must always be kept clean, clear and free from discharge. It is the gate of entry for air to the lungs.

It is important also that breathing should be deep. It is not voluntary deep breathing that is needed but the involuntary deep breathing induced by vigorous out-of-doors exercise. Only in this way can the lungs be properly expanded and the minute air sacs distended in the most remote parts of the lung. Tuberculosis is more likely to secure a hold in any part of the lung which is not thus

adequately ventilated. Proper breathing will also depend on a child's habitual posture. Children who bend over their work, or loll about and carry themselves badly, will not exercise their lungs so well as children who hold themselves erect and are generally alert and vigorous.

(g) Necessity for Sunlight.

The beneficial influence of sunlight in relation to health has only comparatively recently been scientifically explained. We have sometimes been apt to fear it rather than to welcome it ; to think of the danger of sunstroke and of the power of the sun to fade carpets and curtains rather than to recognise that it gives health and vigour to the body, and destroys germs of disease. Provided that there is proper protection of the head and nape of the neck from a very hot sun, the more children play in the sunlight and the more we let sunlight into our rooms at home and at school the better. In our large towns much of the sun's energy is cut off, only about one-quarter of it getting through the atmosphere as compared with one-half at the seaside and three-quarters on mountain tops. Some of the beneficent influence of sunlight is due to invisible rays. A beam of sunlight when passed through a prism or through the drops of a shower of rain, is divided up into its constituent parts and we see the seven primary colours of which sunlight is composed (as in the rainbow), starting with red at one side and ending with violet at the other. The invisible special health-giving rays are found beyond the violet rays and are called ultra-violet rays. Unfortunately these rays are filtered out when sunlight passes through window glass, and this is one of the reasons why being indoors is not so health-giving as being out of doors. Advantage is taken of the health-giving properties of sunlight, especially of these ultra-violet rays, to treat debility and other ailments. Its healing properties are utilised in the

treatment of children suffering from such diseases as rickets and tuberculosis of the skin, bones and joints, by *heliotherapy* in the open air, or artificially by the *arc lamp*.

(h) Injury done by Smoke.

The harm done by the smoke pall which hangs continually over so many of our large cities, and by the fogs which occur with greater or less frequency, blocking out the sunlight from our homes, schools and streets, is due partly to the acids, carbon and tarry matters in the smoke which injure vegetation, corrode buildings, make houses dirty, or choke the lungs. Also, we tend to keep our windows shut to prevent unclean atmosphere and dirt coming in. In some large industrial towns from 500 to 700 tons of sooty matter charged with chemical impurities are deposited every year upon each square mile, while in some seaside and country towns the deposit may be as low as one-seventh of this, and is, moreover, less injurious. Atmospheric smoke obstructs the actinic rays of the sun more in the town than in the country or the seaside.

(i) Principles of the Open Air School.

The open air school is so built that it allows full and free entry of fresh air and sunlight. One side of the class room may be entirely absent, or two or three sides may consist of windows or movable partitions; the walls of the school are so designed as to be a shelter from rain and wind but not obstructive to air ("loose-box" method). Where the school cannot be built as an open air school one or more class rooms may be so constructed; or a private house may be adapted and hutment classrooms constructed in the garden; where neither is possible the class may meet in the open air of the playground or park.

More important than premises are educational methods. The open air school principle comprises (a) living as much

as possible in the open air, (b) sufficient and suitable school meals, (c) organised physical exercises in the open air, (d) midday rest in horizontal position, (e) shower baths, (f) practical subjects, manual work and nature study, and (g) careful daily medical and nursing supervision.

The results are improved attendance, decrease in ailments, increase in weight, improvement in colour, energy and mental alertness, greater activity and happiness, and love of Nature.

4. CLEANLINESS.

(a) Basis of all Healthful Living.

Habitual disregard of cleanliness, whether in the individual or his surroundings, is responsible for much that is disagreeable and of social disadvantage. Uncleanliness is the cause, directly or indirectly, of many ailments and diseases. It is, unfortunately, true that many parents have an altogether inadequate conception of cleanliness, though it is only fair to say that too often the character of their surroundings and the insufficient facilities for maintaining cleanliness raise almost insuperable difficulties in maintaining a high standard. It falls to the school teachers, therefore, to take upon themselves much of the responsibility for securing personal cleanliness in the children. It is necessary to inculcate in children a love of cleanliness through its habitual practice, and to train them to understand its significance in the life of the individual and the community. The child should not come to school with dirty face, hands or body.

Habitual uncleanliness must be distinguished from occasional uncleanliness. All healthy boys and girls will get themselves dirty, and the healthier the child and the more active its life in work and play the more likely it is to become dirty at times.

(b) Evils of Uncleanliness.

Uncleanliness of the body hinders its proper functioning, aggravates skin disease, and may complicate a slight scratch, cut or blister with inflammation and even blood poisoning. It may also beget a characteristic and unpleasant smell in the schoolroom or bedroom. Dirty hands or nails may convey germs to the mouth or to food. Uncleanliness of the head is not only disagreeable, but it spoils the character of the hair and often gives rise to sores from which the glands of the neck may become affected. Uncleanliness of the nose and blocking of the nasal passages may contribute to mouth breathing, nasal catarrh or even adenoids. Uncleanliness of the eyes may cause their inflammation, and produce or aggravate the condition of sore eyelids and eyebrows. Uncleanliness of the ears may lead to ear-ache and inflammation and increase the seriousness of discharge from the ear. Uncleanliness of the mouth produces decay of the teeth and swelling of the gums; harm may result through interference with proper biting of the food, by the swallowing of septic matter from the gums and teeth, and by the absorption of poisons, all of which give rise to ill-health and disease. Uncleanliness or constipation of the bowel is the root of much evil.

(c) Social Effects of Uncleanliness.

The teacher would refer to the following points: the unpleasantness and risk to other people of uncleanliness; fleas and lice flourish in dirty surroundings; refuse left lying about forms a breeding place for flies, and these carry germ-laden dirt which they deposit on food and particularly in milk; stagnant water breeds mosquitoes; polluted water is a source of disease. We have already seen that the uncleanliness caused by our coal fires and factory boilers poisons and pollutes the atmosphere; windows in houses, schools and workshops get covered with dirt and

dust which tend to keep out the light and the sun's rays ; unclean houses retain infection. Sore throats, catarrhal conditions and consumption are more frequently met with in factories where dusty conditions prevail.

(d) Cleanliness in the House.

We live in houses for shelter from rain, wind, cold. The sanitary condition of the house is a principal condition of personal health. The sanitary house should be (i) free from serious dampness ; (ii) satisfactorily lighted and ventilated ; (iii) properly drained and provided with adequate sanitary conveniences, and with a sink and suitable arrangements for disposing of slop water ; and (iv) in good general repair. The house should have (v) a satisfactory water supply ; (vi) adequate washing accommodation ; (vii) adequate facilities for preparing and cooking food ; and (viii) a well-ventilated store for food. It should be situated on good porous soil or well-drained clay. Windows should be made to open and cross ventilation should be always maintained. The rooms should not contain too many small articles of furniture nor many curtains or bed-hangings.

5. EXERCISE AND REST.

(a) Value of General Exercise.

One of the primary needs of growing children is the exercise of the larger muscles of the body. Active forms of exercise tend to strengthen all the muscles (including the heart), develop the brain, deepen and increase the rate of respiration, induce the skin to perspire, and secure and maintain equilibrium. They are essential if proper benefit is to be derived from food, if the digestive organs and the bowels are to be kept in good working order, if proper excretion through the kidneys, skin, and lungs is to be

ensured, and if nervous regulation of the body is to develop. Hence the importance of the boy and girl actually playing games and not merely watching them; and his or her learning to swim, taking part in school sports, organised games, and active forms of recreation such as country and other dances. Too many children at present never acquire the *habit* of active exercise.

