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PERSONAL HYGIENE

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Frontispiece

LIVING MACHINES IN ACTION.

PERSONAL HYGIENE

BY

FRANK OVERTON, A.M., M.D.

AUTHOR OF "APPLIED PHYSIOLOGY"

NEW YORK ·:· CINCINNATI ·:· CHICAGO

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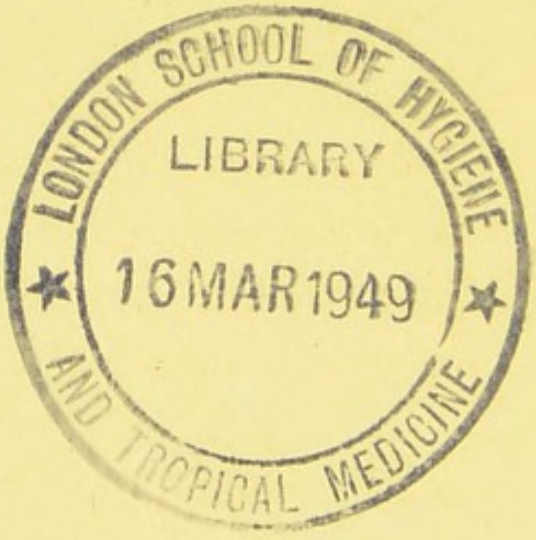

PREFACE

This textbook of Personal Hygiene is designed to instruct pupils in the modern science of hygiene of sanitation. It is adapted to young pupils, and its language has been carefully adjusted to their comprehension and interest. It meets the requirements of the most modern courses of study in physiology. It contains the essential facts of anatomy and physiology that are necessary for understanding the care of the body, but it places emphasis on the proper performance of voluntary acts rather than on a scientific observation of involuntary actions and hidden structures.

The test of the value of school instruction is its usefulness in the daily lives of pupils after they have grown up. The actions that are discussed in this book are those over which the mind has a direct control, and the knowledge that is imparted is applicable to the daily acts of every child throughout his life.

This book is the result of years of experience and observation by the author, not only as a teacher and lecturer, but also as an active health officer. The modern science of hygiene is only a few years old,

and its elementary principles have not yet become matters of common knowledge. Every health officer finds that he has to explain the elementary facts concerning the cause, transmission, and prevention of diseases before he can secure intelligent coöperation from infected persons and their families. This book will promote a hearty and effective co-operation of the private citizen with public health agencies.

The old idea of the causes of diseases was that they were produced by unfavorable conditions of the air, soil, and water, such as cold weather, dampness, noxious weeds, and emanations from the ground. Modern hygiene places very little stress on natural conditions as compared with persons themselves. This book shows how colds and other infectious diseases spread from the sick to the well, and makes it plain that the prevention of diseases is principally a matter of personal action by both the sick and the well. It shows that the customs of good society are founded largely on a hygienic basis, and that they are sufficient in themselves for the prevention of most diseases. It gives weighty hygienic reasons for simple toilet acts, such as washing the face, combing the hair, and brushing the clothes. It shows that the prevention of disease is not a far-off event over which common persons have no control, but that it is directly dependent on the personal habits of each individual man, woman, and child.

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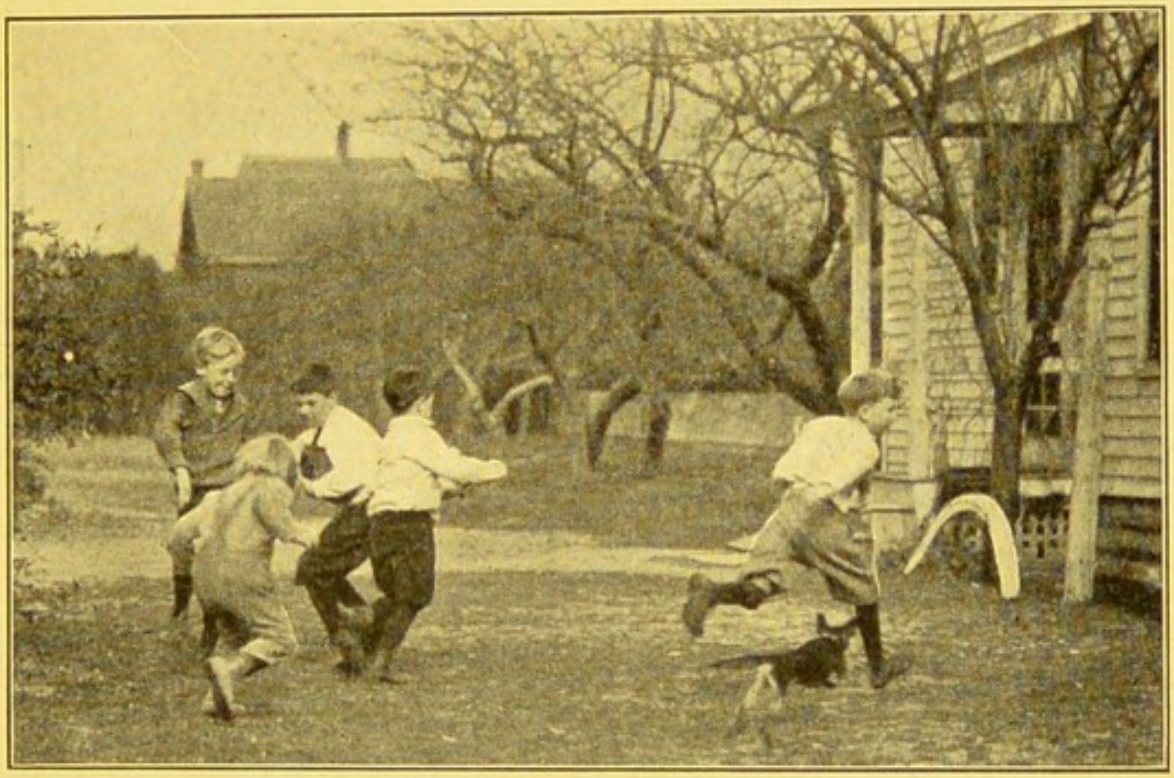
PERSONAL HYGIENE



CHAPTER I

THE STUDY OF HYGIENE

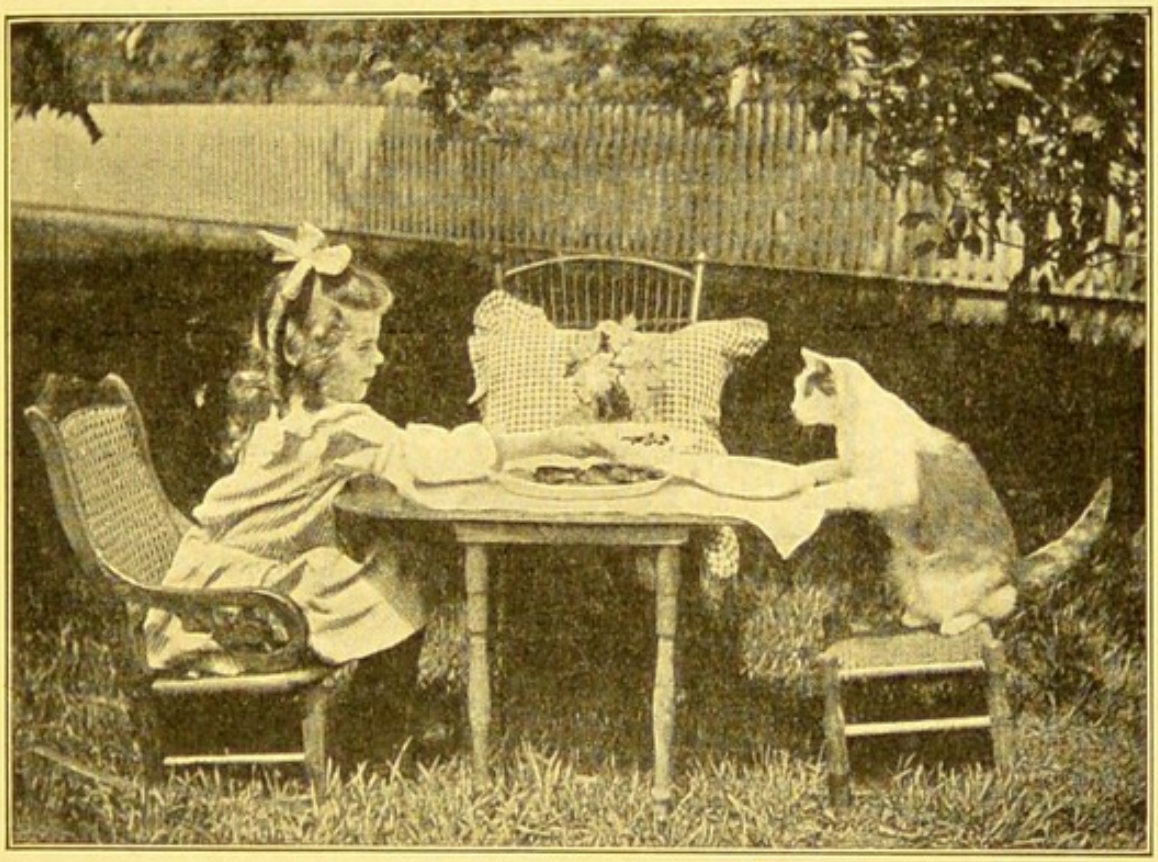
Good Health. — Sometimes you are bright and cheerful, and are ready for work or play. You feel comfortable and at ease in every part of your body. You do not readily become tired, and you enjoy your tasks as if they were play. When you feel and act like this, we say that you are in *good health.*

Sometimes you are dull and gloomy, and do not feel like stirring. You have pains and aches, and cannot help thinking about your uncomfortable feelings. You are too tired to work. Playing is a hard task, and even a rest does not help you. When you feel like this, we say that you are in *poor health* or are sick.

You can keep yourself in good health without great cost or trouble. Your body is a living machine which will work perfectly if you take good care of it. When you do not feel well and cannot work or play, the reason usually is that you have not given your body proper care.

A Strong Mind. — You are something more than a living machine. You have a mind as well as a body. Some persons with strong and healthy bodies fail in their work because they do not have good minds; but many persons with fine minds cannot work because their bodies are weak and sickly. Anything that harms your body is likely to harm your mind also. For example, after you have eaten too much dinner, you will feel too dull and stupid to study; a headache or a toothache will keep you from thinking about anything except your pain; and when you have a bad cold or a fever, you may feel too sick to think at all. You go to school in order to train your mind, but you cannot have a strong and bright mind unless you learn to care for your body also.

Health and Good Looks. — It is well for you to be as good looking as possible, in order that your appearance may please other persons. A shapely face, blue eyes, wavy hair, and round cheeks will not give you pleasing looks if you are not in good health. Pleasing looks come from a fair skin, rosy cheeks,



Both are Well and Happy.

a pleasant smile, sparkling eyes, and a happy face, and these come from good health. If you have a headache, a scowl or a pout will take the place of a smile. If your body is weak, you will easily become tired and you will look dull and sleepy. You cannot have pleasing looks unless you feel well.

Sickness. — After you have worked or played hard, you may have tired feelings which seem like the feelings of sickness; but if your body is sound, a short rest will put it in order again. Sickness means a disorder which a rest of a few hours will not repair.

Nearly every man, woman, and child is sick for several days in each year. But there is less sickness now than there used to be, and there will be still less sickness in years to come, for people are learning more and more about the care of their bodies. A doctor has to study for many years before he can cure diseases, but a school child can easily learn how the common diseases are caused, and how they may be prevented.

Hygiene. — The study of caring for the body is called *hygiene*. When you study hygiene, you learn about such things as how to keep your body clean, what to eat and drink, how to care for a wound, and how to keep the air of a room fresh and pure.

In order to understand the care of your body, you must study about what goes on inside of it. This study is called *physiology*. In it you will study about such things as how food is digested, how blood flows, and how breathing takes place. If you wish to have a bright mind, a sound body, and good looks, or if you wish to have strength to do great deeds, you will study hygiene and physiology.

QUESTIONS

What is meant by *good health?*

In what way may an unhealthy body prevent the mind from doing good work?

In what way will a healthy body help your good looks?

What is *sickness?*

What is the study of the care of the body called?

What are some of the subjects which are studied in hygiene?

What is *physiology?*

What are some of the things which are studied in physiology?

CHAPTER II

DISEASE GERMS

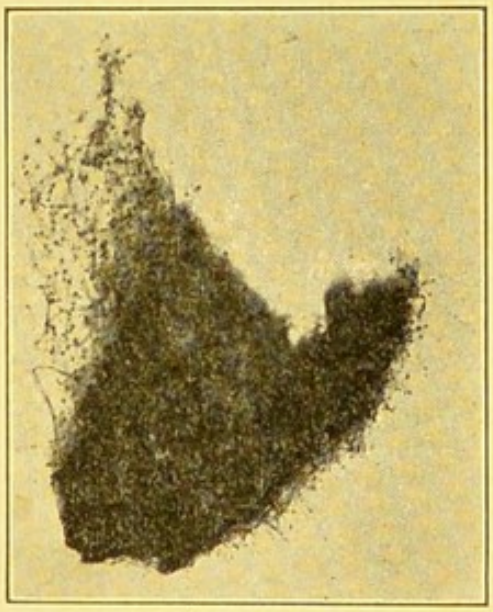
Catching a Disease. — Some forms of sickness are caused by something which comes from the bodies of the sick. For example, if any one has measles, it is because be has caught the disease from some one who has had measles. Over half of the people who are sick have caught their diseases from other sick persons.

Infectious Diseases. — Those diseases which are caught from other persons are called *infectious* diseases. They are caused by living germs which grow in the body. You will not have one of these kinds of sickness unless you take the germs of that disease into your body. One of the principal things which you will study in hygiene, is how to keep germs of sickness out of your body. It is therefore important for you to learn what disease germs are like, and how they grow.

Examples of infectious diseases are colds, tonsillitis, tuberculosis, diphtheria, malaria, yellow fever, typhoid fever, measles, whooping cough, mumps, chicken pox, scarlet fever, and smallpox. These diseases are caused by living germs which leave a

sick person's body and become planted in the body of another person. The germs often live for days outside the body and are sometimes carried from place to place before they finally reach another person; but it is hard to make the germs grow and multiply anywhere except in the body of a person or of a lower animal.

Kinds of Disease Germs. — There are many kinds of disease germs. Each disease has its own kind of germ, just as each tree has its own kind of seed. Thus, consumption always comes from the germs of consumption, and measles from the germs of measles, just as pine trees come from the seeds of other pine trees.

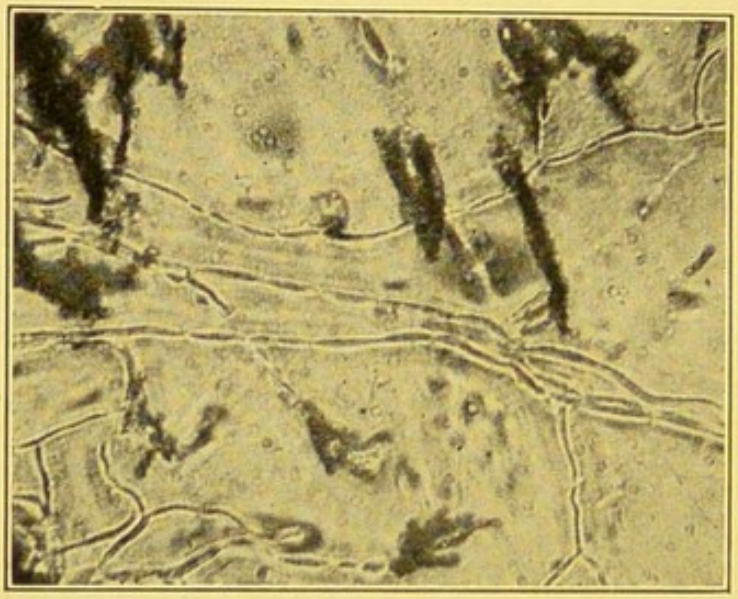


Bread covered with Black Mold.

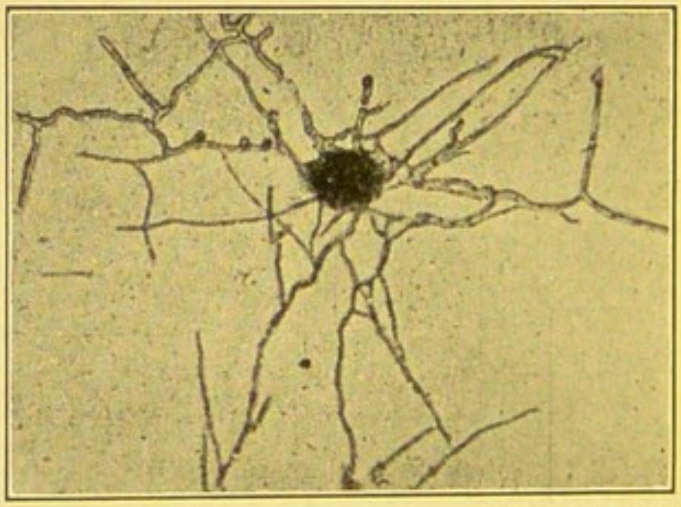
Mold. — Disease germs are much like common mold. The black mold which is often seen on spoiled bread and cheese looks like the fine hairs or threads on velvet cloth, but the part which is seen on the outside of the food is only the fruit of mold plants. Many more of the same kind of threads grow through the food itself, and cause it to spoil.

The threads may multiply very fast, and a few may become a mat of threads within a few hours.

The tip of each fruit thread is a knob, filled with tiny balls called *spores*. These spores are like seeds. They may float away as dust, and when they fall upon other pieces of bread or cheese, they may grow into threads of mold. Many millions of spores are formed in each spot of mold, and so the spores are scattered nearly everywhere. This is why food often becomes moldy after it is a few days old. The mold seems to spring from the food itself, but it really comes from tiny spores that have fallen upon it from the air.



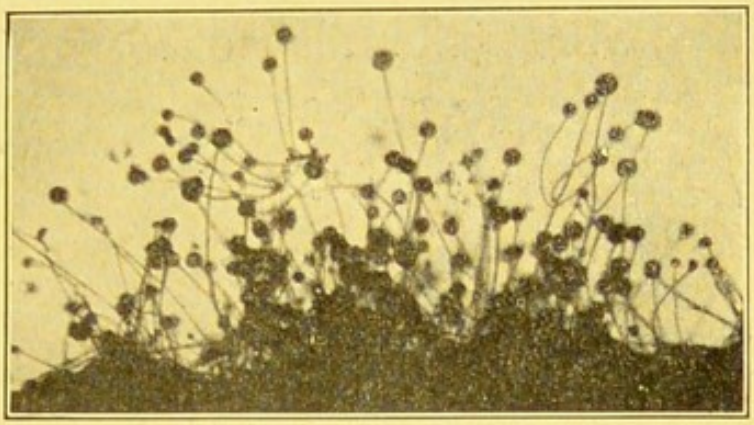
Mold Threads. (Magnified.)



Mold Spore and Threads. (Magnified.)

There are many kinds of molds which do harm to food and clothing. A few kinds of disease germs are molds. One kind growing in the skin is the cause of ringworm, and other kinds often make the mouths of babies sore.

Bacteria. — Most disease germs are tiny plants called *bacteria* or *microbes*. Bacteria are much like molds, but smaller; and as they grow in number they break apart, instead of forming threads as mold plants do.



Black Mold on Bread. (Magnified.)

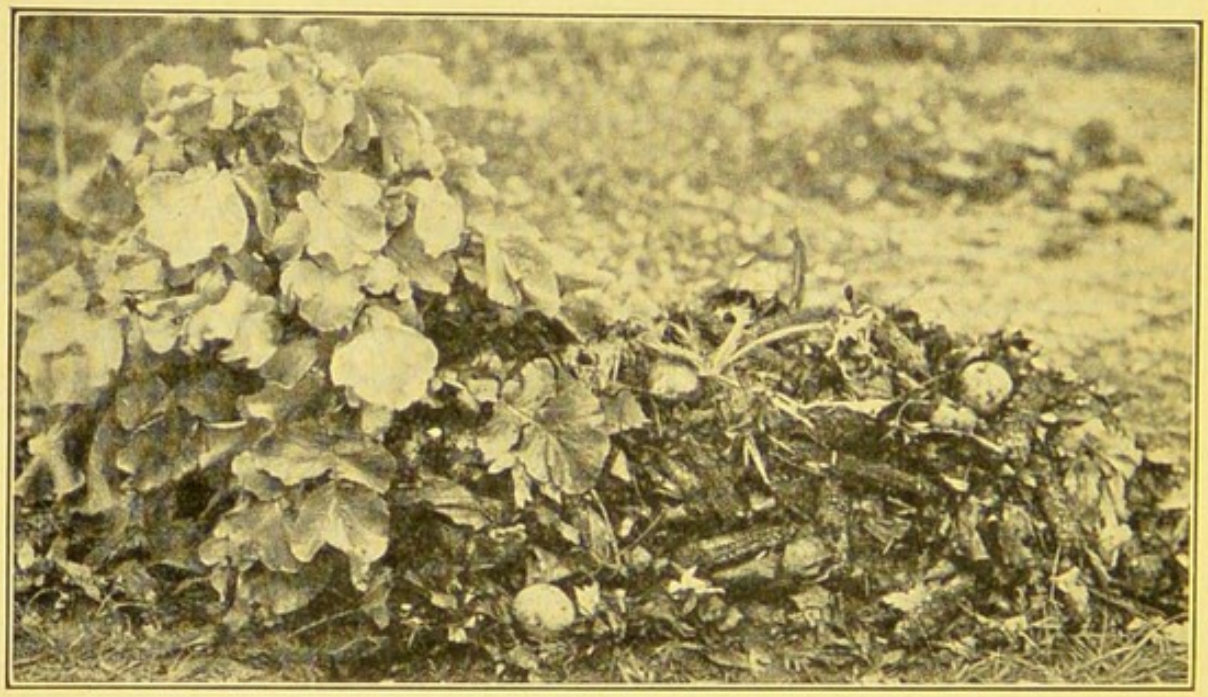
Bacteria are the smallest living things that are known. Millions of them could swim in a small drop of water without crowding one another. Powerful microscopes are needed to see them at all, and even then the most of them seem like small dots and dashes on the page of a book. When millions of them are grown in a dish, they may look like a spot of mold.

Bacteria are extremely hard to kill. Cold will stop their growth for a time, but they will grow again as soon as they become warm. Boiling will kill most of them, but sometimes a few will grow even after they have been boiled. Many of them are not killed by drying. They may blow away as dust, but they may grow again as soon as they fall upon a wet substance.

Where Bacteria are Found. — Bacteria are found nearly everywhere. The soil swarms with them, and muddy water is full of them. A few may nearly

always be found floating in the air, but if the air is very dusty, it contains millions of them. Bacteria are found wherever air can go, and so they are on our food, our bodies, our clothes, and on everything else which the air touches. They cannot grow in many places, as on clean glass, but they can grow wherever any other kind of living thing can grow.

Bacteria and Decay. — Bacteria usually get their food from substances which have been alive in



Useful Decay in a Garden.

plants and animals. They take parts of the substances into their own bodies, and leave the rest softened and partly destroyed. If the change spoils the substances and produces unpleasant smells, it is called *decay* or *rotting*. Most forms of decay are caused either by bacteria or by molds. The rot-

ting of fruit and vegetables, the souring of milk, and the decay of meat are caused by bacteria.

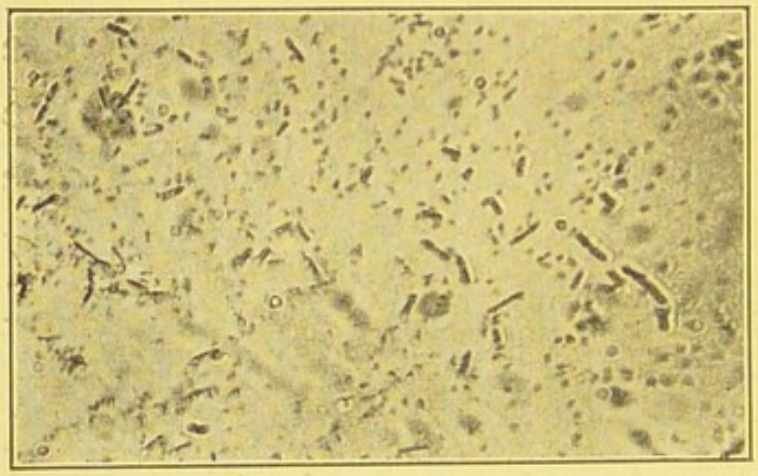
Decay is often useful. When garbage or the dead bodies of animals are buried in the soil, bacteria of decay enter them and soon destroy them, just as if a fire had burned them. If there were no bacteria of decay, dead leaves, grass, trees, and the bodies of dead animals would not go to pieces, but would lie upon the ground like rocks, and would leave no room for living things on the face of the earth. But when dead things decay, they become a useful part of the soil. The fertilizers which are put upon the land to make plants grow are mostly decayed substances, and thus the decay of dead things helps food crops to grow.

Canning Food. — Almost the only reason why food spoils is that bacteria and molds grow in it. When food is prepared for canning, it is boiled so that the living germs in it may be killed. It is then put into air-tight cans so that no more germs can reach it. Vegetables, fruit, and meat which have been preserved in this way will keep fresh for months and years. But after a can is opened, the food soon spoils, for bacteria and molds then enter it.

Useful Bacteria. — Some kinds of bacteria may be useful in food. Vinegar is made by a kind of bacteria growing in the juice of apples or of grapes. The flavor of butter and the taste of cheese are caused by bacteria growing in the food. But if

bacteria of decay also grow in the butter or the cheese, the food will taste bad and be spoiled.

Bacteria and Sickness. — The bacteria of decay produce substances which are poisonous to the body. Many persons are made sick each year by eating spoiled food. A chicken which has been kept in a market until it is beginning to decay may taste good, and yet it may be spoiled and may cause a stomach ache and vomiting in any person who eats it.



Bacteria in Decaying Meat. (Magnified.)

A few kinds of bacteria may grow in living flesh. There they may form poisons which are often more deadly than the poisons of decaying substances. These are the germs that are the cause of infectious diseases, such as diphtheria and typhoid fever. Diseases spread because disease germs leave the bodies of the sick and enter the bodies of well persons. Catching a disease means taking germs of that disease into the body.

It used to be supposed that infectious diseases were spread by such means as cold weather, fog, damp ground, and night air. The principal reason why these things are sometimes harmful is that they

cool the body, but they do very little harm if the body is kept warm. Not one of these things can produce a disease germ, and so they cannot be the cause of an infectious disease.

An example of a sickness which seems to many persons to be caused by cold, damp weather is the form of sore throat called *tonsillitis*. This sickness is nearly always caused by disease germs which come from other persons who have the sickness.

How Disease Germs leave the Body. — Very few disease germs pass out of the body of a sick person through the skin, or with the breath of quiet breathing. They leave the body with the solids and liquids which pass out of the nose, the mouth, the bowel, and the bladder. If every sick person should guard these four gateways of the body, and should destroy all the germs that escape through them, there would soon be no more infectious diseases, such as measles, scarlet fever, diphtheria, and consumption.

Dirt and Disease Germs. — If a person has an infectious disease, everything which he soils will be likely to contain disease germs. Dirt from his body, his clothes, and his room will be dangerous on account of the disease germs in it. Those who are mildly sick, or who are beginning to be sick, give off living germs of disease, and so dirt which comes from any person may be dangerous. Cleanliness is one of the best of all means of preventing sickness.

QUESTIONS

What is the cause of the diseases which spread from sick persons to those who are well?

What is meant by an *infectious* disease?

Where do disease germs grow?

What are molds?

What is the shape of a mold plant?

How do molds spread from place to place?

What are bacteria?

What have bacteria to do with decay?

Of what use is decay?

Where may bacteria be found?

Why does food not spoil when it is properly canned?

What are the four principal gateways through which disease germs leave the body of a sick person?

What are the principal things which make dirt dangerous to health?

How does cleanliness help to prevent diseases?

CHAPTER III

BATHING

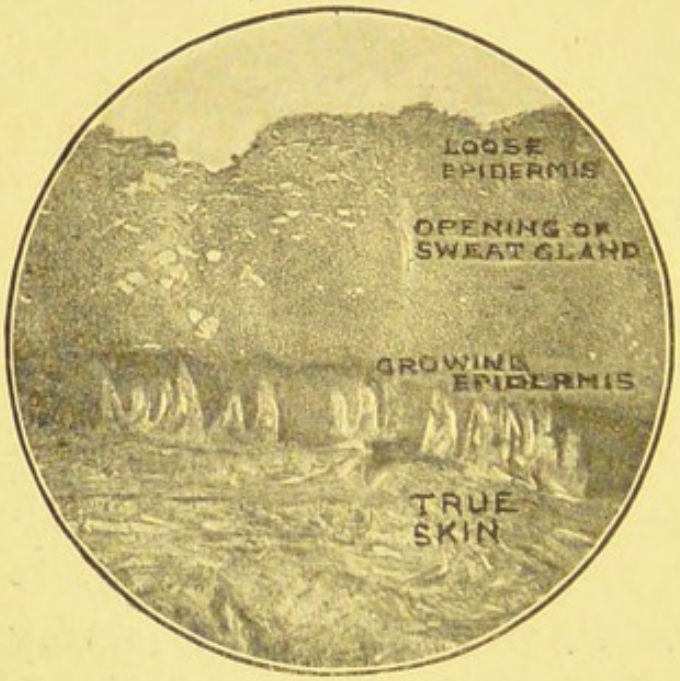
Cleanliness and Good Health. — The principal way by which disease germs may be kept from the body is by cleanliness. Many persons seem to think that the only reason for keeping clean is for the sake of good looks. A greater reason for keeping clean is to be well and healthy. You will not take many disease germs into your body if you eat clean food, breathe clean air, drink clean water, and keep everything about your body clean.

The Skin. — The whole body is covered with a skin which is soft and strong. The thickness of the skin may be seen by grasping a fold of flesh on the back of the hand. Nearly all of the flesh which can be lifted up is skin.

The skin is made of tough threads of flesh. Leather is an animal's skin that has been preserved by tanning, and its fibers and threads are like those in a person's skin.

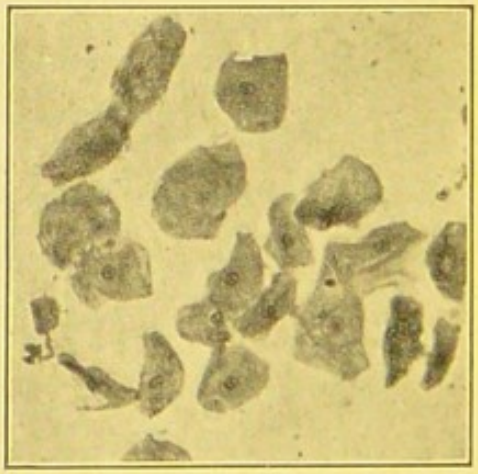
The skin is full of blood tubes. The blood in the tubes makes the skin look pink. When any one is faint, the skin is pale and almost white, for then there is only a little blood in it.

Epidermis. — The outside of the skin is covered with fine, soft scales which are matted into a thin sheet. This covering is like a sheet of paper pasted upon the skin and is called the *epidermis*. It may be cut and pricked without pain or bleeding. One of its uses is to keep the tender flesh under it from being hurt.



A Bit of Skin. (Magnified.)

The epidermis is waterproof and keeps liquids from soaking into the flesh. It also keeps the flesh from drying. If the epidermis is healthy, most kinds of poisons may be handled without danger, for very few kinds of subtances can pass through the scales.



Scales of Epidermis. (Magnified.)

You are always shedding scales of epidermis from the surface of the skin, and new scales are always growing next to the true skin. By scraping some of the scales from the back of the hand or the inside of the cheek, and examining them with a microscope, you may see how they look.

Oil in the Skin. — The skin is kept soft by means of a kind of oil or fat. The oil is formed within tiny tubes, called *oil glands*, which lie deep in the skin around the hair roots. There are oil glands in the skin wherever there are hairs, but more of the glands may be found on the top of the head than anywhere else on the body.

Perspiration, or Sweat. — If a bare finger is held against a cold window pane, the glass soon becomes wet. This shows that water passes off from the skin. The water is the *perspiration*, or *sweat*. It is formed in small tubes, called *sweat glands*, which lie deep in the skin on all parts of the body. It passes off through tiny openings which are often called *pores*. Perspiration is always passing off from the skin. Over a quart leaves the skin every day, even on a cold day of winter.

Waste Matter of the Body. — When the body works, its flesh wears out just as a machine wears out when it runs. In doing its work the body also uses up a great deal of food in the same way that a steam engine uses up coal when it runs. Flesh that has become worn out, and food that has been used up are waste substances. They are of no more use to the body, but are often poisonous, and would make the body sick if they were not taken away. A great deal of the waste matter is dissolved in the water of the perspiration, and is carried outside of the body by the perspiration.

Dirt on the Skin. — The skin becomes dirty from three principal causes.

1. Loosened scales of epidermis are always leaving the body. They may be seen on an arm where the clothing has kept them from flying away. Little rolls of the scales may be rubbed from the skin after a hot bath. Each person sheds about a tablespoonful of scales each day.

2. When perspiration dries, the waste matters that were in it are left upon the skin. These substances have a bad odor and cause the greater part of the smell of a dirty skin.

3. Dust is blown upon the skin and many kinds of substances stick to it during work and play. The dirt always contains bacteria of decay, and very often it contains also the bacteria of diseases.

When the skin is dirty, the most dangerous things on it are disease germs. The germs are likely to be carried into the flesh when the skin is cut or pricked. There they may grow and produce pimples, boils, running sores, and blood poisoning. Some of the disease germs in the dirt may also be carried from the skin to the nose or the mouth, or to food, and in that way they may be the cause of a cold, or typhoid fever, or other infectious disease.

Washing the Hands and Face. — The hands are the parts of the body that are the most likely to become dirty, for they are used in working and in handling dirty things. Dirt on the hands is likely to do more

harm than dirt on any other part of the body, for they are used to handle food, to rub the mouth, nose, and eyes, and to do other things which might carry poisons and disease germs into the body. School children often catch a dangerous form of sore eyes called *granulated lids* by rubbing their eyes with their fingers after their hands have been soiled with the tears or matter from the sore eyes of another child. Keeping your hands clean will help you to be strong and well.

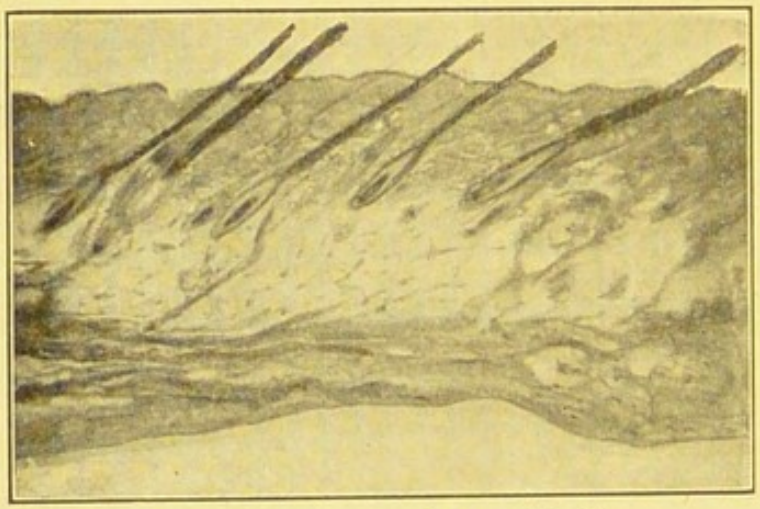
The face, too, is likely to become dirty, for it is seldom covered. If the face is dirty, the nose and the mouth are both likely to be dirty also. Much sickness is caused by breathing dirt into the nose and mouth. By washing your face you get rid of a great deal of the dirt and disease germs which might reach the inside of your body through the nose and the mouth.

Washing the face and hands once a day is not enough, for they get dirty again within a few hours. Wash them when you get up in the morning, for as much waste matter passes off from the skin during the night as during the day. Wash your face and hands before each meal so that you will not soil your food. Wash them again just before going to bed so that no dirt or disease germs from them may harm you through the long hours of sleep. Also wash them after any kind of dirty work or play.

Use of a Towel. — After washing the skin, dry it

with a clean towel. If a number of persons use the same towel, some one who is beginning to be sick is likely to leave disease germs on it. A towel that is dirty, or smells as if it had been used, is not fit for drying the skin. When you travel away from home, carry a clean towel for your own use, so that you will not need to use one which has been soiled by another person.