(b) Recreation.

Recreation other than that obtained by vigorous exercise, e.g., walks, reading of books, visits to museums, art galleries or the Zoo, concerts, cinema halls, etc., may have an important influence on health, beneficial or otherwise according to circumstances. It should be remembered that, other things being equal, *enjoyment* has a wholesome tendency, and that for this reason children should be encouraged to use such forms of recreation as they prefer, provided that these are harmless to body, mind or spirit. They should at the same time be encouraged to cultivate a taste for wholesome books and amusements.

(c) Need for Formal Physical Exercises.

Active forms of free exercise of the kind referred to above should come first in the child's physical training, but they need supplementing by the more regulated and systematic forms of physical exercises which play a special part in the harmonious training of the body as a whole. Organised exercise leads to improvement in the general physique, to the prevention or correction of faulty attitudes of the body, to the acquirement and development of habits of self-control, discipline and quick response.

Systematic physical exercises are a valuable safeguard against danger from strain arising in the course of the more violent forms of exercise, such as running or swimming;

they are of particular value to the less robust children who may need to be warned against undue strain, especially in competition with their fellows.*

(d) Good Habits of Rest and Sleep.

Many children need to be encouraged to acquire good habits of rest and sleep. The difficulties in the way of children getting a long night's rest may be very great in some households, but children can form the habit of sleeping through much disturbance and noise, though it should be borne in mind that sleep in quiet surroundings is more beneficial. One of the most important forms of health education is to get ingrained in the child's consciousness that "early to bed and a long night's rest" is one of the essentials of good bodily and mental growth and fitness. Both by direct influence upon the child and through co-operation with the parents the teacher should endeavour to secure that children up to twelve years of age have at least twelve hours in bed every night, the younger children as much as fourteen hours; older boys and girls need at least ten hours. The teacher should help the child to

* For a fuller statement of the advantages and limitations of organised exercise, games, dancing and swimming, the Board's Syllabus of Physical Training for Schools, 1919 (especially the Introduction), should be consulted (1s. 6d.); and also (a) Syllabus of Instruction in Physical Training for Training Colleges, Two Years' Course (3d.); (b) Physical Exercises for Children under Seven Years of Age, with Typical Lessons (3d.); (c) Suggestions in Regard to Games (4d.); (d) Physical Exercises for Rural Schools, 1924 (3d.); (e) The Team System (now included as an Appendix to the 1919 Syllabus) (1d.); (f) Memorandum on the Planning and Equipment of a Gymnasium for a Secondary School (2d.); (g) Memorandum on Physical Education in Secondary Schools (2d.); (h) Memorandum on extended Physical Education in certain Schools and Classes (2d.); (i) Syllabus of Physical Training, Supplement for Older Girls (4d.); and (j) Reference Book of Gymnastic Training for Boys (3s. 6d.). These publications are on sale at H.M. Stationery Office.

acquire the habit of repose and tranquillity as necessary to attainment of physical and mental health. Remember that in the ancient world it was taught that "healthy sleep cometh of moderate eating."

6. WARMTH AND CLOTHING.

(a) Body Heat.

Body heat may be briefly explained to the children. It can be illustrated by considering how the heat of the body is created and conserved (by the living body, food, exercise, clothing, etc.), and lost (by evaporation and wet clothing), the distinction between cold and warm-blooded animals, the changing summer and winter coat of animals, the practice of hibernation and migration, the superiority of warm-blooded animals and the torpidity of cold, etc. From this the child will understand something of the purpose of clothing.

(b) Wearing of Suitable Clothing.

Much can be done by the teacher to train children to wear clothing suitable both in quantity and quality. By means of needlework, laundry and domestic lessons in school, by the force of example of other children, and by getting into direct touch with the parents, the unsuitable and unhygienic clothing worn by many children can be changed into clothing that is simple, clean, attractive and adapted to the season of the year. The principles and proper methods of clothing should be taught to all older children and by the making of garments a habit of suitable clothing should be acquired. Children are probably more frequently over-clothed than insufficiently clothed.

(c) Suitable Clothing Materials.

The best materials for retaining heat are fur, wool, silk; cotton and linen conduct heat from the body, taking up

moisture but not retaining it. Open meshed material should be used and the mesh should be of a character that does not shrink in washing. The reason for this kind of material is that air is entangled in the meshes and thus the material, while allowing for evaporation of moisture from the body surface, acts nevertheless as a poor conductor of heat. Flannel or wool is usually worn next to the skin on account of this property of being a poor conductor of heat, but unless very carefully washed it tends to become hard and does not allow of the necessary air-bath around the skin. Material of cotton mesh or of a mixture of wool and cotton is light and serviceable and suits some people equally well as ordinary woollen underclothing. It is moreover appropriate for all seasons.

(d) Clothing for Boys and Girls.

Clothing, particularly for girls, has become considerably more hygienic and utilitarian of recent years. Close fitting unwashable stuff dresses, boned corsets, and tight bodices are seldom used now, while stiff collars are much less common among boys than formerly. Moreover, the number of garments worn has certainly decreased. This improvement is no doubt due partly to changing fashions, partly to a more practical application of the rules of hygiene in matters of dress, and partly to increasing opportunities for physical activity both in and out of school hours.

Girls.—Light, loose and warm garments of simple pattern are the most hygienic and in the end most economical. For example, a long vest ; knickers with separate washable linings of varying thickness according to the season ; a tunic form of dress, with a washable blouse, or a jersey and skirt supported from the shoulders ; with a cardigan or knitted coat for extra warmth, form a suitable and comfortable dress for every-day wear. No clothing should be tight fitting and garters should not be worn.

Boys may suitably wear a woollen vest and drawers, a cotton or flannel shirt with a soft collar and tie, and knickers and stockings which leave the knees bare or covered according to the season ; braces or belts ; there should be either a woollen pull-over or a jacket, or, if necessary, both. For younger boys a jersey is convenient. Tight bands or restrictive garments of any kind should be avoided.

When extra clothing is required for warmth it is important that it should be evenly distributed over the body. Knitted woollen garments are excellent and the popularity of hand knitting has made such clothing more easily procurable. There should be adequate protection from chill and the fashion of allowing young (particularly ill-nourished) children to go about with bare thighs and legs in cold and damp weather is not unattended with risk.

The provision of suitable footwear is less difficult than formerly, as well-shaped boots and shoes are now obtainable at a reasonable price. It may be useful to refer to two points in connection with footwear. First, while parents are willing to provide stout football boots for boys, the need of the girls for similar thick boots in which to play field games is not always appreciated. Secondly, while it is satisfactory to find that the use of rubber-soled shoes for physical activity is becoming much more general, these shoes should not be worn for long periods at a time as rubber prevents evaporation of moisture.

(e) Change of Clothing.

All underclothing should be changed at least once a week. Whenever clothing gets wet it should, if possible, be changed, especially socks and stockings. After severe exercise, e.g., playing football or cross-country running, the clothing should be changed and the body well rubbed down with a rough towel ; if a shower or ordinary bath is available so much the better. The chilling of the

body through damp clothing is a source of discomfort and loss of body heat, and may be a pre-disposing cause of illness.

7. CARE OF THE EYES AND EARS.

(a) Care of the Eyesight.

The light of the body is the eye. The child's eye is immature and growing. It is injured by improper exercise, bad or excessive light, the use of unsuitable reading or writing materials, or prolonged and close work. Vision comes by use, by alternate exercise and rest of the eye. Scientists, artists and craftsmen have become eminent by the use of the eye and by training in the faculty of observation. The extreme importance of the care of the eyesight throughout life may be impressed upon children by training them in particular habits. Thus the maximum amount of light should be allowed to come into the house ; curtains should be such as can be completely drawn back to expose the whole of the window during the daytime ; whenever possible the light should come from a direction to the left of the child, and in any event strong cross shadows should be avoided ; school books should be of a suitable type and children should be warned against reading badly printed books at home. The undesirability of "glare" should be recognised and the risk of looking straight at the sun or any very bright light should be explained. Children should be encouraged (a) to report any difficulty they may find in seeing what is written on the blackboard or when reading from a book, and (b) to wear glasses if medically advised to do so and at the times advised. Worried looks, frowning, blinking, face-twitching, rubbing eyes, the book held too close to the eye, and headaches are early signs of eye strain and call for attention. Eye strain left untreated leads to headache and nervous conditions and may affect the general health ; good physique will greatly aid in

maintaining good eyesight. Children should learn that if the eye becomes inflamed they should not rub it, and that any rag or towel used to bathe or wipe their eyes should not be used by anyone else.

(b) Care of the Hearing.

Children should be taught the danger of putting any foreign body into the ear and the harm that may follow a blow upon the ear. Should wax accumulate it should be left to a doctor or nurse to remove it. The seriousness of discharging ears should be impressed on teachers and they should be encouraged to submit children suffering from this ailment to early, regular and persistent treatment. The habit of quiet talking and careful listening should be cultivated. It should be remembered that there is close relation between deafness and defect or blocking of the nose or throat.

(c) Examination of the Sight and Hearing.

The importance of perfect eyesight and hearing can be further impressed on the children by interesting them in the method of the examination of the vision and hearing, and this, under the instruction of the school medical officer, may well be undertaken at regular intervals as part of the ordinary school routine. Deterioration of hearing may go on for some time before it is noticed. Slight defects in sight and hearing are important, and cold in the eye, or pain in the ear, or a discharging ear should receive prompt attention. Any degree of deafness should be referred to the school doctor.

8. CARE OF THE TEETH.

For the teaching of this subject to be effective and practical, it should be realised, *first*, that children are not greatly interested in their teeth, and that an appeal on this ground is likely to fail, all the more because they have

no direct evidence in childhood of ill-health arising from neglect of the teeth ; and *secondly*, that the formation of good habits, even though the reason for them is not fully understood, is likely to be of permanent value, especially in young children. For these latter, therefore, practical demonstration accompanied by frequent inspections should constitute the chief method of inculcating care of the teeth. For older children, information may be given as to the growth and construction of teeth in early years and their dependence on constitution and dietary.

(a) Value of Teeth.

(i) It is obvious that teeth can be beautiful in themselves, and that they are a necessary adjunct to good looks. Children readily appreciate that the pleasing effect of a smile or laugh depends partly upon the teeth. Again, it can be shown that personal appearance has a good deal to do with success in life and that young people applying for posts often succeed or fail as their appearance impresses the employer favourably or otherwise, and in this the condition of the teeth plays a part.

(ii) Health depends upon good digestion more than anything else. To ensure good digestion an efficient set of teeth is the first requirement ; even one decayed and tender tooth may lead to the habit of swallowing food without proper mastication. The function of the teeth in cutting, crushing and grinding the food and mixing it with saliva is the first step, and one of the most important, in the process of digestion and the nutrition of the body, and is essential for the proper maintenance of physical strength and vigour.

(b) Results of Dental Decay.

In order that children may realise to some extent the insidious nature of dental disease, it should be explained to them, first, that we have no means as yet of being able with certainty to prevent decay arising, however much care is

exercised ; secondly, that in its early stages there are no warning signals, such as pain or disfigurement ; thirdly, that when decay has once started in a tooth it will almost inevitably proceed to the destruction of the tooth, and may spread to the other teeth, unless steps are taken for its arrest.

There are three direct results of dental decay, and they are all practically certain to occur sooner or later.

- (i) *Pain.* This is nature's warning, but is often absent in the early stages of decay, and may not occur until the tooth is irreparably damaged. It is never, therefore, safe to wait until a tooth hurts before seeking attention.
- (ii) *Loss of Use.* The tenderness of a single decayed tooth may prevent the proper functioning of the entire set.
- (iii) *Disfigurement.* The loss of even a single tooth may seriously impair personal appearance. In neglected mouths decay tends to spread from one tooth to another, and involves a disfigurement which may be a handicap in life.

The ultimate result of dental decay is an impairment of the general health owing partly to digestive troubles due to the inability to masticate properly, and partly to the constant swallowing of poisonous matter arising from the decay. Of the many ailments which tend to impair happiness and efficiency, such as headaches, lassitude, anaemia, physical unfitness and a group of septic diseases, dental decay is probably the commonest cause.

(c) Care of the Teeth.

The teacher will understand that no instructions for the care of the teeth are likely to be effective until the children have grasped the fact that such care is really worth while. The first step, therefore, is to persuade the children to take an interest and a pride in their teeth.

TEETH

Cleanliness of the teeth (as with cleanliness of other parts of the body) should be inculcated primarily not as a health measure but as a personal and social duty. It should be pointed out to older boys and girls that it is even more important, from the point of view of decency, comfort and appearance, to have clean teeth than to have a clean body or clean hair. Younger children should be taught the practice before they can appreciate the purpose. Some form of "tooth-brush drill" is desirable to attain this, preferably with actual brushes. The necessary up-and-down and side-to-side movements (inside the teeth as well as outside) should be practised, and children should be encouraged to look at their own and one another's teeth. A small tooth-brush is to be preferred to a large one, and the teeth should be cleaned daily, in the morning and at night. The cleaning at night is the more important, for it is during the hours of sleep that the injurious decay-producing agencies are active and the natural methods of cleansing are in abeyance. No food of any sort at all should be taken after the teeth are cleaned at night. The tooth-brush itself should be kept clean. More harm than good may be done by using a dirty tooth-brush.

Natural methods of cleansing teeth by the chewing of fruit, hard crusts, etc., and the rinsing of the mouth with water after a meal should be encouraged. It should be explained to the child that many kinds of food, especially those of a starchy or sugary nature, are apt to leave a thin film on the teeth, which may form the starting point for the germs of disease. This is the reason why such articles as biscuits or sweets should not be taken after the teeth have been cleaned at night.

Children should be taught that they may have it in their power to strengthen their teeth to resist decay, by getting all the sunlight and fresh air that is possible, by giving their jaws vigorous exercise on hard and fibrous foods, and by taking plenty of milk, butter, eggs and fresh green vegetables.

Finally, they should be brought to understand the privilege and value of dental inspection and treatment; that the dentist with his skill and experience can detect the earliest beginnings of decay, and can arrest it without pain; and that children who go regularly every year for dental inspection and follow the dentist's advice will probably, when they leave school, have a complete and sound set of teeth.*

9. BODILY AND MENTAL HEALTH.

(a) The Brain.