Combing the Hair. — Dirt and disease germs are often caught in the hair of the head, and sickness may be due to failure to keep the hair clean. Germs of colds and sore throats are often blown upon the hair from dirty streets and soiled floors. These germs may be rubbed from the hair upon a pillow during sleep, and then they may be breathed into the body, and thus be the cause of a cold or a sore throat.



HAIR ROOTS. (Magnified.)

You remove a great deal of dirt and dust from the hair when you comb and brush it; and you keep dirt from catching among the hairs when you make them lie smooth and straight. By combing your hair you improve your health as well as your looks.

A dirty comb and brush may carry disease germs

into the hair. Have your own comb and brush, and wash them whenever they become soiled. When you go away from home, take them with you so that you will not need to use those which have been used by another person.

Washing the Hair. — Hairs do not grow from the top of the skin, but from roots which lie deep in the flesh. Baldness is due to a disease of the roots and is often caused by disease germs growing in the skin. Sometimes the skin of the scalp peels off in fine flakes called *dandruff*. This, too, is often caused by disease germs. Washing the hair often with soap and water helps to remove disease germs, and to keep it in good condition.

Nails. — The nails on the fingers and toes are hardened growths of the outer covering of the skin. Keep them trimmed even with the end of the flesh. Use a sharp knife or scissors so as to leave their ends smooth. Biting the nails will leave them rough and make the ends of the fingers sore.

Many persons suppose that the finger nails may poison the body if they scratch their skin with them, or swallow a bit of nail. The nails themselves are not poisonous, but the dirt that collects under their ends often contains decaying matter and disease germs. Keep your nails clean for the sake of your health as well as looks.

A hangnail is not a nail at all, but is a sliver of torn skin that hangs near the nail. Biting or pulling

it off makes the skin sore. You can cure it by cutting it off close to the skin with a sharp knife or scissors.

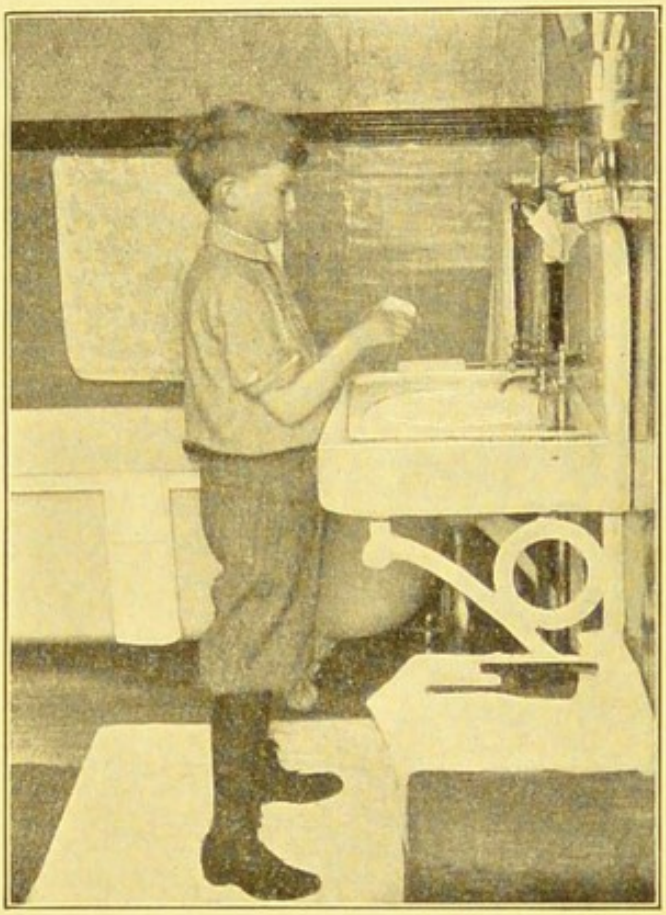
Washing the Body. — The parts of the body that are covered with clothing do not get dirty so quickly as the hands and face; and yet if these parts are not washed often, dried perspiration will give the skin an unpleasant odor. This odor is a sure sign that the body needs washing all over. You will need to wash your whole body at least once a week, even in winter, in order to prevent its odor from becoming unpleasant.

An Easy Way to Bathe the Body. — In taking a bath you will need some water, some soap, and a towel. If the water is warm, it will soften dirt more readily than water that is cold. If you bathe in a warm room, you will be able to take plenty of time for the bath; but if you wash quickly in a cold room, you will feel bright and refreshed because of the cold. A bathroom with running water makes bathing easy; but even if you have no bathroom, you can easily keep yourself clean.

Here is a good way to take a bath quickly. Use a basin of warm soap suds. Rub the suds over the whole body and then dry the skin with a towel. In this way you can bathe and dry the whole body within five minutes.

Use of Soap. — The oil on the skin holds dust and dirt fast to it. Water will not mix with the oil, and

so you cannot easily clean the skin by washing it with water alone. Soap rubbed upon the skin will make the oil mix with the water, and in this way it will help to loosen the dirt. Use a kind of soap which does not bite or sting the tongue when you taste a bit of it.



Soap loosens Dirt.

Bathing for Stimulation. — A cool bath will make a healthy person feel strong and active. In the morning it is a good plan to wet the whole body and dry it quickly by rubbing it with a towel. This causes a great deal of blood to flow through the skin and makes a person feel wide-awake and ready for work. A basin of water and a towel are all that are needed for such a bath. But a person who is weak or sickly may be harmed by a cold bath, for it may cool his body too much.

If you are tired at night, a warm bath just before bed time will help to quiet you for sleep. The best time to take a cold bath is in the morning, for it will rouse you up and make you ready for work.

Swimming. — Swimming is a good form of bath if you do not stay in cold water too long. When you first plunge into the water, you may feel cold, but if you stir around briskly, your skin will soon become red and warm, and you will feel bright and strong. If you stay in the cool water too long, the blood will leave the skin and you will feel cold and tired. The time to leave the water is as soon as you begin to feel chilly.

Bathing the Sick. — When a person is sick abed, a bath will often make him feel better than almost anything else that can be done for him. You can easily give a bath to a sick person by washing one part of his body at a time, and drying it at once. Begin with the face, then wash an arm, and then wash the other arm, then the legs, then the front of the body, and then the back. Cleanse the teeth and mouth also. A feverish person will be helped by having such a bath two or three times a day.

Hot Water Bag. — When you have a toothache, or earache, or backache, or stomach ache, or other pain, or have sprained a joint, or bruised the flesh, you may lessen pain by heating the skin over the painful spot. A good way to do this is to fill a rubber bag with hot water and lay it against the spot. The bags may be bought at drug stores.

QUESTIONS

In what respect is the skin like leather?

What is the *epidermis?*

Of what use is the epidermis?

Where is perspiration formed?

What substances are dissolved in the water of the perspiration?

Of what does the dirt on the skin consist?

What things compose the most dangerous part of dirt?

Give some reasons why the face and hands should be kept clean.

Why should the hair be washed?

In what way may combing and brushing the hair help to prevent sickness?

How may dirty nails cause poor health?

How may a hangnail be cured?

What causes the unpleasant odor of an unwashed skin?

Of what use is soap in bathing?

In what way may bathing be good for the health even when the body is clean?

Of what use is a cold bath besides cleansing the body?

Of what use is a hot bath?

Describe a good way of bathing a sick person.

How should a hot water bag be used to relieve pain?

CHAPTER IV

CLEANING HOUSE

Dirt and Dust. — Dirt is always forming in houses. It falls from shoes and clothing, and drops from packages of goods, and from wood and coal. Bits of wool and cotton are rubbed from clothing and carpets, and shreds of wood are torn from floors. Finger marks are left on doors and windows, and dirt is made during work and play. Some of the dirt floats away as dust in every breath of air and falls in a shower when the air becomes quiet.

Disease Germs in Dirt. — Dirt in houses nearly always contains waste matter from the body, such as scales of dead skin, and substances which are coughed from the throat or blown from the nose. These substances often contain disease germs when an unhealthy person is in the house. They become dried and may float in the air as dust. If there are disease germs in the dirt of the room, they will rise with the dust, for they are even smaller and lighter than the bits of dust which we can see in a sunbeam. A sore throat, consumption, and diphtheria are examples of diseases which are often caught from the dust of dirty rooms. A dirty or dusty

house is unhealthful and dangerous. Cleaning a room helps to make it healthful as well as attractive.

Sweeping. — One way to remove dirt from a room is to sweep it out with a broom. A living room and a kitchen will need sweeping at least once every day. While you sweep, keep the doors and windows open so that the dust will float out of the room. Be careful to sweep in the corners of the room and behind the furniture, for dust and dirt are harmful in those places just as they are in the middle of the room.

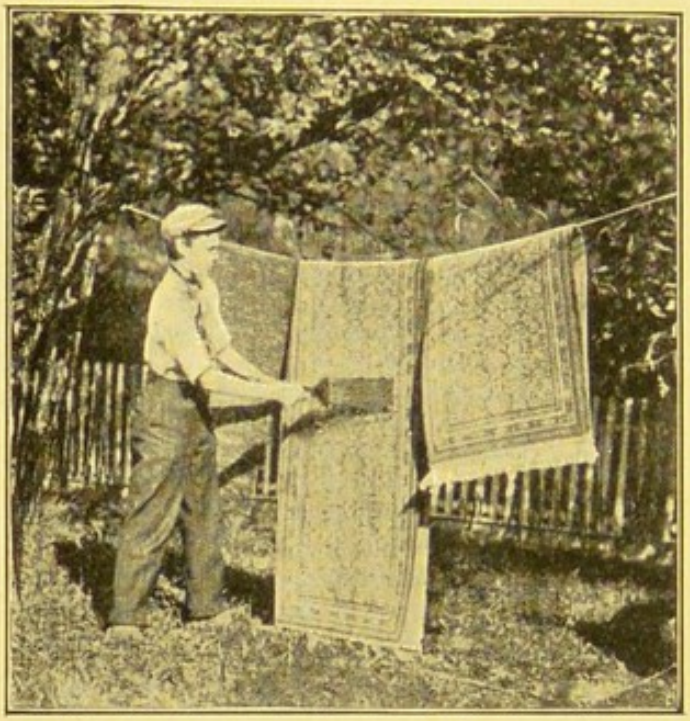
Dusting. — Sweeping will remove the larger bits of dirt and dust, but it will stir up the finer dust and spread it through the air. When the air becomes still, the dust will settle slowly back to the floor and the furniture. The cleaning will not be finished until the dust has been wiped from the furniture.

A dry cloth used to dust the furniture will not catch and hold the dust, but will only stir it up and make it float off to another part of the room. Dampen the cloth so that it will hold the dust which is wiped up.

Cushions and couch covers hold a great deal of dust. Clean them also when you sweep a room.

Cleaning Carpets. — Sweeping rugs and carpets with a broom will take away the dirt which lies on the surface, but it will not remove the dirt which sifts into their threads or goes through them to the floor. You cannot clean carpets by sweeping them while they lie on the floor. The only way to

clean them thoroughly is to take them out of doors, and there beat the dirt and dust from them. Rugs are more healthful than carpets, for the rugs can be taken up and cleaned the more easily.



RUGS MAY BE CLEANED OUT OF DOORS.

Closed Rooms. — Some persons think that a clean room will not become dirty if it is kept closed. But dusty air blows through cracks in the windows, doors, and floors. After a room has been closed for a day or two, the air in it will smell musty, and the bedclothes and carpets will have a kind of peppery odor. A large part of these smells are due to molds. A room that has been closed for a few days will not be fit for use until it has been well aired and dusted.

Sunlight. — Sunlight is a great help in getting rid of molds and disease germs in a house, for it destroys them in the same way that it burns the skin when it shines strongly upon the face. If a room is flooded with light, few disease germs can live in it. Light will kill the germs even though the sun does not shine directly into a room.

Every time that you clean a room, put the mats out of doors in the sunlight. Raise the shades so as to let in the light, and leave them up for some hours. The light may fade the carpets, but it will make the room a healthful place to live in.

A bedroom needs light all through the day, for it is in use longer than almost any other room in the house. When you get up in the morning, leave the shades up and a window open, in order to let light and air into the bedroom. Spread out the sheets and bedclothes so that the air and sunlight will dry the perspiration from them and kill the bacteria in the dirt with which they may be soiled.

QUESTIONS

Of what is house dirt composed?

What substances in dirt are dangerous to health?

How should a room be swept?

How should a room be dusted?

Why is a dry cloth not a good thing to use in dusting furniture?

Why should a carpet be cleaned?

Why are rugs on the floors more healthful than carpets that cover the whole floor?

How should cushions be cleaned?

What harm is done by leaving a room closed for days at a time?

How does sunlight in rooms help to make them healthful?

What care should be given to a bedroom in the morning?

CHAPTER V

CLOTHES

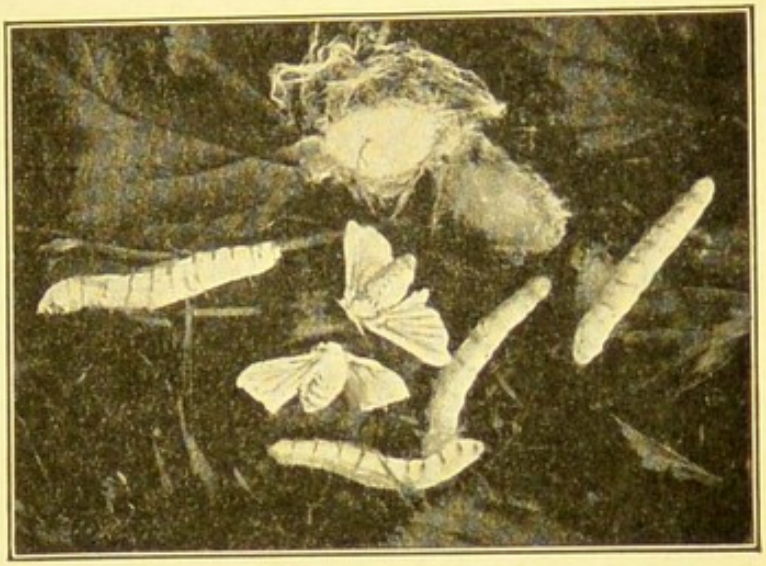
How Clothes warm the Body. — One of the uses of clothing is to keep the body warm. Clothes do not make heat, but the body warms itself by making its own heat. Clothing makes the body warm only because it keeps heat from leaving the body.

Shearing a Sheep.

Of what Clothes are Made. — Most clothes are made from cotton, or linen, or wool, or silk. Cotton consists of short fibers which grow upon the seeds of cotton plants; linen is the stringy bark which covers the stalks of flax plants; wool is the hair of sheep; and silk is composed of fine threads which are unwound from the cocoons of silkworms.

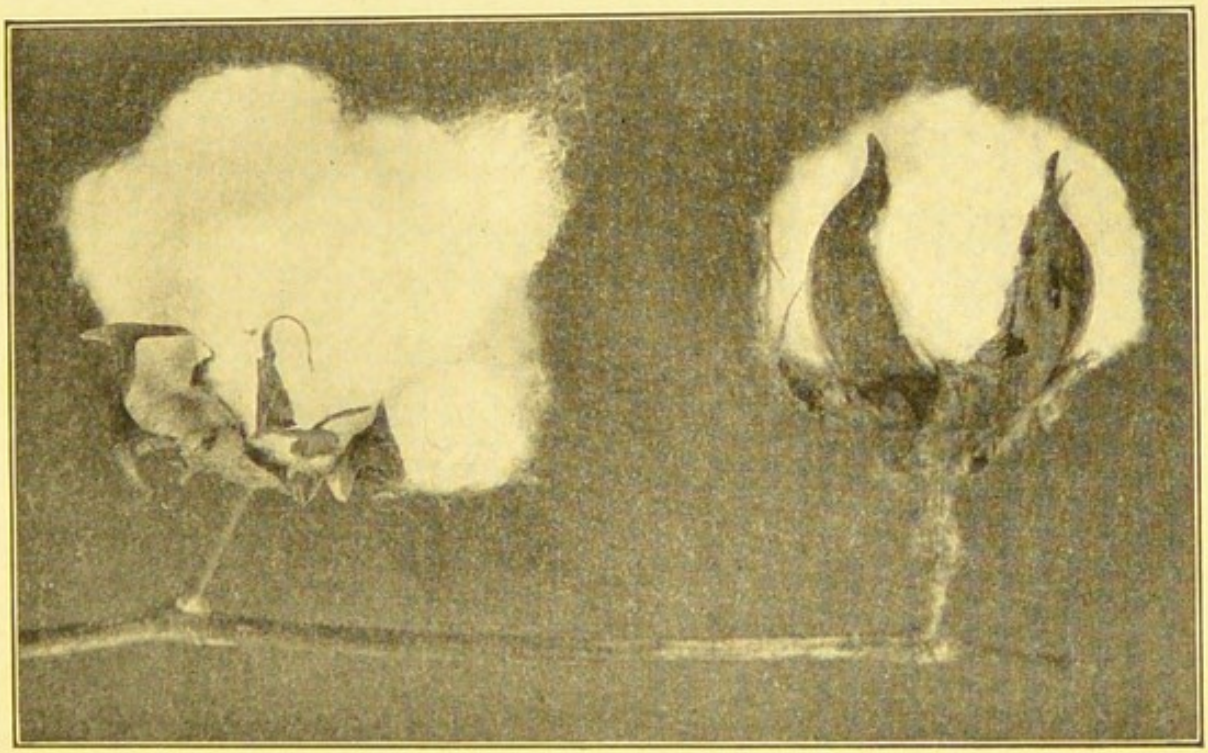
Wool and Cotton. — When cloth is loosely woven and soft, a great deal of air is held among its threads. This air is a great help in preventing heat from leav-

ing the body. Fur is warm because of the air which it holds. The threads of woolen cloth usually remain soft and fluffy, even after they are washed, and so wool makes warm clothing. Silk clothing is about as warm as that made from wool.



Cocoons, Moths, and Silkworms.