The brain is made up of nerve cells which are linked together and connected with one another by means of nerve processes and fibres, and it is these nerve fibres which form the paths of communication between the different parts of the brain. The functional activity of the brain depends largely upon the facilities for communication between the nerve cells; and one of the objects of education is to encourage the constant formation of new nerve paths, and to secure effective correlation and co-ordination of those already existing. As the brain develops the linking-up of the nerve cells becomes correspondingly closer and more complex. Nerve cells are grouped together in different masses of brain tissue, which are known as "centres," and these centres govern the functions and actions of all parts of the body. No part of the muscular system is unrepresented in the brain, and communication between the muscles and the brain is established by means of afferent and efferent nerves. The communication between the brain and the muscular system is thus extremely intimate, and co-ordinated movements of all kinds depend on the integrity of this harmony. In the young child many of the centres

* Instructive dental leaflets and charts for lessons on dental hygiene may be obtained from the Dental Board of the United Kingdom, 44, Hallam Street, London, W.1.

of the brain are undeveloped, and many nerve cells contained in them have not become functionally active. As growth continues new movements and activities are constantly attempted and the "coarse" massive movements are supplemented by finer and more delicate ones; all these stimulate further development of the centres of control. By means of these motor activities the brain cells of these centres are subject to constant growth and development, which does not end with childhood. Thus, normal physiological stimulation of the nerve cells is good and promotes the general as well as the local development of the brain. It is only when the stimulation is excessive or premature that harm may be done. The steady and balanced growth and working of the brain should be the aim, for the brain is the regulating centre of the whole body.

(b) Importance of a Healthy Mind.

The older children should be taught the intimate association between body, brain and mental health. In other portions of the Suggestions the hygiene of the body has been dealt with, and is of paramount importance. It should be remembered, however, that the health of the mind is equally important, and unless it is sound the whole body will tend to degenerate. Thus, physical fitness should not be advocated by the teacher as an end in itself, but as a means to promote the mental and moral health and character of the child. The child is an individual with his own desires, emotions and propensities. The development and expression of individuality involves psychological development, just as the completion of personality depends on social, and the balanced body on physical, factors. The duty of mental fitness may be urged because this will make the children more useful persons in the world, better able to help other people, and equipped to undertake work and occupations suited to them. They should learn that

good health is not merely a matter of the body but that the child really worthy of the name of a healthy child is healthy mentally and morally as well as physically.

The key to mental hygiene lies in building up the innate character of the child. (i) First, there is a normal body with particular *senses* and sensations; secondly, there is a mind with *impulses* (instincts) and emotions. The guidance and cultivation of these elemental powers is necessary to health. The child instincts of movement, of play, of imitation, of curiosity and of life preservation, call for direction. Their growth is aided by emotions, by sympathy, by sociableness, by sex. These are the materials out of which character and conduct are to be built. It was Ruskin who said that "education is not to teach a man to know what he does not know, but to behave as he does not behave." The task of the teacher is to take these primitive faculties and train them by inducing habits of inhibition or cultivation. (ii) To do this there must be *springs of action*, the desire for happiness and usefulness in girls; the desire for risk, adventure, fame, and usefulness in boys. (iii) There must also be a clear conception of the *fundamental ends of life*, beauty, goodness and truth, as expressed in an intelligent, adaptable and reliable child, capable of sustained endeavour. These qualities cannot come by chance. They are effects of causes. They must be constructed out of the senses, the impulses, and the primitive emotions common to mankind.

The degree of emotional control is an important index; the psychology of fear, for example, shows how ramified and complicated the child's mental structure is. A child's nature harbours all the fundamental emotions which are common in adults—love, jealousy, hate, revenge, fear, shame, disgust—and responds to emotional situations in much the same way as does the adult, except that its feelings are more direct and less controlled than in later life. The child whose conduct reacts to excessive fear or morbid terror is being wrongly brought up. A child's feelings are the

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driving forces of his personality, and are a proper object of all educative efforts, which should aim at moulding them in the course of years to forms that are acceptable when judged by cultural standards. Without sound mental development there can be no enduring bodily health or freedom from fatigue nor yet a healthy outlook on life.

(c) School Fatigue.

Mental fatigue in school children, whether in the classroom or elsewhere, may be due, as Prof. Cyril Burt has pointed out, to three or four causes. (i) Some of it is really physical fatigue, due to mild internal poisoning by the waste-products of the body itself: such bodily poisons may accumulate during sedentary tasks, and can be worked off by a little gentle exercise in the fresh air. (ii) Some of the restlessness, inattention, and slow or inaccurate work, is a sort of instinctive self-defence, prompted by minor sensations of discomfort and cramp, *e.g.*, in the postural muscles of the trunk (as after prolonged sitting), or in the small muscles of the hand (as in writing), or in those of the eye (as in reading). (iii) Most of it is probably due to mere boredom—that is, to lack of continued interest in the work itself, and to constant repression of other interests or instincts more natural to the child; change the subject at which the child is working, change the method of teaching or the teacher, introduce some new incentive or tap some fresh source of enthusiasm, and at once all symptoms of so-called fatigue may completely disappear. (iv) Anything like genuine mental exhaustion—exhaustion of the brain itself, or of its nerves and nerve-cells—may occur, but it is extremely hard to demonstrate, particularly in the healthy boy or girl up to the age of about 14. What is called over-pressure or over-work is seldom due to sheer excess of brain activity. It is due not so much to intellectual exhaustion as to emotional strain, arising perhaps from excessive anxiety connected with the work itself (*e.g.*, fear of not

passing an examination), or perhaps from secret worries about more or less irrelevant conditions at home (*e.g.*, petty domestic crises). It is commonest in delicate children with mild but chronic physical ailments, whose weakness is further aggravated by lack of exercise, sunshine, and fresh air. Much the same is true of the "fatigue" of older people.

(d) Value of a Healthy Outlook.

To ensure that a healthy outlook is fostered in children, the prime necessity is that the body and the mind should themselves be healthy. The child should be encouraged to interest himself in the world around him; to concentrate on the task in hand; to exert himself to overcome difficulties; to appreciate the value not only of his own health but the effect of his presence and personality on those around him. Hence the importance of cheerfulness and courage. He should gradually assume his right share in responsibility. He may begin by having certain duties in connection with order and cleanliness of the school; then with "things going right" in the school; he should learn to be, as occasion demands, either a follower or a leader. The illimitable effect of moods and actions on the world must be explained, and that to be sulky, to brood, to be irritable, greedy, seeking only his own advantage, and the like, have not only a deleterious effect on his own health and character, but have a definite influence on others, and may be positively harmful to them.

This question of the mental health of children is by no means easy, but the above Notes will form a practical guide to the teacher in the sort of way he can help the child. Of three facts we may be sure. First, that mental disorders are as common and natural as physical disorders, and are due, not to "fate," but to definite causes, many of which are preventable. Secondly, if we neglect the mental health of childhood we cannot escape its results in many

kinds of mental ailment—dull, backward, neurotic, “difficult,” or delinquent children. True mental defect (feeble-mindedness), imbecility and idiocy are something inborn; but neglect, or unsatisfactory environment, or inadequate training and nurture will assuredly lead to abnormal development. Each child must be watched to see that mentally he “evinces a steady willingness to grow up;” that he is neither held back by “the call of the cradle,” nor misdirected by the “grown-up” life becoming too threatening. The former may tend to infantilism, the latter to over-pressure and the making of little old men and little old maids. Thirdly, the child is so constructed of body, mind and spirit that he cannot live at the full height of his human capacity unless harmony between all three be attained. In so far as it is reached he has health, wholeness, oneness, the best of which his particular body is capable.

10. COMMUNICABLE DISEASES AND HOW TO AVOID THEM.*

(a) What may be taught to Children.

Ordinary infectious diseases such as measles, whooping cough, scarlet fever, diphtheria and the simpler forms of contagious disease such as pediculosis, impetigo, ringworm, are met with so commonly in children that they may well be taught to take an intelligent interest in these ailments, and learn what they may do to avoid catching them or passing them on to others. Children having these diseases should be kept away from other children. They may be instructed to appreciate the importance of (a) the seed, i.e. the germ, and (b) the soil, i.e. their bodies, and that both the avoidance and the spreading of these diseases are often a matter concerning the individual himself rather than his

* See *Outline of the Practice of Preventive Medicine*, 1926. H.M. Stationery Office, 1s.

surroundings. Simple facts about bacteria, and their role in nature, should be learnt in connection with nature study and science lessons. Unless one emphasises the beneficent work of bacteria (*see* Sect. 12 (e)), children come to associate bacteria only with disease and lose correct perspective.