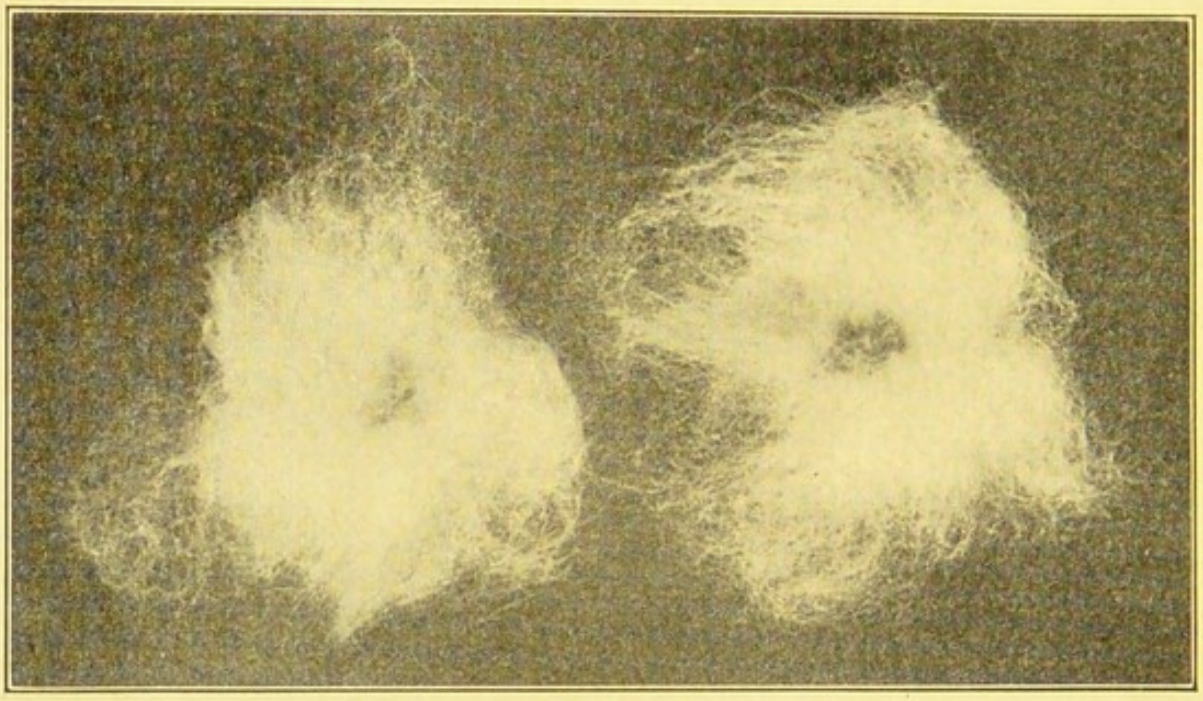
Cotton cloth becomes hard and matted after it has been wet or washed, and so clothing made from it is not so warm as that made



Ripe Cotton.

from wool. Linen clothing is about as warm as that made from cotton.

Paper Clothing. — Clothing made from paper weighs but little, and yet it will keep the body as warm as cotton clothing. A newspaper spread under your



Cotton Seed and Cotton Fiber.

coat may be used to keep your body warm when you have forgotten your overcoat. A few newspapers spread under the quilts of your bed may keep you warm when you cannot get enough bed clothes.

How Much to Wear. — Your feelings will be your best guide as to how much clothing to wear. Wear enough clothes to keep yourself warm. More clothes than this will be in the way, and will hinder you in moving the arms and legs. In winter you will need a thick suit of underclothes, a warm coat or waist, and an overcoat to put on when you go out of doors

on cold days. Some persons wear two suits of underclothes in place of an overcoat; but the coat will be the better, for it can easily be put on when the air is cold, and taken off when the air is warm.

Neck Wraps. — If cold air is never allowed to touch the neck, the throat will become tender and will easily be harmed by a slight chill. Use underclothes which reach up to the neck, and wear a low collar on your waist or shirt. When you go out of doors on a very cold day, button your coat up to the neck, or turn up its collar. If you care for your neck in this way, you will be warmer and healthier than if you bundle it up in thick wraps.

KEEPING DRY ON A RAINY DAY.

Loose Clothing. — Loose clothes keep the body much warmer than tight clothes, for when they are loose they hold a great deal of air among the layers of cloth (p. 38). For the same reason two thin garments are warmer than a single one which weighs as much as the two.

Damp Clothes. — Wet clothes are likely to be harmful because the vapor passing off from them

takes heat from the skin and cools the body. The cooling may injure the body so much that it cannot overcome disease germs if they should enter it. For this reason the wearing of damp clothing may help to bring on a cold or sore throat. But wet clothes are not likely to be harmful if a person keeps warm by exercising. When your clothes become wet, keep moving around and exercising until you can either dry them or change them for dry ones.

Brushing Clothes. — Clothes which are dusty and dirty often have disease germs on them. Brushing your clothes and keeping them clean will help your health as well as your good looks.

Brush your clothes every morning as regularly as you wash your face and hands. If you brush them in your room, the dust and disease germs will float in the air, and you will be likely to breath them into your body. Brush them by an open window or out of doors.

Underclothes. — Underclothes soon become dirty and have an unpleasant odor like that of a dirty skin. Change your underclothes for clean ones at least once a week. If you perspire a great deal, or do dirty work, change them as often as they become soiled.

Many persons think that the only use of underclothes is to keep the body warm, and that there is no need to wear them in summer. An important use of underclothing is to keep perspiration and

other waste substances from soiling the outside clothes. Wear underclothes all through the year, in summer as well as in winter.

Washing Clothes. — Sheets, pillow cases, table-cloths, napkins, towels, and handkerchiefs, all become soiled from touching the body. They will nearly always contain disease germs after they have been used by any one who has an infectious disease. But when they are clean and white, they are not likely to have any germs of disease on them. The reasons for washing underclothes and household linen are to make them clean and white, and also to remove or kill the disease germs which may be on them.

Use of Soap. — A great deal of the dirt on clothes consists of oily substances which water alone will not dissolve. Soap in the wash water will help to dissolve the oil, and then the dirt may easily be rubbed or rinsed from the clothes (p. 30). In the place of soap some persons use soda, but soda may soften the fibers of the cloth and weaken the clothes. Use soap rather than soda.

Boiling Clothes. — Boiling clothes is a great help in cleansing them from dirt. The steam bubbling through the threads loosens the dirt, and the hot water dissolves the stains from the clothes and helps to make them white. The boiling also drives off the smell which is in dirty clothes. But one of the greatest reasons for boiling clothes is that

the heat kills the disease germs which may be in them.

Ironing. — Ironing clothes after they have been washed helps to keep them clean. The ironing makes them so smooth that they have no folds or creases to catch dust and dirt. It makes the surface of starched cloth so hard and polished that dirt will fall from the cloth instead of sticking to it. The heat of the ironing also kills the disease germs which may be on the cloth.

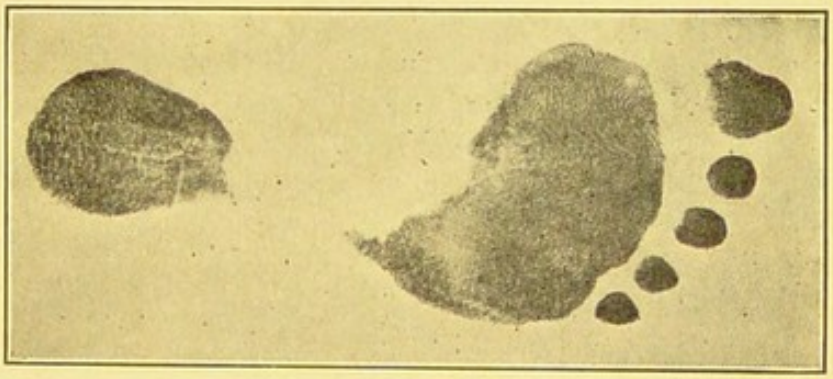
QUESTIONS

How do clothes keep the body warm?
How can you know how much clothing to wear?
Why is woolen clothing usually warmer than cotton clothing?
Why are loose clothes warmer than those which fit tightly?
How may damp clothes be harmful to health?
Give some reasons why clothes should be kept clean.
Why should clothes not be brushed in a room?
Give some uses of underclothing.
Give some reasons why soiled underclothes should be washed.
Of what use is soap in washing clothes?
Why should clothes be boiled when they are washed?
How does ironing clothes increase their healthfulness?

CHAPTER VI

THE FEET

The Feet and Health. — The feet are put to harder work than any other part of the body, for they bear the whole weight of the body for hours at a time. They are more likely to be injured than other parts of the body, for they are often in places which are cold, or wet, or dangerous. If anything is the matter with them, all the rest of the body will suffer also. Many persons suffer tortures whenever they stand or walk, because they did not learn to care for their feet while they were young. The care of the feet is of great importance in preserving the health of the rest of the body.



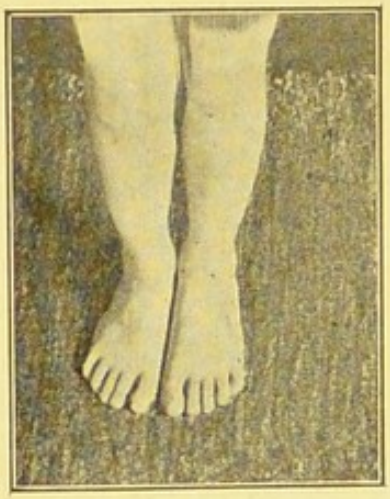
Print of a Foot.

Shape of the Foot. — If you wet the bare sole of your foot and step with it upon a piece of dark colored blotting paper, a print will be left in the exact shape of the parts of the sole which touch the paper. The print will show that the foot

rests upon the heel, and the ball behind the toes, but that the middle of the sole under the ankles hardly touches the paper. Thus a foot is in the shape of a bow or arch which bears the weight of the body like the springs of a wagon. The arch lessens the jolts and jars caused by running or jumping.

While a person is standing, his foot is longer and wider than while he is sitting, for the weight of the body flattens its arch. A shoe is not large enough unless it is as broad and long as the foot is while it is bearing the weight of the body.

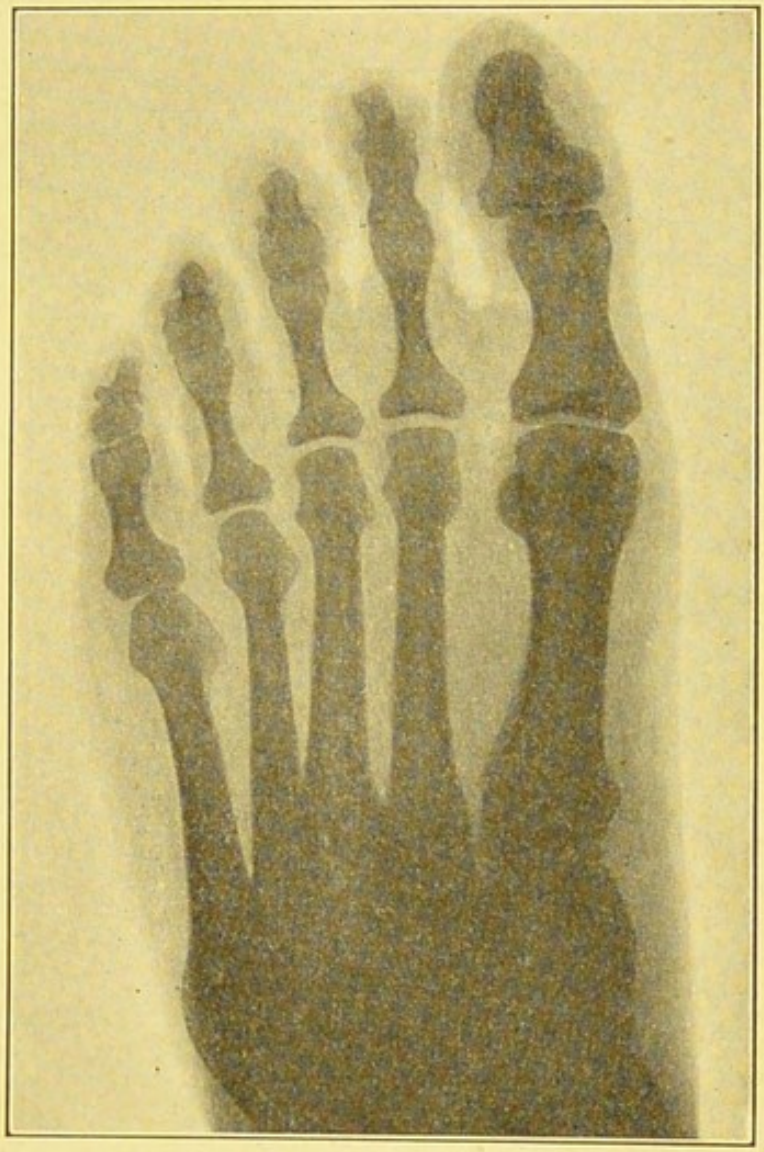
Straight Inner Edge of a Shoe. — If the feet are placed side by side, they will touch each other from their toes to their heels, for their inner edges are almost straight. If a shoe is shaped to fit a foot properly, its inner edge must be almost straight. Shoes with straight inner edges can now be bought at most shoe stores.



THE INNER EDGES OF THE FEET ARE ALMOST STRAIGHT.

A poorly fitting shoe often seems to press against the little toe when the real trouble is that the great toe has not room enough. If the great toe is pushed sidewise, the whole foot will be crowded sidewise with it, and in this way the little toe will be pressed against the outer side of the shoe. The skin on the little toe is more tender and

thin than the skin on the great toe, and so the pressure will be felt most on the little toe. If the inner edge of the sole is straight, the great toe will not be pressed against the outer side of the shoe, unless the shoe is too narrow.

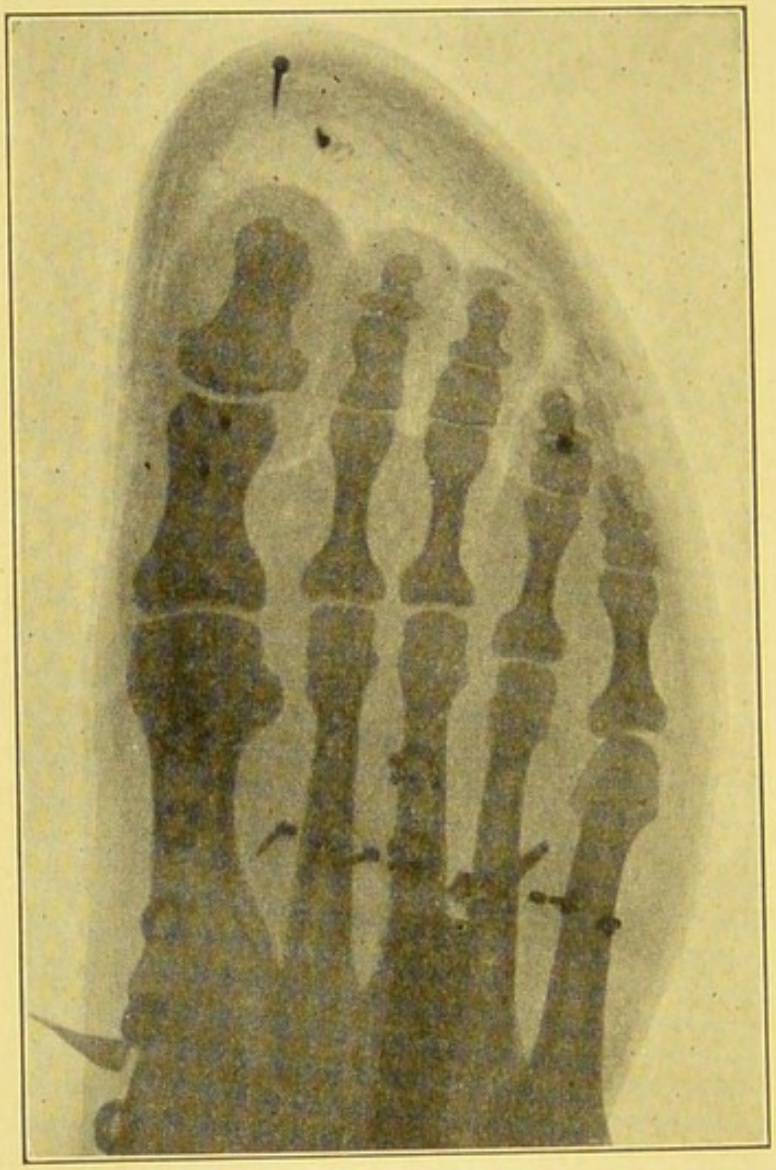


X-Ray Print of a Bare Foot.

Pointed Shoes. — The longest part of a foot is its inner edge from the heel to the tip of the great toe. If a shoe fits the foot perfectly, its tip will not be opposite the middle of the foot, but opposite the great toe. A shoe may be made pointed if its inner edge is straight, and its tip is placed at the end of the inner edge. This is because the outer edge of a foot is much shorter than its inner edge. A shoe which fits the right foot will not fit the left foot.

Ingrowing Toenails. — If the point of a shoe is

not opposite the great toe, the curved inner edge of the shoe may press the great toe sidewise and make its edge lie upon the second toe. The pressure will then push the flesh up against the sharp edge of the nail of the great toe, and will produce a painful sore called an *ingrowing toenail.*



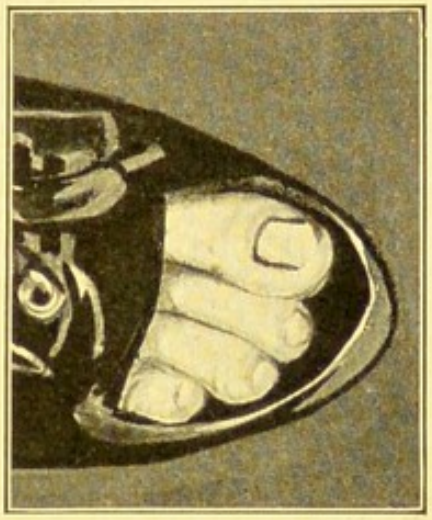
X-Ray Print of a Foot in a Shoe.

You may prevent or cure an ingrowing toenail by wearing a wide shoe which has a straight inner edge. This shoe will allow the great toe room to lie apart from the second toe, and there will be no pressure to push the flesh against the nail.

Trimming the Toenails. — If the edges or corners of a toenail are trimmed, the nail may not be wide enough to cover the end of the toe. The flesh may then become pressed against the edge of the nail. Cut the edge of the nail squarely across, even with

the tip of the toe. Do not cut off the corners or edges of the nail, but let them grow beyond the toe so that they will cover and protect the flesh.

Corns. — If badly fitting shoes are worn, the epidermis grows thick at the places which are pressed or rubbed. These spots of thickened skin are called *corns*. They are tender and painful, for the shoes press them into the flesh. If you always wear well-fitting shoes, you will not have corns.



An Ingrowing Toenail.

Weak Ankles. — If an ankle is weak, the foot may turn sidewise easily. This trouble is usually due to a weakness of the muscles and cords which pass down the leg on each side of the ankle. Wearing ankle supporters in the shoes may keep the ankles from bending over, but it is better to exercise the legs in order that the muscles may grow strong enough to hold the ankles in place.

Cold Feet. — The feet are kept warm by the warm blood which flows through them. Tight shoes hinder the flow of the blood and make the feet cold. Shoes and stockings which are thin and loose allow the warm blood to flow freely, and are warmer than those which are thick, but tight.

Perspiring Feet. — If the feet become wet with perspiration, they may feel as cold as though they were

wet with rain. A good way to keep the feet dry and warm is to wear thick inside soles in the shoes. The soles will soak up the perspiration as fast as it is formed. Take the soles out each night and dry them.

Rubber Overshoes. — Rubber overshoes are water-tight and will keep dampness from reaching your feet when you walk in wet places. But they also keep perspiration from passing off from the feet. If you wear them in a warm room, your feet will soon become wet with perspiration, and will feel cold when you go out of doors. Put on your overshoes when you go out of doors in the wet, but take them off as soon as you go into the house.

QUESTIONS

What parts of a foot usually touch the floor in walking or standing?

What is the shape of the inner edge of a shoe which fits well?

Opposite which toe should the point of a shoe be placed?

What is the cause of an ingrowing toenail?

How may ingrowing toenails be prevented?

In what shape should a toenail be trimmed?

What is a corn?

How may corns be prevented?

How may weak ankles be strengthened?

How may tight shoes cause cold feet?

How may perspiration cause cold feet?

How do inner soles worn in the shoes help to keep the feet warm?

Why is it harmful to wear rubber overshoes in a warm room?

CHAPTER VII

THE NOSE AND THE MOUTH

The Nose. — The nose has two hollow tubes through which air passes into the body. Thin curtains or folds of bone and flesh hang down in the tubes to warm and purify the air of the breath.

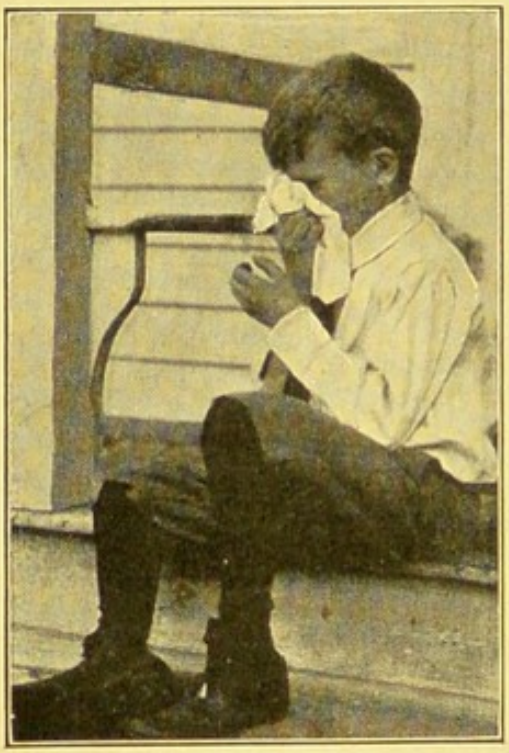
Mucus. — The inside of the nose and throat is moist with a slippery liquid which looks like the white of an egg, and is called *mucus*. This is the substance which comes from the nose when it is blown, and from the throat during a cough.

Mucus is somewhat sticky. It catches dust and disease germs which are breathed into the nose, and prevents them from going deep into the body. The natural way to cleanse the nose is to blow the mucus from it. This will also remove dirt and disease germs from the nose.

Use of a Handkerchief. — When you have a cold or sore throat, a great deal of mucus will be formed in your nose and throat. This mucus will contain germs of the sickness. When you blow your nose, always use a handkerchief in order to catch the disease germs and keep them from spreading to other persons.

Do not use a handkerchief after it has become dirty, for you might take germs from it back into your body and so cause a slight cold to become a bad one. Do not use a handkerchief which another person has used, for you might catch a cold from him, or give him a cold when you return it. When you wash the handkerchiefs, boil them in order to destroy the disease germs which may be on them.

A Stopped-up Nose. — When you cannot breathe through your nose, you feel dull and uncomfortable. You cannot do your best work when your nose is stopped up. If you have to breathe through your mouth, find out what is the matter with your nose, and have it cured.



THE NATURAL WAY TO CLEANSE THE NOSE.

There are three common causes of a stopped-up nose.

1. The nose may be full of mucus. This can be cleared out by blowing the nose.

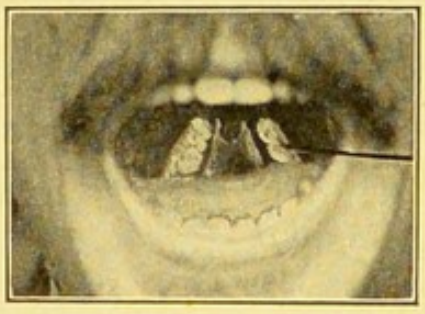
2. The nose may be stopped up because the folds of its lining are swollen and puffed up with blood. The swelling is what stops up your nose when you have a cold in your head. Blowing the nose hard will make the swelling worse, for it will force a great deal of blood

into the nose. If you cannot clear your nose by blowing it lightly, you will do harm by blowing it hard. You may make the swelling go down by blowing out the breath and then waiting as long as possible before you take in the next breath. This draws the blood away from the nose and makes its lining become smaller, like a balloon which has no air in it.

3. The nose may be stopped up with lumps of soft flesh called *adenoids* growing just behind it.

Adenoids. — Adenoids are folds and tufts of soft flesh growing in the upper part of the throat behind the nose. They partly close the openings of the nose, and are a great hindrance to breathing. Most children who breathe through the mouth do so because they have adenoids.

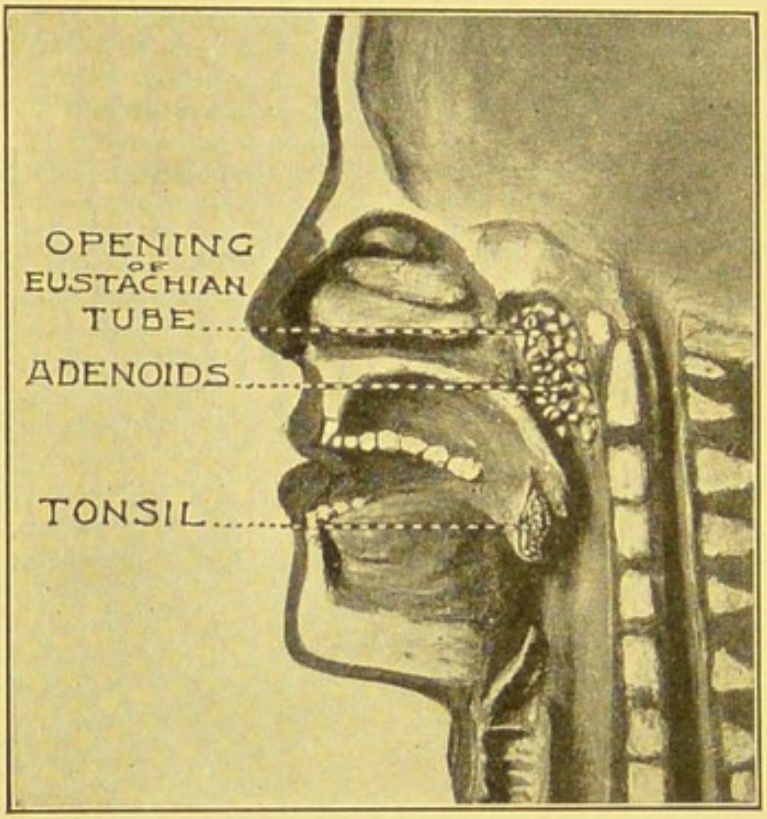
Enlarged Tonsils. — Breathing may also be hindered by lumps of flesh called *enlarged tonsils.* If the tonsils are enlarged, they will look like two red marbles, one on each side of the throat, half hidden in the flesh just above the back end of the tongue. A person who has enlarged tonsils usually has adenoids also.



TONSILS.

Adenoids and enlarged tonsils do not usually trouble grown folks, for the openings of their noses and throats are large; but in children they cause a great deal of poor health and sickness. Children

who have them usually snore and sleep poorly because the openings of their noses are small. They have to breathe with their mouths open, their noses and upper jaws become narrow and pointed, and their upper lips seem too short for their teeth. They are often uncomfortable with stopped-up noses, and they cannot put their minds upon their lessons. They are often weak and sickly without seeming to have a cause for their weakness.



Section of Nose, Mouth, and Throat.

If you have to breathe through your mouth for the greater part of the time, go to a doctor and find out if you have adenoids. If you have them, let the doctor take them out of your throat.

Spitting. — Grippe, tonsillitis, whooping cough, diphtheria, and consumption are some of the diseases which are caused by living germs. In all these forms of sickness the disease germs are given off with the mucus from the nose and throat. If the mucus is spit upon the floor or pavement, it may

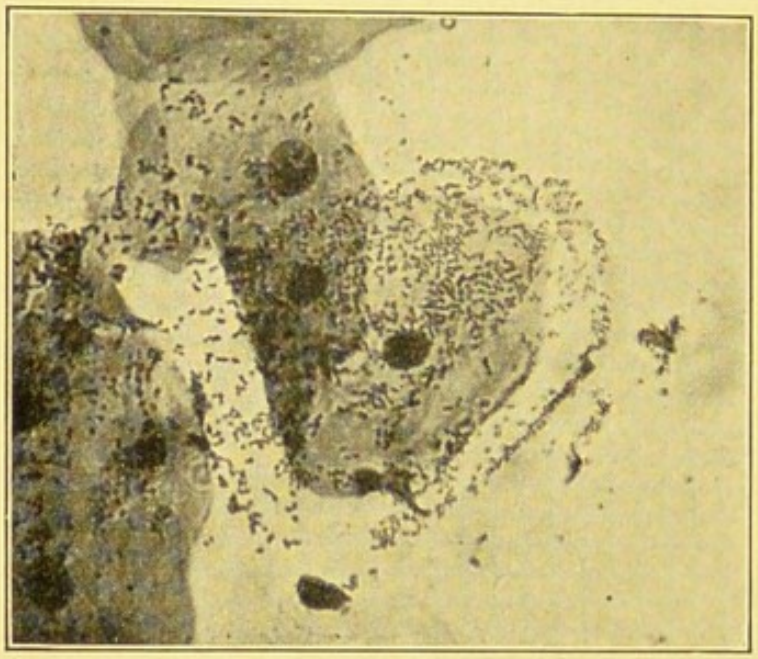
become dried and blown away as dust, and yet the disease germs may remain alive and cause the disease in any one who breathes the dust. The germs of consumption may nearly always be found in the dust which blows from a city street, for careless persons who have consumption go about spitting on pavements and streets.

Spitting on a floor or pavement is dangerous to health. In many cities there are signs which forbid spitting in public places. Spitting is largely a habit. It is seldom necessary for any one to spit in a public place.

A Coated Tongue. — The surface of the tongue is somewhat like the surface of velvet cloth. This furry covering catches and holds many of the things that are in the mouth. Among the substances which may usually be found on the tongue are dust which has been breathed, mucus like that in the nose, and dead scales from the skin which lines the mouth. These substances often form a thick white or yellow coating on the tongue when a person is in poor health, or is sick. A coated tongue is therefore a sign of poor health.

Bad Breath. — Many kinds of bacteria may always be found in the mouth. If the mouth is dirty, it swarms with bacteria that produce a kind of decay, and unpleasant odors in the breath. Cleansing the mouth two or three times a day will lessen the odors.

Disease Germs in the Mouth. — Disease germs may enter the mouth with impure air, or with impure food, or with dirty substances which are put into the mouth. They may grow and multiply in the mouth for some time without entering the flesh, but they may become so numerous that they spread through the body and cause sickness. The mouth may be kept free from disease germs by cleansing it often.



BACTERIA ON SCALES OF EPIDERMIS FROM THE MOUTH. (Magnified.)

How to cleanse the Mouth. — The way to cleanse the mouth is to wash it with water. Rinsing the mouth will not remove all the dirt, for the mucus is somewhat sticky and holds the dirt fast to the skin until it is rubbed off. When you wash your face, rub the tongue, the inside of the cheeks, and the top of the mouth with a finger, or a clean cloth, or, best of all, with a toothbrush. By doing this you will loosen the coating that is on the tongue, and remove the dirt and decaying substances from the whole inside of the mouth.

Care of the Mouth in Sickness. — In most forms of sickness there is an uncomfortable taste of dryness and stickiness which is caused by the coating on the tongue. Cleansing the mouth and teeth several times a day will remove the unpleasant taste. When you take care of a sick person, cleanse his mouth every time that you wash his face and hands.

Putting Things into the Mouth. — The germs of colds, sore throats, consumption, and most other infectious diseases are found in the mouths and noses of those who have these forms of sickness. The germs may stick to anything which is put into the sick person's mouth. If he wets his fingers with his tongue in order to turn a leaf, he may leave the germs on his book. If he touches the point of his pencil to his tongue when he writes, he may leave some germs on the pencil. In these and similar ways germs of disease are often scattered where they may reach other persons.

THERE MAY BE GERMS ON THE PENCIL.

If you touch your tongue with a pencil point every few seconds while you are writing, break yourself of the habit. If you use a pencil or pen which an unhealthy scholar has touched to his mouth, you may catch a disease from him. Have your own pencils and pens, and when you are not using them, keep them in your desk away from those of other children.

QUESTIONS

What becomes of dust which is breathed into the nose?

What is mucus? Of what use is it?

How may the nose be kept clean?

What are some of the causes of a stopped-up nose?

How can you clear the nose when it is stopped up?

What are adenoids?

What are enlarged tonsils?

What harm is done by adenoids and enlarged tonsils?

Give some reasons why you should always carry a handkerchief.

What harm may be done by using a dirty handkerchief?

What harm may come from spitting?

Name some diseases which may be spread by the habit of spitting.

What harm may come from a dirty mouth?

What is a common cause of bad breath?

Of what does the coating on the tongue of an unhealthy person consist?

How may the mouth be cleansed?

When a person is sick, what care should be taken of his mouth?

What harm may come from the habit of putting things into the mouth?

CHAPTER VIII

THE TEETH

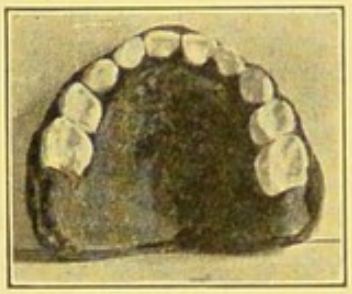
Teeth and Good Health. — The teeth have a great deal to do with the health of the body. Those who have poor teeth cannot chew their food well, and so they do not get the strength that they should from the food, and they often suffer from indigestion and headache. Germs of disease may lie in a decayed tooth, or in dirt between the teeth, and from there may spread to the rest of the body. Decayed and dirty teeth are the direct cause of a great deal of sickness.

Shapes of the Teeth. — In each half of a jaw the two front teeth are thin and sharp like chisels, and are used for cutting bites from food. The next tooth is shaped like a blunt awl and is called the eyetooth. The rest of the teeth have large flat tops, and are used for grinding food. They are often called *double* teeth, or *molars.*

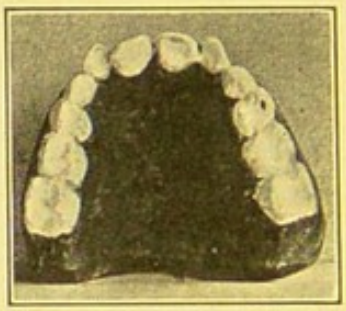
Sets of Teeth. — Two sets of teeth grow in the mouth during a lifetime. Those in the first set begin to appear when a child is about six months old, and when he is about two years old he will have a full set. Then there will be ten teeth in each

jaw, making twenty in all. Each jaw will contain four front teeth, two eyeteeth, and four double teeth.

At about the age of six years some of the first teeth become loose and drop out, but a new tooth soon grows in the place of each one that is lost. One by one the first teeth drop out until, at about the age of fourteen, all of the first set are gone, and in their places are twenty teeth of the second set. Twelve more double teeth also grow in the back of the mouth, making in all thirty-two teeth in the second set.

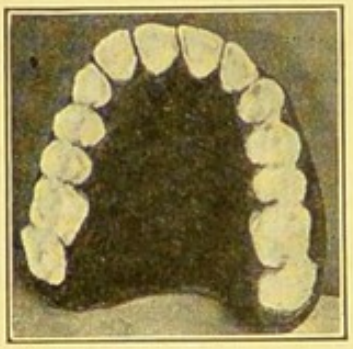


Upper Teeth of a Five-year-old Child.

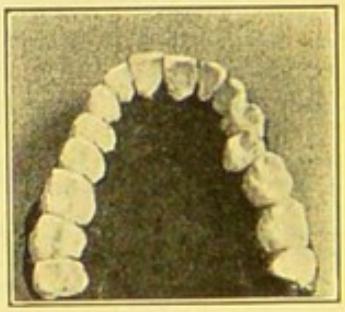


Upper Teeth of a Ten-year-old Child.

Preserving the Teeth. — If a tooth of the first set is lost, another tooth will grow in its place; but if a tooth of the second set is lost, the jaw will not form another tooth in its place. Few persons have full sets of teeth, for most persons allow them to become injured or decayed. Yet all the teeth of the second set may be preserved through a lifetime if proper care is given to them.



Upper Teeth of a Fifteen-year-old Boy.



Upper Teeth of a Man.

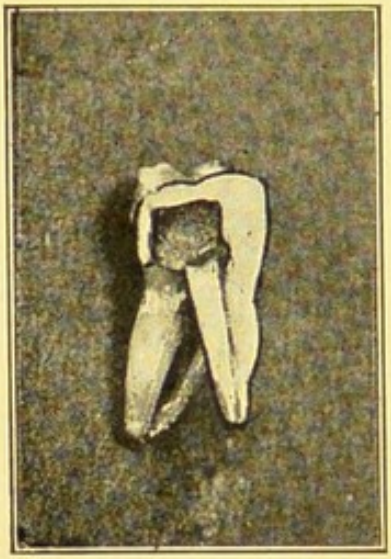
Sixth-year Molars. — The first set of teeth contain only two double teeth on each side of a jaw. If there are three double teeth on either side of a jaw, the tooth that is the farthest back is the first tooth of the second set. It appears when the child is about six years old, and is called the *sixth-year molar.* If it is lost, another tooth will not grow in its place.