(b) Avoidance of Germs.

We cannot hope to abolish the germ—if we could, we should then of course get rid of the particular disease associated with it—though we can learn how to avoid it, and how to make our bodies strong to resist the attack or to lessen its severity. Thus the deadly malaria has almost disappeared from many parts of some countries as a result of getting rid of the breeding places of mosquitoes, or of other measures based on the knowledge that mosquitoes are the agents that spread the disease. Typhoid fever has been almost banished from this country by attending to sanitation and cleanliness, and preventing the contamination of milk and water supplies by filth of all kinds. Tuberculosis is being steadily reduced year by year and is not nearly so common as it was formerly, partly because of improved sanitation and nutrition, partly because of a wider degree of natural immunity, and partly because of reduced infection and better education.

(c) Responsibility for the Spread of Infectious Disease.

The child may well be trained to understand the responsibility of each individual and of the family for the spread of communicable diseases. Thus ordinary colds are passed on by direct communication from one person to another. No one should ever sneeze or cough near another person without guarding the mouth and nose with a handkerchief, or otherwise. If the minute particles discharged from the mouth and nose of a person with a cold did not get passed on to another person, there would be no

spreading of colds. This is why colds are so much less frequent at open air schools and sanatoria ; fresh air is always blowing about between individuals and the germs that are carried off in the minute particles discharged from the mouth get diluted. Moreover, when blown about in fresh air many germs have a very short life. It takes a large dose of germs from one person to start a cold in another person. Scarlet fever again is spread from person to person when there is inflammation of, and therefore discharge from, the throat or nose or ears ; the germs may pass in this way through the air directly to another person, or through the medium of clothes, pens, pencils and books. Diphtheria, wrongly associated in people's minds with drains, is spread almost entirely from person to person. Unfortunately a person may carry the germ in his throat even though he is not actually ill with diphtheria and so pass it on to someone else. The part that bad sanitary conditions play is to predispose to sore throats and general lowering of the body vitality, and thus help to produce a favourable soil for the development of the diphtheria germs. In the case of measles it is very difficult to prevent the spread of infection from one child to another in the home and school, almost as difficult as to prevent the spread of a common cold ; indeed measles begins with a condition very similar to a common cold. Everything possible, however, should be done to postpone the infection until after infancy.

(d) Fight against Tuberculosis.

It is possible to interest children keenly, without engendering any morbid feelings, in the great fight against tuberculosis, the White Man's plague. They may learn how widely present in Nature is the tubercle bacillus, how it gains entrance into the body through the mouth or nose, in the case of children through drinking infected milk or putting dirty objects picked up off the floor into the mouth, or by

breathing in particles of dust which have been infected by germs coming from a consumptive person. They may learn how important it is to keep their bodies healthy in every possible way, in order to resist the development of any germs taken in, and to keep themselves and their surroundings clean.

The children will be interested to hear that the germs of tuberculosis are, like other *microbes*, so minute that they cannot be seen with the naked eye ; they can be seen only through a microscope. When magnified many times by this means they are seen to be like little rods (hence the name *bacillus*), rather similar to a match cut into many pieces, but so small that thousands placed end to end would only measure an inch in length.

The tuberculosis germs may attack any part of the body, but most commonly the lungs, producing what is sometimes called "consumption." Hence the importance of the precautions referred to above. Other parts of the body that may be attacked by the germs are the bones (arms, legs, ribs and spine), the joints (knee, elbow, hip) and the skin. We are all liable to attack by germs, but fortunately we have in our bodies a power of defence against the enemy. If we are in good health we shall be successful in this defence, and we call this having good resisting power. If we are in poor health (and poor resistance) we lose the battle. Our resisting power is kept fully up to its work by our leading healthy lives, eating nutritious foods, taking sufficient exercise in the open air, having enough sleep, and avoiding over-strain, worry and excess of various kinds. Thus it is seen that though we may inhale a few tuberculosis germs they will do no harm unless our bodies have lost their resisting powers ; but what it is most important to guard against is a "large dose" (known to the doctors as "mass infection") of the germ, through sleeping in the same bed or room as a consumptive person, or in other ways coming

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into contact with tuberculous persons in confined spaces. There is then a danger of so many germs entering our bodies that our power of defence is overcome.

There are many weapons that we can use, in addition to keeping the body up to its full resisting strength, to fight tuberculosis infection and prevent both ourselves and others from getting the disease. The most valuable of these weapons is knowledge. The germs of tuberculosis can live in dust for months, in dark and dirty places, especially in houses ; but the germs soon die if exposed to sunshine, or they can be killed by burning, boiling or suitable disinfectants. If a pure and tubercle-free milk supply is not available, it is best to boil the milk. Thus, in addition to nourishing food and fresh air and sunshine, good habits and cleanliness are our chief allies. When you cough screen the mouth with a handkerchief, or, failing that, with your hand. Tuberculosis germs may be present in the spit or phlegm, so do not spit. In any case, it is a dirty and objectionable habit. To sum up, the chief and primary means of preventing tuberculosis are fresh air and cleanliness of the hands and body and of our houses.

(e) How to Avoid Communicable Skin Diseases.

As regards such communicable diseases as pediculosis, impetigo and ringworm children should be taught to take pride in their personal appearance. On no account must they fall below the standard of a clean head and a clean skin ; as one child always catches pediculosis from another they should learn to feel that it is bad form to be the means of making another child dirty.

Children should not be accused of being dirty because they have developed ringworm which may appear in the head or body of the cleanest child. They should, however, learn that, as it always spreads directly through contact of head with head or through the exchange of hats and caps,

the risk of infection may be at once stopped. Children should be taught, as far as practicable, to use their own hair brushes only and not to exchange caps or clothes with other children.

In order to avoid contracting infectious or contagious disease by the skin two rules should be followed. First, the skin itself should be kept clean and healthy, by cleansing and by muscular exercise. Secondly, actual contact with disease should be avoided. For instance, smallpox, scarlet fever, measles, ringworm, pediculosis, and certain eye diseases may be "caught" by contact, and many other infectious diseases by close association.*

II. FIRST AID IN EMERGENCIES AND SICKNESS OF CHILDHOOD.

There are certain simple forms of "first aid" which every older boy and girl should be capable of rendering. It is, however, important not to expect or train children to take responsibilities in advance of their years; it is easy in rendering first aid to do more harm than good. In some schools it may be practicable to arrange with the St. John Ambulance or similar organisation for a first-aid course, especially for older boys. Boys and girls will receive excellent training in this direction by joining the Boy Scouts, Girl Guides, or other similar bodies. Suitable elementary text-books on this subject are obtainable.

The principal point for the teacher to bear in mind is the signs of the commonest *ailments* of children. It is important that the earliest signs of disease should be discovered and dealt with, and the teacher can help considerably by bearing in mind the commoner ailments from which children may suffer. These are:—(a) Fatigue, headache, lassitude, vomiting. (b) Common affections of the skin, e.g., sores,

* See also, Memorandum on Closure of and Exclusion from School, 1927, H.M. Stationery Office, Price 3d.