Many persons suppose that the sixth-year molars belong to the first set of teeth, because they appear while a child is young. Many are also careless about preserving those teeth, because they suppose that other teeth will grow in their places if they are lost. These are among the largest and the most useful of all the teeth, and yet they are often lost while a child is only eight or ten years old. The time to begin to care for them and for all the rest of the teeth is before any of them show signs of decay.

Structure of a Tooth. — A tooth is composed principally of a kind of hard bone called *dentine.* The dentine is covered with a thin sheet of hard substance called *enamel.* The inner part of the dentine contains blood tubes and feels painful when it is touched.

Decayed Teeth. — If a tooth is injured, bacteria may grow in it and cause the dentine to decay. Enamel which is sound and whole will protect a tooth from bacteria; but it may become cracked

by biting upon fruit pits or other hard substances, or it may become softened by substances which are formed in the dirt of the mouth. Then bacteria may reach the dentine and cause it to decay.



A Decayed Tooth.

Toothache. — Decayed dentine is soft and black. It crumbles and leaves a hole in the tooth. If the hole is deep, the tooth will be tender and painful. The most common cause of toothache is a decayed tooth.

Use of a Toothbrush. — If teeth are kept clean, they are likely to remain sound and firm through a whole lifetime, because cleanliness will protect them from bacteria of decay. In order to clean the teeth, you will need a toothbrush and a little warm water. Brush the teeth on their inner sides as well as on their outer sides. Brush the back ones as well as the front ones. Rub the brush up and down as well as sidewise, so that the bristles will reach between the teeth and remove the dirt which is wedged there. After you have gone over the teeth, rub the tooth-brush over the tongue and roof of the mouth in order to cleanse them as well as the teeth (p. 56).

Brush your teeth every morning when you get up, for much dirt collects on them during the hours of sleep. It is also a good plan to brush them after

each meal, so as to remove the bits of food that may be left on them.

A dirty toothbrush may contain disease germs and be dangerous to health. After brushing the teeth, rinse the toothbrush well in clean water so as to remove all dirt from it. Then put the brush in a clean, dry place, where it will not become dusty or soiled.

Use of a Tooth Powder. — A hard, brownish substance often collects upon the teeth and prevents small cracks and holes from being seen when they first begin to form. Using a tooth powder on the brush is a great help in rubbing away this substance and in keeping the teeth clean and white.

Some of the sugar in food may remain between the teeth, and there may turn to sour substances which are likely to soften the teeth and so cause them to decay. Eating a great deal of candy may cause bad teeth. A tooth powder made of chalk will destroy these sour substances, and so will help to preserve the teeth.

Use of a Toothpick. — Bits of food may become wedged between the teeth so tightly that they cannot be removed with a toothbrush. There they may decay and cause the teeth to decay also. Remove them with a soft toothpick, or with a waxed thread or dental floss passed between the teeth. Do not use a pin or other hard pick, for fear of breaking the enamel and so starting a spot of decay.

Filling Teeth. — A broken or decayed tooth does

not heal like a sore spot on the skin, but sometimes a dentist can repair it. If one of your teeth begins to decay, go to a dentist and have the hollow part cleaned out and filled. Filling the tooth does not hurt if it is done while the hole is small. If a tooth is filled while it is still strong, it may be made to last a lifetime. Go to a dentist once or twice a year to find out if there are any holes in your teeth. Have each tooth filled as soon as the tiniest hole is seen in it. If you do this, you are not likely to have toothache, or to lose a tooth. The expense and trouble are small if you attend to the holes as soon as they appear.

Filling Children's Teeth. — The back teeth of the first set do not drop out until a child is about twelve or fourteen years old. They may begin to decay while a child is only two or three years old, and then they may give trouble for years with soreness or aching. Have the teeth of the first set cleaned and filled as carefully as those of the second set.

Disease Germs in Decayed Teeth. — It is almost impossible to keep the holes in decayed teeth clean. If disease germs should enter the mouth, they may lie in the holes in decayed teeth, and may multiply to great numbers. From there they may spread through the body. Two kinds of disease germs which may often be found in decayed teeth are those which cause consumption and tonsillitis. One of the principal reasons for having decayed

teeth filled is to prevent disease germs from growing in them. In many schools doctors and dentists are appointed to examine the teeth of the pupils and to tell each child what he needs to have done to his teeth.

Pulling Teeth. — It may be impossible to fill a tooth that is greatly decayed. Such a tooth is dangerous to health, for it may be the hiding place of disease germs. It is best to have it pulled out. But remember that nearly every tooth may be saved if it is filled as soon as it begins to decay.

Uneven Teeth. — If a few of the teeth are out of line with the others, the opposite teeth will not meet, and it will be impossible to chew well. For this reason crooked and irregular teeth may be the cause of weakness and poor health. If your teeth are not in an even row, go to a dentist and have the row straightened.

The Teeth and Adenoids. — The teeth in each jaw are arranged in a half circle. If a child has adenoids, the half circle of the upper jaw will become flattened sidewise, and its front part will be pointed. Then the upper teeth will not meet the lower ones perfectly, and the front upper teeth will extend beyond the lips. If the upper lip is too short to cover the teeth, the cause is nearly always adenoids (p. 53).

If the jaw is deformed by adenoids, it may be shaped properly by a dentist if the adenoids are first removed.

QUESTIONS

How may the teeth affect the health of the body?

How many sets of teeth grow in the mouth during a lifetime?

How many teeth are in the first set? How many teeth are in the second set?

At about what age does a child get the first tooth of the second set?

What is the sixth-year molar?

What is the structure of a tooth?

What are some causes of decay in teeth?

What is the most common cause of toothache?

How may the use of a toothbrush help to keep the teeth from decaying?

Of what use is tooth powder?

Of what use is a toothpick?

When should the teeth be brushed?

Name two kinds of disease germs which are often found in decayed teeth.

How may a decayed tooth be repaired?

When should a decayed tooth be filled?

Why is it important to have a decayed sixth-year molar filled?

How may the health of the body be harmed by teeth which are set irregularly in the jaws?

What effect do adenoids have on the shape of the upper jaw?

CHAPTER IX

FOOD

Uses of Food. — The life of the body is supported by such things as bread, butter, meat, and water. These substances enter the body and become blood and flesh. Anything which may become a part of a living body is called a *food.*

One use of food is to become new flesh in the body. Each day a grown man wears out about a pound of living flesh, and in its place he forms about a pound of food into new flesh.

A second use of food is to give the body warmth. The warmth comes from a change that takes place in some of the food within the body. This change is like a slow burning.

A third use of food is to supply the body with strength. In doing its work the body uses up or burns some of its food in much the same way that an automobile uses up gasoline in running.

Of what the Body is Composed. — The body consists mainly of a mixture of five different kinds of substances. The names of these substances are water, minerals, protein (pro′te in), fat, and sugar.

The greater part of the body is water. Flesh is

about three fourths water, and bone is one fourth water.

A small part of the body is mineral matter. This is the part which is left as ashes when flesh or bone is burned.

The most important part of the flesh is somewhat like the white of an egg. This substance is called protein. Everything that is alive contains protein, and life could not go on without it.

There is always some fat in the body. Owing to the heat of the body it is in a liquid form, like olive oil. Fat meat consists of little pockets of flesh filled with fat.

The body also contains a small quantity of sugar.

Of what Foods are Composed. — The body is constantly using up its water, minerals, protein, fat, and sugar, and therefore it must often take in new supplies of these substances. Mixtures of some or all of these substances compose the foods which we eat.

Water and minerals are found in nearly every kind of food.

Protein is found in most kinds of foods. Meat, eggs, milk, grain, vegetables, and fruit all contain it.

A great deal of fat is found in nearly every kind of food produced by animals; but only a little fat is found in food produced by most plants. Meat, eggs, and milk contain much fat. Grain, potatoes, vegetables, and fruit contain only a little fat.

Sugar and Starch. — Starch is a food substance

which is almost like sugar, for it becomes changed to sugar after it has been eaten. The greater part of the sugar that is in the body is formed from starch, for most persons eat more starch than sugar.

There is very little sugar or starch in most foods that come from animals, but most foods that come from plants contain much sugar or starch. Almost no sugar or starch is found in meat, fish, and eggs; but a great deal of either sugar or starch is found in grain, vegetables, and fruit.

What becomes of Food.— Water and minerals may become a part of living flesh, but they cannot supply the body with warmth and strength.

Some of the protein which is eaten is formed into living flesh, and some is used to supply the body with heat and strength.

The fat, the sugar, and the starch of food are not formed into flesh or bone, but are used up in giving the body strength and warmth.

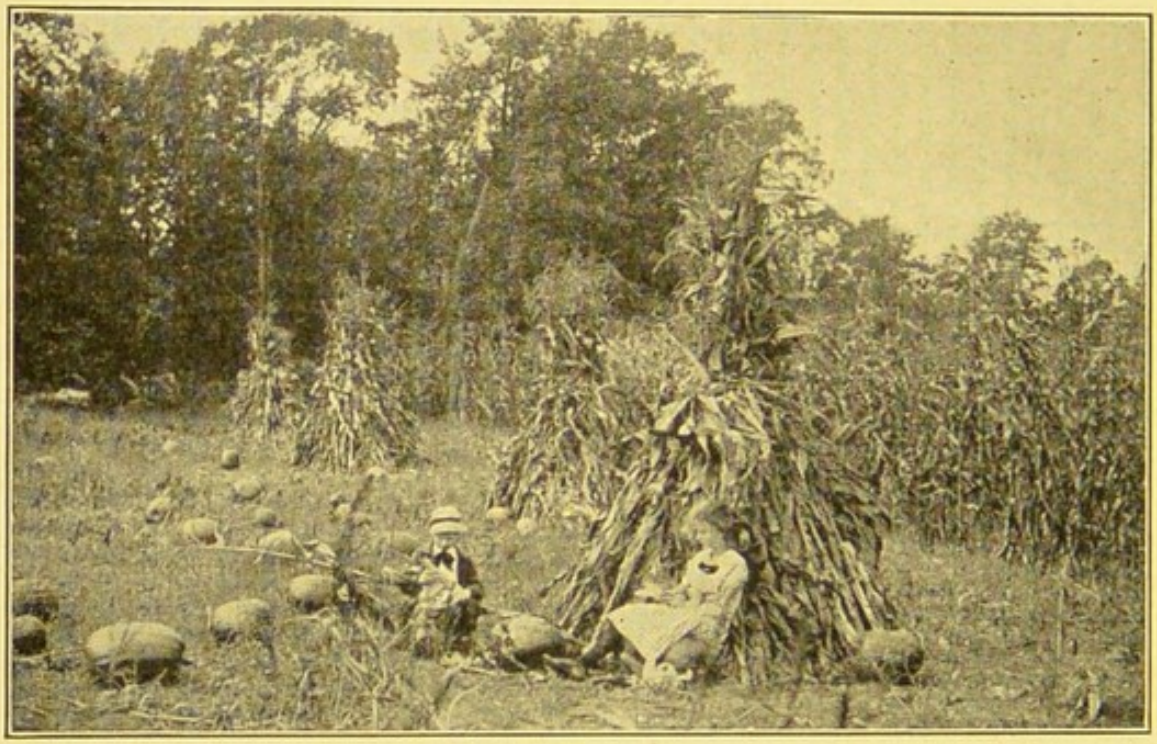
If a food is rich in protein it is called a *flesh-forming* food. For example, lean meat is a flesh-forming food, for it contains a great deal of protein, only a little fat, and no starch or sugar.

If a food contains a great deal of either starch, sugar, or fat, it is called a *heat-producing* food. Potatoes are an example of a heat-producing food, for they contain a great deal of starch, and only a little protein.

Nearly all kinds of foods contain some substances

that form flesh and some that produce heat. Each person needs some of each kind of food every day.

Grain. — The principal kinds of grain that are used as food are wheat, corn, and rice. Examples of food made from them are bread, crackers, pancakes, and



A Field of Ripe Corn.

cereal breakfast foods. Grain foods are both flesh forming and heat producing, for they contain protein and sugar or starch. They are the principal foods of mankind.

Vegetables. — Potatoes and sweet potatoes both contain a great deal of starch and some protein, but very little fat. A person could not live on them alone and be strong, because they do not contain enough flesh-forming substances.

Examples of garden vegetables are turnips, cabbages, carrots, tomatoes, and lettuce. Most of these vegetables contain only a small amount of food substances, but beans and peas are very rich in protein and starch.

Fruit. — Bananas, grapes, and dates all contain a considerable amount of protein and sugar.

The juicy fruits, such as oranges, apples, and strawberries, contain a very small quantity of food substances. But these and garden vegetables contain iron and other substances which are lacking in grain and meat. For this reason some fruit and vegetables are needed in order to keep the body healthy. Another use of fruits and vegetables is to give a pleasant taste to other food with which they are mixed.

Meat. — The flesh of animals consists mostly of protein. It also contains fat, but no sugar or starch. Lean meat is an excellent flesh-forming food, and fat meat is also an excellent heat-producing food. The meat of fish, oysters, clams, and crabs is similar to the flesh of cattle, but it does not contain so much food substance.

Milk. — Milk is one of the best of all foods, for it contains just enough of the right kinds of protein, fat, sugar, minerals, and water to supply the needs of the body. Babies live upon it, and a man can do hard work if he takes no food except three or four quarts of milk a day.

Cream, butter, and cheese are valuable foods which are made from milk.

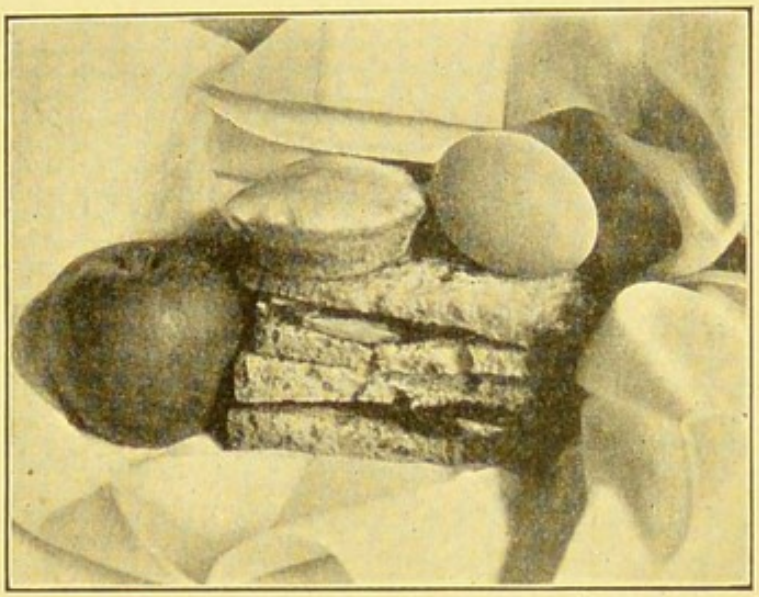
Food Mixtures. — The body needs a mixture of protein, fat, and sugar or starch at each meal. The best forms of protein and fat are found in animal foods. Sugar and starch are found in plant foods. Thus each kind of food has what the other lacks. A mixture of plant and animal foods is usually a more complete food than either alone would be. Examples of good mixtures of foods are bread and eggs; potatoes and meat; crackers and cheese; fish and rice; bread and butter; and pork and beans.

Healthful mixtures of food usually taste good. Most persons spread butter upon their bread to improve its taste; but buttered bread is a more healthful food than bread alone.

Food List. — If you had to get the meals for a family for a day what foods would you choose? Here is a list of wholesome foods which might be chosen:

Breakfast	Noon Meal	Supper
Bananas	Bean soup	Beef stew
Oatmeal	Broiled codfish	Bread
Boiled eggs	Mashed potatoes	Butter
Bread rolls	Butter	Sponge cake
Butter	Bread	Canned peaches
Milk	Custard	Milk
	Milk	

Lunches away from Home. — When you expect to be away from home at a mealtime, you may need to take a lunch with you. The body would find it hard to make use of a lunch made of cake, pickles, and candy. The best kind of a lunch is one of sandwiches made of such plain foods as crackers and cheese, or bread and butter with meat or jelly. To these you can add hard-boiled eggs, fruit, and plain cake.



A Good Lunch.

Food during Sickness. — When a person is sick, he does not need so much food as when he is well. It is usually a mistake to coax a sick person to eat. It is a still greater mistake to give him puddings, jellies, ice cream, and other sweet things. The best foods for the sick are soups, milk, eggs, and bread. Such foods as these are also the best for those who are well.

Foods and Children. — Growing children need a great deal of protein food in order to form new flesh. Because they like the taste of sweet things, many children eat too much sugar and too little meat, bread, and other flesh-forming foods. Then

they become thin and weak, and do not grow as fast as they should, for they lack protein to build up their flesh. They need milk, or eggs, or meat, or fish every day in order to supply their bodies with flesh-forming food.

Keeping Food Fresh. — Most kinds of food are likely to become moldy, or sour, or decayed unless they receive proper care. The most of the spoiling is caused by molds and bacteria. Food which is protected from molds and bacteria will stay fresh for a long time.

Living germs do not grow readily when they are cold. Keeping food in an ice box or in a cellar or other cool part of the house, will help to preserve it.

Few germs are found in clean places. Keep your pantry, kitchen, and dishes clean, and have your hands clean when you touch the food.

Flies carry a great deal of dirt on their bodies. Keep them out of the kitchen, pantry, and dining room. If you cannot keep them out of the rooms, cover the food so that they cannot light upon it.

Clean Milk. — Milk is more likely to spoil than almost any other kind of food. It will turn sour in warm weather within a few hours unless great care is taken to preserve it. The souring is caused by living bacteria which enter the milk with dirt (p. 19). If fresh milk contains dirt and bacteria, it may become sour in the stomach and may produce

sickness, just as it would if it had been sour when it was swallowed. Most of the sickness among babies in the summer is caused by milk that contains dirt. If dirt can be seen in the bottom of a pitcher or pail of milk, that milk is unfit for a young child or baby.

Buy your milk from some one who sells clean milk, and handles it in a clean way. Put it in a pail or pitcher that is clean, and keep it in a clean room or closet.

A great deal of dust and dirt from the street falls into open cans of milk. It is best to buy bottled milk, and to keep it in the bottles until it is used.

Most of the dirt in milk comes from the fur of the cows and from their stables. If these are kept clean the milk will also be clean. If this milk is handled in a clean way, it may be easily kept from souring.

Cooling Milk. — If milk is cooled as soon as it is taken from the cow, and is kept cool until it is used, the bacteria in it will grow very slowly, and the milk will keep sweet for many hours. When you buy milk, choose that which has been cooled, and keep it in a cool cellar, or well, or ice box.

If milk is heated nearly boiling hot, most of the bacteria in it will be killed. Preparing milk in this way is called *Pasteurizing* or *sterilizing* it. If the milk is then cooled quickly and is kept cool, it will keep sweet for days. If you are not sure of the cleanness of milk, do not feed it to babies unless it has been Pasteurized.

QUESTIONS

Name three uses of food.
Name the five principal substances which compose the body.
Name the five principal substances of which food is composed.
What is protein? Of what use is it to the body?
What becomes of the fat, sugar, and starch which is eaten?
Of what substance does a flesh-forming food largely consist?
Of what substances do heat-producing foods consist?
Name some foods which are good flesh formers.
Name some foods which are good heat producers.
Give some examples of good mixtures of food.
Why are fresh vegetables and fruit needed as foods?
Why do children need meat or other flesh-forming food?
Name some ways by which food may be kept from spoiling.
Write out a good bill of fare for breakfast.
What dishes of food would you get for a noon meal?
Name the foods which you would choose for a supper.
What foods are good for a lunch at school?
What foods should you give to a sick person?
What is the cause of the souring of milk?
What harm is done by dirt in milk?
How may milk be kept fresh?
What is meant by pasteurizing milk?

CHAPTER X

DIGESTION

What Digestion Is. — After a meal has been eaten, it will be of no use to the body until it becomes a part of the blood. In order to reach the blood, the food must be dissolved in some of the fluids of the body. The changing of food to a form which can enter the blood is called *digestion.*

Mouth Digestion. — The digestion of food is begun by grinding it between the teeth. The grinding is a long step in the process of digestion, for small bits of food will dissolve much faster than large masses, just as powdered sugar will dissolve faster than lump sugar.

The mouth, while chewing food, pours a liquid over it. This liquid is mostly water, and is called *saliva.* There is always some saliva in the mouth, but the act of chewing causes it to flow so freely that it makes the food become like a thin paste.

Drinking while Eating. — When you eat dry food like crackers, you sometimes want to drink in order to wet the food faster than the saliva can moisten it. It is much better to chew a mouthful of food until it is wet with saliva than to wet it with a drink of

water. If you are thirsty at mealtimes, do not drink while you have food in your mouth, but drink between mouthfuls.

Digestion by Saliva. — When there is starch in a mouthful of food, the saliva will change some of it to sugar. For this reason chewing will make such food as bread taste sweet. But the change requires a moment's time. If food is eaten fast, there will be no time to change the starch to sugar, and the food will not be digested well.

Swallowing. — After a mouthful of food has been chewed, it is rolled into a lump by the tongue and cheeks, and is sent backwards into a fleshy tube called the *esophagus*. The esophagus carries the mass down through the middle of the body and into a bag called the *stomach*, where digestion is continued.

Sometimes you may wish to drink while eating, in order to help to swallow the food fast. If you cannot swallow a mouthful of food easily without drinking, chew it until you can swallow it readily.

Stomach Digestion. — The stomach is a fleshy bag that holds one or two quarts. It lies in the front part of the body, just above the line where the waistband of the clothes is usually worn. It digests food in much the same way that the mouth does. First, it stirs and mixes the food, but in a much slower and gentler way than the mouth. Second, it pours a watery liquid over the food. This liquid is called the *gastric juice*. It makes the food almost as thin as milk.

Third, the gastric juice changes some of the protein of the food to a form which can pass into the blood.

Intestinal Digestion. — Every few moments the stomach lets a little of the liquid food pass into a long tube called the *bowel* or *intestine.* In from two to four hours the stomach usually becomes empty.

The intestine is about four times the length of the body, and is about as large around as a thumb. Its coils fill the most of the lower part of the body below the line of the waistband. In it the greater part of digestion takes place.

The intestine does three things to the food, just as the mouth and stomach do. It stirs and mixes the food and forces it along the whole length of the tube; it pours out a liquid over the food, thus making the food still more watery; and it dissolves and changes the protein, the starch, and the fat of the food to a thin liquid which is ready to enter the blood.

The Pancreatic Juice. — Most of the digestion in the intestine is done by a fluid called the *pancreatic juice.* This fluid comes from a mass of flesh called the *pancreas* or *sweetbread,* which lies behind the stomach.

Control over Digestion. — You will have very little control over your food after you have swallowed it, for the stomach and intestine are not under the control of the mind as the mouth is. But what

your mouth does to food before you swallow it will have a great effect on what the stomach and intestine will do to it. If food is not well chewed, your stomach will have to do more than its share of work, and will have aches and pains while it tries hard to digest the food. If you eat food properly, you are not likely to have a single unpleasant feeling to show that your stomach and intestine are at work.

How Digested Food reaches the Blood. — The inside of the intestine is covered with short velvety threads of flesh called *villi*. Blood flows near the surface of the villi and is separated from the food in the intestine by only the thin walls of the fine tubes through which it flows. These walls prevent anything from passing from the blood stream into the intestine, but they allow digested food to pass from the intestine into the blood stream. In this way digested food enters the blood.

VILLI. (Magnified.)

By the time the food has passed the length of the intestine, the digested parts have been taken up by the villi, and only the waste parts are left. These waste substances are of no further use to the body, but are often poisonous. The last act of digestion is to get

rid of them. Empty the waste matter from the intestine at least once every day.

The Liver. — The blood which flows from the villi carries the digested food to the liver. The liver strains out those parts of the food which are harmful to the body, and allows the rest of the food to pass on with the blood through all parts of the body.

The substance that the liver strains out from the blood is a yellow liquid called *bile*. The liver sends the bile back to the intestine, where it helps to digest the next meal. When the liver does not do its work well, the bile passes on with the blood and stains the skin yellow. This is what gives the skin a yellow or muddy color when a person is bilious.

Cooking. — Many of our best foods cannot be easily digested if they are eaten raw, but the heat of cooking will soften and change most kinds of food to forms that may be easily digested. It would be difficult to live on raw grain, for the stomach and intestine could not digest it fast enough to supply the needs of the body. But after grain has been softened by cooking, it may be digested easily. Cooking is the beginning of the work of digestion.

Long Cooking. — Many foods cannot be easily digested if they are cooked for only a short time. Oatmeal becomes soft and tastes good after it has been cooked for only ten minutes, but it cannot be easily digested unless it has been cooked for an hour or two. A good way of cooking it for breakfast is

to put it over the fire in a double boiler and let it cook slowly on the back of the stove all night.

Most vegetables, and most foods made from grain, cannot be easily digested unless they are cooked for some time after they become soft and tender. Most animal foods can be easily digested if they are cooked only until they become tender, but they are not usually harmed by long cooking. Cooking food for a long time helps the stomach to digest it, if the cooking is done without burning or drying the food.

Taste and Digestion. — The sight or smell of food which is pleasing will cause the saliva to flow into the mouth, even before the food is tasted. The taste of good food will cause the gastric juice to flow into the stomach before the food is swallowed. A pleasant taste has an important use in telling the stomach to get ready to digest food. For this reason food which looks and tastes good will be digested more easily than food whose appearance and taste are unpleasant. The use of a pleasing taste in food is not merely to give pleasure, but also to help in digesting food.

Exercise and Digestion. — If you are in good health, your stomach and intestine will digest the amount of food that you need. When you work hard, your body will use up a great deal of food. When you sit still in the house or in a school-room day after day, you will use up only a little

food. Then you will have a small appetite, and will need only a small amount of food. You can increase a small appetite by taking a long walk or by doing some kind of active work about the house or in the yard.

If you exercise briskly just after you have eaten a hearty meal, you will use up the strength which your stomach needs for digesting the meal. After eating a full meal, rest for about half an hour, so that your stomach may not be disturbed while it begins the work of digestion.

QUESTIONS

What is digestion ?
In what three places in the body is food digested ?
How does the mouth digest food ?
What uses has the saliva ?
Why should you chew each mouthful of food for a long time ?
What may be the harm of drinking at mealtime ?
How is food swallowed ?
What three things does the stomach do to food ?
How is food digested in the intestine ?
What is the pancreatic juice ?
How can you help the stomach to digest food ?
What are villi ?
How does digested food get into the blood ?
What does the liver do to food ?
What becomes of bile ?
What becomes of food after it is made a part of the blood ?
How does cooking help the digestion of food ?
How does the good taste of food help digestion ?
Why should you not exercise hard soon after eating ?

CHAPTER XI

INTEMPERANCE IN EATING AND DRINKING

Indigestion. — If a person's food does not digest well, we say that he has *indigestion* or *dyspepsia*. Indigestion is one of the most common causes of ill health and sickness. If food should not become changed at all after it has been eaten, it might not be harmful to the body, even if it were not useful. But if it is not digested and taken up by the blood, it usually spoils and becomes sour in the stomach and intestine, just as it would if it were kept in a dish in a warm pantry. It is then as poisonous as food which has spoiled in a pantry. Most of the bad feelings which come from indigestion are due to the spoiling and souring of food in the stomach and intestine.

Indigestion is nearly always caused by wrong habits of eating. If you always eat properly, your food will be digested properly and you will hardly be aware that you have a stomach and intestine (p. 80).

Nervousness. — In most forms of indigestion some of the food becomes sour and poisonous. When the poisons pass into the blood, they may cause

uncomfortable feelings, even though they do not make the body sick. They make a person feel so cross and uneasy that he can neither work nor rest. Children who have indigestion cannot pay attention to their school studies, but keep moving in their seats, and looking around the room. What is called *nervousness* is often caused by indigestion, and usually passes off when the person eats properly.

Intemperance. — One of the principal causes of indigestion is taking food and drinks for the mere pleasure of eating and drinking. Many persons eat too fast, too often, and too much. Others injure their stomachs and intestines by taking harmful drinks, such as beer, wine, and whisky. These drinks are harmful. They hinder the digestion of good food, and produce bodily weakness and sickness.

Taking any kind of food or drink merely for pleasure is intemperance, and is harmful to both the body and the mind. When we say that a person is intemperate, we usually mean that he takes a great deal of beer, wine, or whisky. Children who form intemperate habits of eating will be in danger of forming intemperate habits of drinking when they grow up, for they do not learn to control their feelings.

Mealtimes. — The feeling of hunger tells you when your body is in need of food. If you eat as you should, you will be hungry in the morning, at

noon, and at night. Three meals a day are enough to satisfy the natural hunger of grown folks and older children, but small children may need one or two extra lunches.

If you are hungry and eat as you should, you will take pleasure in eating, and your body will make good use of food. If you are not hungry, wait until the next meal before eating..

Eating between Meals. — The stomach needs a rest like any other part of the body. It becomes empty three or four hours after a meal is eaten, and then it needs a rest of at least an hour or two. If you eat between meals, the stomach will get little rest, and will become too tired to do its work well. Then you will suffer from indigestion. Eating cake, or candy, or fruit, or ice cream between meals is as unhealthful as eating potatoes or meat between meals. The only proper time to eat is at meal-time.

Fast Eating. — One of the most common faults of eating is taking food too fast. If you eat too fast, there will not be time for the saliva to mix with the food and to begin its digestion. You will not chew the food well, but will swallow it in lumps which the stomach and intestine cannot easily break up or dissolve. You will also be likely to eat more than the stomach can digest.

Eat slowly, and take at least fifteen minutes for a meal. Take small bites of food, and chew each

mouthful to a paste. Swallow each mouthful before you put another into your mouth. If you eat in this way, you are not likely to have indigestion.

How Much to Eat. — Your feeling of hunger will tell you how much to eat, as well as when to eat. You may usually eat until you have satisfied your hunger. Then stop eating, and do not keep on eating merely for the sake of the taste of the food.

Eating Sweets. — A common fault in eating is taking too much sweet things. The body gets a great deal of starch and sugar from such food as bread and potatoes. If you eat a great deal of ice cream, or cake, or candy, or other sweets, you will get more sugar than your body can use. If you wish to eat sugar, or cake, or candy, use them as a part of a meal, but also eat meat, or eggs, or milk in order to get all the protein and fat that you need.

Taste. — Most foods that are wholesome have a pleasant taste. Most foods that are unfit to eat have an unpleasant taste that will keep you from eating them. The sense of taste is very necessary, for by it you choose your proper food and avoid those things which are harmful. The pleasant taste of food is also a great help in its digestion (p. 82).

Pleasure in Eating. — If eating were an unpleasant task, many persons would not eat enough to keep themselves strong. But the pleasure of eating leads many persons to eat a great deal more than they need.

When you are not hungry, and your body is not in need of food, you may wish to eat some kinds of food for the sake of their taste. You like pie, or cake, or pudding, or preserves, or candy, or other forms of fancy dishes, between meals, or after dinner.

A Pleasant Meal.

If you wish to eat these things, use them as foods, and eat them only when you are hungry. But if you are not hungry for bread and butter, do not eat desserts and sweets. If you are really hungry and are in need of food, you will prefer bread and butter to cake, or candy, or desserts.

If you eat all the potatoes and meat or other plain

food that you wish, and then leave the table, you will feel satisfied and comfortable. But after satisfying your real hunger with potatoes and meat, you may still wish to eat pie or other dessert in order to enjoy its taste. Then your desire for the dessert will be a false hunger.

You can usually tell a real hunger from a false one by eating a piece of bread and butter. If you really enjoy the bread, you are probably in real need of food, and may safely eat a dessert. If you do not enjoy the bread, your hunger is probably false, and you would be harmed by eating a dessert or any other kind of food.

False Appetites. — The feeling that the body is in need of something is called an *appetite*. The principal appetites are those of hunger and thirst.

You may have a false thirst. If your tongue and throat are dry and sore, your mouth has an unpleasant feeling which will not be helped by drinking. Cleansing the teeth and tongue with a toothbrush and water will help this feeling better than drinking.

Many persons have false appetites for such drinks as beer, wine, and whisky. These drinks have a stinging taste. They injure the mouth and make it feel dry and burning. They make a thirst greater, instead of satisfying it. A great danger from the use of these drinks is that the more a person takes the more he wants. It is not safe to begin their use at all.

Table Manners. — If you enjoy a food, it will do you a great deal more good than if you do not like it. If you are unhappy or cross, your food will not digest well. Good manners at table will help you to be happy, and so will help to digest your food and to make you well and strong.

The rules of good manners are not merely for style and show. They are also good rules for eating in a healthful way. If you eat as well-mannered persons do, you will come to the table with clean hands and faces and clean clothes. You will take time to eat properly, and will act in such a way that others can eat in comfort. You will eat slowly and chew each mouthful of food well. You will sip your drink instead of gulping it down in great swallows. Then the food will digest well, and will make you strong and healthy.

QUESTIONS

What is indigestion?
If food is not digested in the intestine, what happens to it?
How does indigestion cause nervousness?
What is intemperance?
Name some forms of intemperance.
How does fast eating cause indigestion?
How does eating between meals cause indigestion?
Of what use is the feeling of hunger?
How may you know how much to eat?
Of what use is the taste of food?
What harm comes from eating a great deal of sweets?

Name some foods which are eaten mainly for the sake of their taste.

If you wish to eat desserts and candy, when should you eat them?

How can you tell a real hunger from a false hunger?

What is an appetite?

Give a reason why a thirst for beer or wine or whisky is likely to grow upon a person who begins its use.

Of what use to health are good table manners?

CHAPTER XII

DRINKS

Water in the Body. — The body contains about three times as much water as solid substance. Water is always passing off from the body, and in a day a grown person loses about three quarts. He must therefore swallow about three quarts of water each day.

Drinks. — Water is the only substance which can replace the water which leaves the body. Tea, coffee, and milk may be used instead of pure water.

Large quantities of such drinks as beer, wine, and whisky are also used instead of pure water. They, too, are mostly water; but their use is harmful, for they contain substances which are poisonous to the body and to the mind.

How Water leaves the Body. — About half of the water which leaves the body passes off through the skin, and with the breath. The other half of the water is given off by the *kidneys*.

The kidneys are two red masses of flesh lying in the back part of the body behind the lowest ribs. They take about three pints of water from the body each day, and get rid of it through the bladder.

Waste Matter and Water. — Blood is mostly water. One of its uses is to wash away waste matter from the flesh, and to carry it to the kidneys and skin (p. 25). The perspiration, and the water which comes from the kidneys, are poisonous, because a great deal of waste matter is dissolved in them.

If you drink only a little water, the blood will not wash away all the waste substances from the flesh, and the skin and kidneys will not give all of them off from the body. But if you drink the proper quantity of water, the skin and kidneys will easily carry the waste matter from the body. Drinking the proper quantity of water will help to keep you well and strong.

When to Drink. — About half of the water which the body receives is swallowed with food, and the other half is taken in the form of liquid drinks. A grown person needs to drink about two large glasses of water three times a day. It is usually safe to drink pure, cool water whenever there is a feeling of thirst.

Water is a kind of food, for it forms a part of living flesh. It can be taken as safely with a meal as at any other time. But a person who is in a hurry sometimes swallows water so as to wash the food down the throat quickly. This use of water is wrong. If you eat slowly, you may safely drink enough water with a meal to satisfy your thirst (p. 77).

Tea, Coffee, and Cocoa. — Tea, coffee, and cocoa satisfy thirst because they are mostly water. They all contain substances that are likely to make a person restless and wakeful, but cocoa is usually the least harmful of the three. On account of these substances tea, coffee, and cocoa are not good for children.

Ice Water. — When water is pleasantly cool, it is more healthful than when it is either hot or very cold. Hot drinks and ice cold drinks are both unhealthful when they are taken in large quantities, for either the heat or the cold will hinder digestion. If a person is thirsty and drinks quickly, he is likely to swallow three or four glasses of ice water before he is satisfied, because he does not wait for the water to pass into the blood. If a single glass of pure, cold water is taken in sips, it is not likely to be harmful at any time.

It used to be thought that persons sick with a fever should not drink water. This was a great mistake. Cold water cools the sick person's body, and helps to carry away the poisons of the sickness. A sick person will seldom be harmed by drinking all the water that he wants, if he takes it slowly.