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impetigo, ringworm, scabies. (c) Adenoids and enlarged tonsils, sore throat, discharging ears, enlarged glands. (d) Decayed teeth. (e) Defective speech; stammering. (f) Imperfect vision and hearing; squint, deafness and common diseases of the eye. (g) Malnutrition. (h) Rheumatism; anaemia; chilblains; colds; bronchitis. (i) Deformities, e.g. spinal curvature, flat-foot, partial paralysis, rickets. (j) Common infectious diseases. Liability to such conditions should be reported by the teacher to the school doctor or school nurse.

In addition to the treatment of disease, the school special services have to provide for abnormal children and the Local Education Authorities have statutory powers for dealing with them. These abnormal children may be classified into three groups: (i) Physically defective (cripples, tuberculous, delicate children). (ii) Blind and deaf (including "partially blind" and "partially deaf"). (iii) Dull and backward, mentally defective, and epileptic. The dull child is mentally subnormal; the backward child is retarded, by bad environment or nurtural or educational neglect. Each group has its particular characteristics, and the several kinds of special schools or classes provide different methods of education.

12. ELEMENTARY SCIENCE AND HEALTH EDUCATION.

(a) Elementary Science as the Groundwork.

The extent to which health education arises out of the teaching of elementary science must necessarily depend upon the character and amount of the science teaching, which vary considerably from school to school. Since, however, such science as may be taught to older children usually comprises nature study and physical geography, together with elementary physics and chemistry and in some schools very simple biology, it is clear that there

must be many opportunities for making these lessons the groundwork of health teaching. Thus when the properties of air and its constituent gases are being studied, demonstrations can be included to show the necessity of air (i.e., of the oxygen it contains) for combustion, and for the life of plants and animals. Considerations of "good" and "bad" air, and its diffusion and pressure, will naturally arise and the relation of these to health. Similarly, the study of the chemical and physical properties of water will have little interest to most children unless it is related to the many associations of water with health. The supply of domestic water, its origin and the methods taken for its purification before it reaches the tap afford an abundant field for science teaching of a real rather than an academic type. With these lessons may be linked up the study of such things as traps and rainwater gullies, the heating apparatus of the school, the cleaning out of cisterns, the repairing of taps and ball valves, etc. Again, the study of light, heat, sound, radiation, and the elements of chemistry and biology furnish a basis for instruction in hygiene of a living and practical kind. "In view of the intimate relations between Man and the rest of the living world, and between the forces exerted by the latter and all other forces, I can see," wrote Huxley in 1863, "no excuse for doubting that *all are co-ordinated terms of Nature's great progression*, from the formless to the formed, from the inorganic to the organic, from blind force to conscious intellect and will."

(b) Physiology and Health Education.

While it is true that the child's first interest is in itself, in the processes of its own body, it is equally true that if we want the older boy or girl to take an intelligent interest in digestive, circulatory, excretory, reproductive and other life processes, we must introduce them in their primitive forms in suitable types of the lower animals. A simple

explanation should first be given of the cell and its functions, and then of a collection of cells, as bricks form a house. When this is grasped there will follow later the understanding of the differentiation of functions among cells as life forms evolve and become more complex, and, later still, of the formation of distinct and separate organs, and finally of the association of these into systems of the body. For the understanding of the working of the human body the two methods may well be employed together, the pupils' interest being secured in the structure and functioning of his own body and also in that of lower forms of life. To restrict instruction to the human body tends to lead, as experience has often shown, to what one may call spurious knowledge, a matter largely of words, notions and diagrams, and possibly even a "medical" bias. The two methods together lay a foundation of intelligent interest in health and its maintenance.

(c) Life in its Lower Forms and Human Health Problems.

Some understanding of life and its processes in both the plant and animal worlds is desirable. The linking up with health education of nature study whether in its simpler forms in the Infants' and Junior Schools or in the form of elementary biology such as may be taught in the Senior School; the reference back to facts and experiences in the life of plants and animals when human health problems are being dealt with; the study of what we owe directly to plants and animals for food, clothing and aids to cleanliness; the relation of plants and animals to disease in man; all these will help to interest the child in matters relating to personal health and will provide a sufficient foundation upon which to build in later life.

(d) Plants in Relation to Health.

Many life processes can be studied in plants; the fact that on plants simple experiments can be carried out in regard to

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growth in general greatly increases their value for this purpose. Plants and fruits may be studied also from the point of view of food supply, and gardening may be made a valuable ally to health education, the children learning to be interested in the cultivation of vegetables and to acquire the habit of eating vegetables and fruits of all kinds. Then there is the use we make of plants for clothing (cotton and flax); for warmth (coal, wood and peat); for drugs in time of sickness (quinine from cinchona bark, opium, belladonna, aconite, aloes, rhubarb, digitalis from the common foxglove, gum arabic, camphor); for condiments (mustard, pepper, ginger, cinnamon, nutmeg, olives and cloves). The children will learn something also of the plants which are harmful to man such as poisonous plants and berries.

(e) Useful and Harmful Bacteria.

The bacteria in their numerous forms and countless myriads are the friends or foes of man. Among the friendly bacteria are the natural scavengers which act upon sewage and convert it into an odourless and useful fertiliser; there are various species that aid in the nitrification of soils; some assist in the ripening of cream, and production of butter and cheese; others are used in the retting, tanning and pulping industries; others abound in the large intestine of man and help to transform and render harmless the products of digestion which might otherwise lead to the formation of poisonous matter likely to get absorbed into the body. But there are also harmful bacteria which cause, as we have seen, such diseases as tuberculosis, the infective diseases, septic processes and the decay of the teeth.

(f) Animals in Relation to Health.

Many are the health lessons which can be learnt from the study of animals. We may study their teeth and reflect on the reasons for their perfection; their glossy skins and

hair which result from perfect health, and in the case of such an animal as the cat from careful attention to cleaning ; their poise, gracefulness and enjoyment of play, so well seen in the case of young animals and some birds, due to the health of body arising from their natural life ; their migration and hibernation ; their obedience to, and compliance with, natural law. We have seen the use we make of plants. We owe a similar debt to animals for the clothing they provide—wool, silk, leather and fur ; for the fats they furnish which, when treated with alkali solutions, are formed into soaps ; for the bristles they supply for making brushes to keep our bodies, hair and clothes clean ; and for all the meat foods. It should be remembered however, that household pets may be injurious to health. They may bite, convey parasites or infection, and introduce dust and dirt to the home. Dogs, cats, rabbits, birds, etc., in or about a house should be cared for and kept clean.

(g) Spread of Disease by the House-fly, Fleas, Rats, etc.

Thus animals, like plants, may be harmful to health as well as beneficial. There is for instance the common house-fly which is responsible for much disease. It is bred on manure heaps and other refuse and the sticky hairs which cover its feet pick up dirt laden with germs and carry them wherever it goes, into the milk jug or on the food. It excretes minute deposits of filth and these it also leaves on the food it crawls over. It is responsible in this way for much of the epidemic diarrhoea among babies and may transmit such diseases as cholera and typhoid fever. Fleas and lice cause irritation and lower the general health ; they are agents also in the spreading of disease, for instance the trench fever of the Great War and the oriental plague (which is spread by rat fleas). The parasitic worms (hook worm and filaria) are another example. There are also the protozoa which are responsible for such diseases as malaria,

yellow fever and dysentery. In the case of malaria these protozoa are carried in the mosquito which, when it bites a person suffering from malaria, sucks up a minute drop of blood containing the protozoa which develop further in the body of the mosquito and may be then injected into the body of the next person whom the mosquito bites.

It is very important that everything possible should be done to get rid of these disease-bringing animals. Thus, the number of flies can be diminished by ensuring that no refuse or manure heaps are left lying about near dwellings, and by trapping and killing flies. Care should be taken to cover up all food and so prevent the access of flies. Much more could be done in this country to protect food both in houses and shops from being soiled by flies. It is most important to prevent the nesting of rats which should be exterminated whenever found, especially on board ship. Something has been done in many countries to banish mosquitoes by getting rid of their breeding grounds, namely swamps and stagnant water. Whenever possible these are drained ; in other cases spraying the surface of the water with paraffin prevents the mosquito from breeding.*

13. OTHER SUBJECTS IN THE SCHOOL CURRICULUM AND HEALTH EDUCATION.

(a) Association of Health Education with the ordinary School Curriculum.

Much health education can be given as part of the instruction in other subjects of the school curriculum, especially in all forms of physical training. It is essential however that there should be careful preparation and planning. It is not

* The principles of Sections 12, 13 and 14 are discussed from the teacher's point of view in *The Health of the School Child*, 1924, pp. 108-122 (Medical Report of the Board of Education), H.M. Stationery Office, 1s. 9d. The teacher is advised to consult these annual surveys on the health of children at school.

enough for the teacher of history or the teacher of English to bear the matter in mind in arranging their courses. The staff of a school should study their health syllabus together and agree as to the ground which each will cover. No doubt there will be some overlapping, but that will be an advantage ; the more health teaching is interwoven in the general process of education the more will its principles and practice become ingrained in the mind, habit and character of the child, and thus form a sort of natural armoury with which to meet in after life the crises which will inevitably arise, whether personal or social.

(b) Teaching of English and Arithmetic.

Health pictures can be used—a child asleep in a room with the window open, children playing out of doors in winter, a child carrying home vegetables for dinner—with suitable words or descriptions printed in large letters. Story-telling can be made to illustrate health practices. Among older children, composition, dictation, reading, recitation, good literature (especially biographies) will provide ample opportunities for illustrations in English and health teaching. As regards the teaching of arithmetic it is sufficient to indicate the many health problems connected with the choice and cost of food ; with the measurement of the children's height and weight ; with calculations as to floor space, area of window surface, size of rooms and ventilation ; with the amount of water supply for a family, village and town ; with the composition of foodstuffs and the construction of dietaries ; with sex and age distribution of the population and with birth and death registration.

(c) Teaching of History.

The teaching of History will be found to present frequent opportunity of showing the place of Hygiene in the life of the people in different stages of civilisation. Country and town life exert an influence on habit and occupation,

dietary, exercise and rest. Disease has had a direct and indirect effect upon the destiny of nations, leprosy in the East, malaria in Greece, plague in Rome in the time of Justinian, the black death in Europe, ague, smallpox, plague and cholera in England. Consider the health ideals and circumstances under the Hebrew, Greek and Roman civilisations; in Britain from the days of King Alfred, during the Middle Ages, under the Tudors, and in modern times.

The children may be taught to consider the effect upon national health of social and political changes in given periods. What has been the health effect of events since 1828, e.g. the development of the Poor Law and the Factory System; the Reform Bill of 1832; the creation of Municipal Corporations in 1835; the construction of roads by Telford, canals by Brindley, railways by Stephenson, the motor car (1885) and the aeroplane; the Corn Laws; the postal system, newspapers, the telegraph, telephone and wireless; the great Exhibition of 1851; the Elementary Education Act, 1870; the franchise extensions (1832, 1869, 1884, 1918); the Public Health Act of 1875, Old Age Pensions (1908) and the National Insurance Act of 1911.

Not only political and historical events but social habits and customs also exert an influence on health: the form and use of houses; window-lighting and the open window; candles, oil, gas, electricity; the introduction of soap and tobacco; baths and bathing; fashions in day clothing and night attire; beds, bedding, and bedrooms; life in the open air; games and sports; dietaries, hours of food, modes of cooking; changes and conditions of occupation; and the introduction of new industries.

(d) Teaching of Geography.

Show the children a map of Mercator's projection of the world and discuss the different climates, by longitude and latitude, illustrating the effect of climate upon physique

of race and social life of the people. Some parts of the world are famous as health resorts, Egypt and California, New Zealand and Switzerland, and it is useful to consider why this is so ; other parts are unhealthy, e.g. West Africa ; and some unhealthy districts (like the Panama) have been made healthy. How ? A comparison may be made of the death rates of different countries ; and a map of the world drawn indicating the distribution of some of the great diseases, leprosy, plague, cholera, malaria, yellow fever, hook-worm. Consider also the acclimatization of races to certain diseases, and their differences between maritime and hinterland, between the mountains and the plains.

Another aspect of geographical hygiene relates to food supply. Consider the sources of the food supply of Great Britain, a dozen nations supply our breakfast table. Inter-communication and internationalism have changed our dietary and contributed to our health.

The religions, customs, caste or social habits of many lands (e.g. India, China, Labrador, Iceland, Madagascar, Thibet, Brazil, Western Europe and America) have affected the health and physique of the people. The growth of Internationalism and the creation of the League of Nations have led to international sanitary codes of great importance to Britain as a maritime power. The relation of shipping to conveyance of infection is direct and indirect and concerns merchandise, aliens and immigrants. Insect-pests, sand-storms, prevailing winds, rainfall, heat and cold, soils, and vegetation of different tropical lands may affect health.

(e) Teaching of Citizenship.

Any teaching of citizenship to elder children resolves itself in large degree into health education. The first duty of a citizen to the State is to make himself a strong, long-lived, capable citizen, able to work and produce, the guardian and maintainer of a home, an all-round man,

loyal, patriotic, "a friend and helper of mankind". The Greeks taught the virtues of self-knowledge, self-control and self-devotion as the basis of citizenship. But this sort of life can only be built upon healthy physique. Hygiene is therefore one of the primary "civic" subjects, each child's first duty to the State. Elder children should learn what the State gives to the individual; (a) maintenance of security, (b) supply of material needs and public sanitation, (c) law, order and justice, (d) the common inheritance of the State, language, liberty, custom, tradition, (e) means of education and communication, postal system, and roads. These are conducive to health, and it is the citizens' duty to assist in their fulfilment and organisation. Children may be taught the ways in which the Local Authority carries out the State's requirements in regard to water-supply, sewage and refuse disposal, poor law relief, child welfare, factory supervision, food control, and the public health.

(f) Training in Handwork and Domestic Subjects.

Handwork can be utilised to re-inforce health education in children of all stages of development from the Nursery School upwards. Examples are the making by young children of toy farms, markets, grocery stores, etc. Older children can design posters and charts, and in the manual room make soap boxes, tooth-brush racks, kitchen utensils of sheet metal, etc. The making of a doll's house on a fairly large scale as a combined effort of boys and girls, its furnishing and appointment, is an exercise fruitful in opportunity of education in health.

Domestic training is essentially a form of health education. In the case of younger children to whom formal lessons in domestic hygiene cannot be given and in the case of older girls in schools where no facilities for regular domestic courses are available, opportunities may nevertheless be found for instruction in the carrying out of simple household

occupations, in which boys also should take their part. It is most desirable to foster appreciation and skill, on the part of both boys and girls, of so-called "menial" occupations, and to explain their relation to health. Mothercraft and infant welfare are now taught to elder girls in many schools, and their practice in such matters constitutes a valuable combination of handwork and domestic subjects.

14. EVENTS IN THE HISTORY OF PREVENTIVE MEDICINE AS ILLUSTRATED BY LIVES OF GREAT PIONEERS IN HEALTH.

(a) Origins.

The history of Preventive Medicine in England may be said to date from about 800 years ago when, at the beginning of the twelfth century, the ravages of "leprosy" led to regard for the insanitary conditions and unhygienic habits of the people, and to the advocacy and common adoption of some primitive preventive measures. In the fourteenth century came plague, the "black death", after it sweating sickness and ague, then smallpox and scurvy. The nation had to learn how to protect itself.

In the eighteenth century alcoholism was rampant, and scarlet fever, diphtheria and smallpox. In the nineteenth century there were four epidemics of cholera, and influenza was very prevalent. All these diseases not only killed many people but disturbed the whole population, and men began to explore ways and means of controlling them.

Scurvy was a disease which, occurring chiefly among seamen, "used to cripple fleet after fleet and to waste thousands of the bravest lives." The discovery that scurvy was largely due to failure to supply, as part of the seamen's diet, fresh vegetables and fruit, especially the juice of oranges and lemons, led at once to steps being taken to prevent the disease. In this connection the story of

Captain Cook and his adventures will always interest children ; indeed, the lives and work of the great explorers are full of suggestion and inspiration to high endeavour in healthy living (Livingstone, Stanley, Scott, Shackleton, Peary, Amundsen, etc.). Darwin used to say that his voyage in the *Beagle* provided him with health, training and education. It is well, also, to remember the influence of pestilence in securing reform. Necessity is still the mother of invention. The disadvantages of epidemics and the growth of knowledge were the origins of Preventive Medicine.*

(b) Jenner's Work on Vaccination.

One of the great landmarks in preventive medicine was the introduction of vaccination at the end of the eighteenth century by Edward Jenner. Up to the time of Jenner, smallpox was a dreaded and loathsome disease producing ravages difficult for us now-a-days to picture. He proved that vaccinia, a disease of the cow, though non-infectious from man to man, was inoculable, and protected against smallpox. This was the first practical demonstration of the protective power of immunity. In those countries where vaccination was efficiently practised smallpox was reduced in prevalence and mortality. Since Jenner's discovery other diseases have been prevented by the same method.

(c) Anaesthesia.

Another great discovery was that of the anaesthetic property of "laughing gas" by Sir Humphry Davy in 1799 (published in 1800). Dr. Morton in America and Sir James Young Simpson of Edinburgh, established in 1846-47 the anaesthetic power of ether and chloroform. They found that small doses of these drugs produced a temporary

* See, "*An Outline of the Practice of Preventive Medicine*," 1926, H.M. Stationery Office, Price 1s.

unconsciousness of the individual and so abolished pain. Hence it was possible to obtain anaesthesia, and the former excessive pain of surgical operations was entirely removed. This made the available field of surgery much wider. Surgical operations could be longer and more carefully and slowly performed, so that in recent times surgeons have been able to undertake many more kinds of operations and do them more thoroughly, as they are painless to the patient.

(d) Pasteur and the Causes of Disease.

In the middle of last century Louis Pasteur, a French chemist, one of the greatest scientists of all time, discovered the part played by germs in the production of disease. His life and work, a story of heroism and adventure, can be made full of interest to children. To him we owe the discovery of the means of controlling silkworm disease, a matter of great importance to the French people ; of the means of preventing woolsorters disease (anthrax) which wrought havoc among flocks of sheep and was dangerous to men handling the hides of animals which had died from it ; of the cause of fermentation and the " souring " of wines and beer ; of the cause of infective diseases ; of the means of preventing hydrophobia, formerly not uncommon in England, but now practically never seen. He discovered that the blood of an animal healed from infective disease contained substances which had destroyed the poison or *toxin* of that disease. This was the basis of the *anti-toxin* treatment of disease which has saved so many lives from death by diphtheria. It is upon his researches that many of our present-day methods for the prevention of disease of all kinds are founded.

(e) Lister, Founder of Modern Surgery.

The work of Pasteur was followed up by Lord Lister, the great English surgeon who laid the foundation of modern surgery. Thousands of people used to die after surgical

operations owing to the "putrefaction" of the wound, thus causing blood poisoning. Lister explored the process and cause of such putrefaction, and discovered that if he could prevent the germs of disease entering the wound from the outside air, or destroy them in the wound, the patient did not suffer or die from septic poisoning. By the use of antiseptic substances he destroyed the septic germs and the patient made a good recovery. His discovery has saved an incalculable number of lives and made surgery safe and possible in many ways previously undreamed of.

(f) Conquest of Malaria.

In the conquest of malaria Laveran was the man who discovered the parasite which causes the disease. Then Sir Patrick Manson demonstrated the rôle of a blood-sucking insect as an intermediate host in the life cycle of a human blood parasite. This he did in his research on the development of the *filaria* worm in the mosquito, which suggested to him investigation into the possibility of there being an intermediate stage of the malaria parasite in the mosquito. After prolonged research in India, Sir Ronald Ross revealed the cycle of the development of the malaria parasite of birds in the mosquito, and indicated the first stages of the development of the human malaria parasite in that insect. Grassi completed the work by exploring the various stages of the development of the human malaria parasite in mosquitoes. The whole discovery was thus the work of several investigators, following up each other's findings by deduction and induction.

In various parts of the British Empire and elsewhere many explorers and settlers have lost their lives through malaria. This disease was so rife that it was one of the chief causes which led to the giving up of the first attempts to cut the Panama Canal. Surgeon-General Gorgas,

applying the new discoveries, was able to prevent the disease, and so secure a band of healthy men capable of completing the enormous undertaking of the making of the canal. Malaria is prevented by land drainage which removes the favourable nidus of the mosquito, and by screening the house and person from the mosquito. It is treated and prevented in the individual by quinine.

15. WORK OF THE PUBLIC HEALTH AND SCHOOL MEDICAL SERVICES.

Thus, whilst the great pioneering doctors were at work—Mead on the plague, Fothergill on septic sore throat, Lind on scurvy, Baker on lead colic, Hunter on diseases and injuries of the soldier, and Pringle and Blane on those of seamen—teaching us the circumstances, character and cure of diseases, the immortal discoverers, Hunter, Jenner, Pasteur, Lister, and others were showing us the way to prevent them by the modern methods and new knowledge of Medicine and Surgery.

Meanwhile, the sanitarians were also busily engaged in fighting disease as it attacked the community. This they did by segregation of the sick, creating the "sanitary idea" in the healthy, and improving the environment. Sir Edwin Chadwick and Sir John Simon were the prominent leaders. Chadwick inquired into the bad conditions of the poor, and Simon investigated epidemic disease and devised effective methods of sanitary administration. Various Commissions of Inquiry were instituted, and Parliament passed a series of poor law, factory, educational and sanitary Acts, which resulted in (a) formation of local authorities undertaking health duties, supervised by Central Departments; (b) provision of grants in aid; (c) appointment of medical officers of health, and (d) establishment of public medical services in every district—hospitals and clinics, midwives, school doctors, nurses, child welfare centres, health insurance, etc.

FUEL and HEALTH

HEALTH is intimately affected by the proper or improper use of fuel in a score of different ways. Realising this, the British Commercial Gas Association, a co-operative research and advisory body representing the British Gas Industry, has undertaken a careful and scientific study of many aspects of public hygiene, the results of which are available to interested readers in printed form. Among the many subjects dealt with in its literature are

The Smoke Evil and Health
Means of Smoke Prevention
The Hygiene of Heating
Artificial Light and Sight
Hygienic Cookery and Health
Refrigeration and Food
Hygienic Refuse Destruction
Aids to Clean Milk Supply
Gas in Hospitals and Dental
Surgeries and Clinics
School Heating and Lighting

Teachers, school authorities, doctors, nurses and others concerned with the welfare of the young are invited to write for information on any of the above or kindred subjects, to the Secretary—

THE BRITISH COMMERCIAL GAS ASSOCIATION
 28, Grosvenor Gardens, Westminster, S.W.1.

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