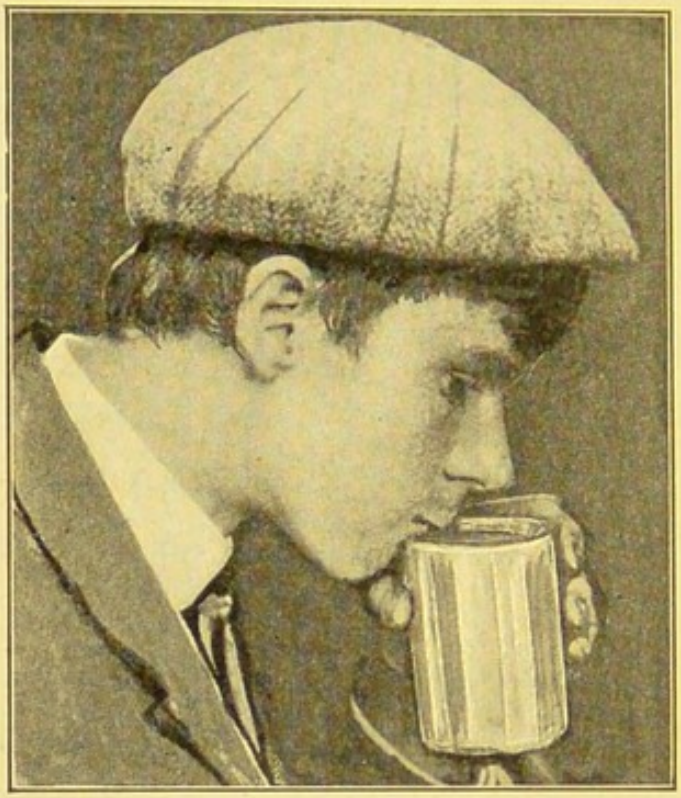
Mineral Water. — In some places the underground water dissolves a little sulphur, iron, lime, potash, or other minerals from the rocks. These kinds of water are called *mineral* waters, and are often used as medicines.

Soda Water. — Plain soda water which is sold from soda-water fountains is water that is bubbling full of a harmless gas. When the water is flavored with sirups, it becomes a food, like candy or other sweet things. Taking soda water between meals is as harmful as eating sweets between meals (p. 86).

Lemonade, ginger ale, and sarsaparilla may be harmful when they contain much sweetening or flavoring, for the sugar in them is as harmful as in the form of candy.

Alcoholic Drinks. — Such drinks as beer, wine, and whisky contain a harmful substance called *alcohol.* Many of them also contain flavorings which are harmful. These drinks are all harmful, even when they are manufactured out of pure materials and in the best manner. But many of them are made from poor materials, and in a careless and uncleanly way. These drinks contain substances which are more poisonous and dangerous than the substances which are in pure liquors.

Public Drinking Cups. — In schools and railroad cars, and at drinking fountains, where many people drink from the same cup, persons who have a cold, or consumption, or other infectious disease, often leave germs of their disease on the cup. Any one who drinks from a public cup is likely to take disease germs which an unhealthy person has left on the cup. It is no more safe to drink from a public cup than it is to eat from unwashed dishes which



Do not touch Your Lips to a Public Drinking Cup.

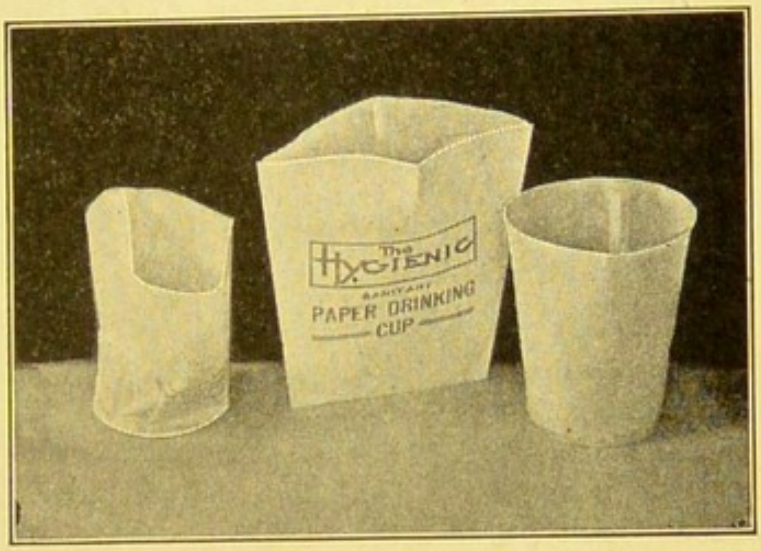
other persons have used. Some states have laws that drinking cups which are to be used more than once shall not be placed in schools, or railroad cars, or other public places.

Bring your own drinking cup to school and do not lend it to any one, or borrow a cup from any one else. When you travel, take your own drinking cup with you, so that you will not need to drink from a public cup. If you must drink from a public cup, do not take the rim of the cup between your lips, but drink by touching both lips to the water just inside of the rim.

In many public drinking fountains running water bub-

A Safe Drinking Fountain.

bles up in a little column, or jet, about half an inch high. A drink is taken by putting the lips to the top of the jet. This form of drinking fountain is safe, for the lips touch nothing but running water. If any germs should be dropped from the mouth while drinking, the water would carry them away at once.



PAPER DRINKING CUPS.

Paper drinking cups are now manufactured and sold cheaply to be used in place of metal drinking cups. Each cup is to be used once and then thrown away.

QUESTIONS

In what respect is water a food?

What substance in tea, coffee, and milk quenches thirst?

What are the three principal ways in which water is removed from the body?

What substances are dissolved in the water of the perspiration?

Of what use are the kidneys?

How much water does a person need to drink in a day?

What manner of drinking at mealtime is harmful?

Why should children not drink tea or coffee?

How should ice water be drunk?

Of what use is water to a feverish person?

What is mineral water?

What is soda water?

What is there in soda water that may be harmful?

What harmful substances do beer, wine, and whisky contain?

What danger may there be in drinking from a public drinking cup?

If you have to drink from a public cup, how should you place your lips to the cup?

Why are paper drinking cups more healthful than those made from metal?

CHAPTER XIII

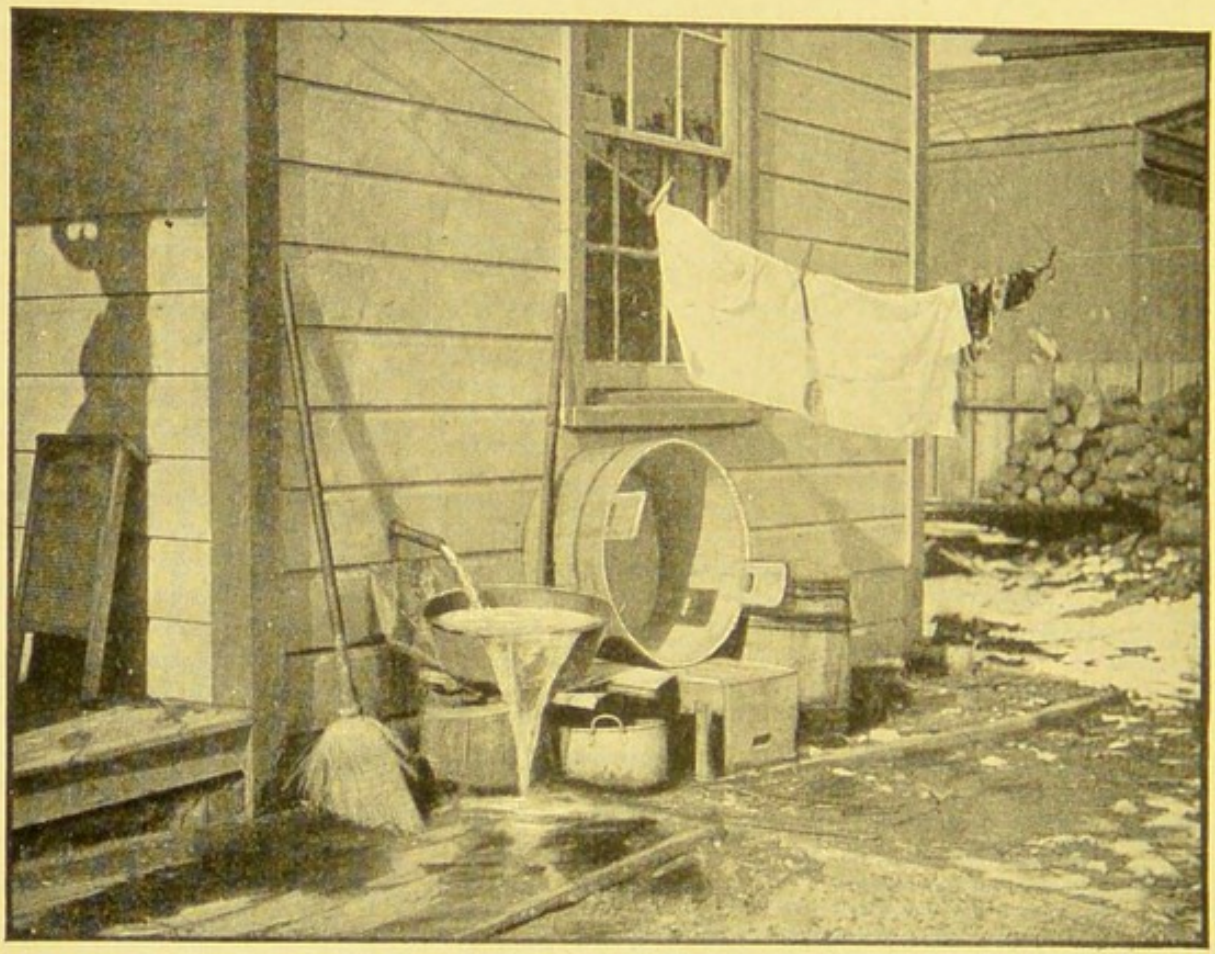
PURE WATER

Impurities in Water. — The most of the water which is used in houses comes either from underground, or from rivers and lakes. It often contains mud, and bits of sticks and leaves. The most of these substances are harmless to the body, but if the water contains enough of them to give it an unpleasant odor or taste, or to make it muddy or cloudy, it is generally not fit for use.

The most dangerous things that are in drinking water are not those which can be smelled, or tasted, or seen with the naked eye, but they are disease germs which are too small to be seen without a microscope. Dirty water is very likely to have disease germs in it, but water that is clear and sparkling and has a pleasant taste may also contain disease germs, for they may be left in the water after the harmful impurities which can be seen and tasted have been taken out.

Sewage.— The waste water from dwelling houses and the slops from bathrooms and kitchens are called *sewage.* Sewage often contains disease germs which have come from sick persons. Most disease

germs which reach drinking water come from slops and sewage, or from barnyards. The way to keep drinking water pure is to dispose of all slops and sewage and barnyard drainings in such a way that

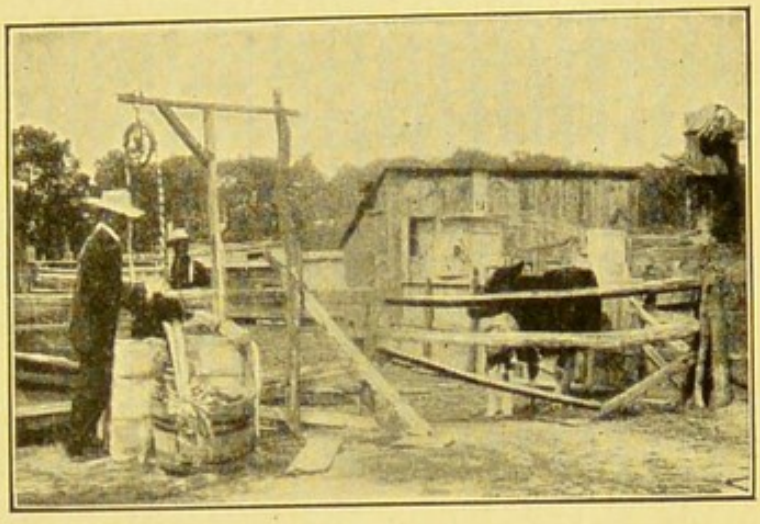


An Untidy Back Yard.

they cannot reach the wells, or springs, or streams from which drinking water is taken. Failure to do this has been the cause of a great deal of sickness. Typhoid fever has been spread to hundreds of persons in a city by the slops from a single farm-house on the banks of the stream which supplied the city with water.

Wells. — Old-fashioned wells were large open

holes lined with brick or stone. Dirty water from the house or barnyard often ran between the joints, and worms and toads dropped through the cracks into the water. These old wells have been the cause of a great deal of sickness. A well is now usually made by sinking a small iron pipe into the ground, and screwing a pump to its upper end. Nothing can fall into it, and no water can flow into it from the earth above the ground water. The water which is drawn from it will be pure, if the underground water is pure.



An Unsafe Well.

Public Water Supply.— Wells and driven pumps may safely be used on a farm and in a small village, but the people of a large village or a city must go to a distance to get pure water, for the soil in the crowded part of the town is usually full of sewage. The water is usually taken from a river or lake, and is brought to the houses by means of iron pipes laid underground in the streets. Most cities and large villages have public water supplies.

Streams and Rivers.— The water from a river is usually safe for drinking if no slops or other sew-

age reach it from towns along its course, or from persons living on its banks. But many cities and villages have to take their water from streams which contain sewage, and therefore it is often necessary to purify the water before it can be used safely.

Filter. — One way of purifying water is by passing it through a *filter*. A common form of filter is a box filled with sand and small bits of charcoal. The sand and charcoal strain out impurities, and allow the pure water to pass through.

A filter is of little value unless it is very large, and the water runs through it slowly. Small filters are made to screw on kitchen faucets, but they are of little use in taking disease germs from water.

Cities sometimes purify their water by passing it through huge filters of sand.

Boiling Drinking Water. — Most impure water may be made safe for drinking by boiling it. The boiling will not remove dirt or take away a bad taste, but the heat will kill the germs of disease that may be in the water. Long boiling spoils the taste of water by driving off the air that is dissolved in it. If the water is taken from the fire as soon as it begins to boil, the disease germs will be killed and yet the taste of the water will not be spoiled.

Where water is impure, persons are sometimes told to drink tea or coffee instead of water. The tea or coffee is safer than water only because it has been boiled.

If you are not sure of the purity of drinking water, drink only that which has been boiled.

Ice. — Ice is sometimes taken from water which is not fit to drink, and is used in cooling drinking water and food. If there were disease germs in the water of a river or lake before it was frozen, the germs will be found in its ice, for freezing will not kill them (p. 17). The ice may also contain disease germs which were left on it by workers or skaters, or by those who sell the ice or handle it. If you put ice in your water or food, be sure that it is as pure as pure drinking water.

Purifying Sewage. — The water of nearly every well, spring, river, and lake is naturally free from disease germs, and would always be free from them if sewage and slops were kept from it. Taking care of sewage and slops is usually much easier and safer than purifying water after it has been made impure.

If only a little dirty water is poured upon the land, it will sink into the soil and become pure by the time it reaches the underground water. This is because the soil acts as a filter, and strains out and destroys the impurities and disease germs.

It will not do to empty a great deal of dirty water upon a small spot of ground, for soil that is soaking wet cannot purify the water. It will not be safe to allow the water from a kitchen sink to form a dirty puddle upon the ground. Catch the waste water

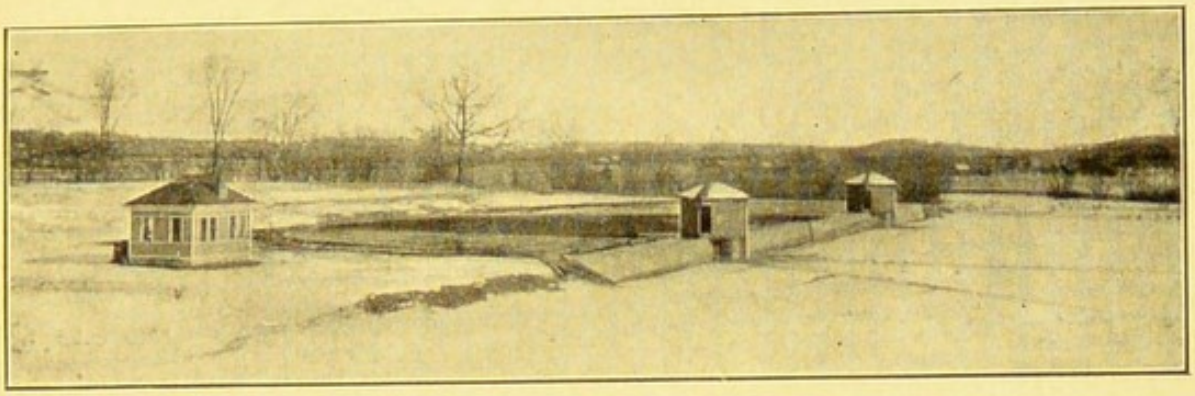
from the kitchen in a pail, and empty it on the back yard, first on one place and then on another. Put only a little at a time on each place. If the ground is frozen, empty the slops on some spot from which they will not run into a well or stream when the ground begins to thaw.

Cesspool. — Emptying slops and sewage on the ground may be safe on farms and in small country places, but this will not be a safe thing to do if the houses are near together. One way of getting rid of all kinds of slops and sewage in small towns is to empty the waste water from each house into a large covered hole in the ground called a *cesspool*. From it the water slowly sinks into the deeper parts of the soil. But it will not be safe to take drinking water from a well or pump that is near the cesspool.

If a layer of rock or clay is just beneath a cesspool or other dumping place for sewage or slops, impure water may flow along it and reach a well or pump. The place for a cesspool is where both the surface of the ground and also the underground rock or clay slope away from a well or other place from which drinking water is taken.

Sewage Disposal in Cities. — In cities the sewage is usually emptied into underground pipes called *sewers*. Many sewers empty into the nearest river, lake, or other body of water. But this makes the water impure and dangerous for drinking, washing, and bathing. The people of the city of Albany,

N. Y., have to spend large sums of money in purifying their water, because the river from which the city water is taken contains the sewage of the



A Small Sewage Disposal Plant.

city of Troy, which is about ten miles above Albany. A better way to get rid of sewage is to purify it in sewage disposal works at public expense.

QUESTIONS

What are some of the common impurities in drinking water ?

What are the most dangerous impurities in impure water ?

What is sewage ?

What harmful substances are found in sewage ?

How do disease germs usually reach drinking water ?

Why is water from a driven well usually more healthful than water from an old-fashioned open well?

What is a filter ?

How does a filter purify water ?

Why does boiling impure water make it safe to drink ?

How may ice which is used for cooling drinking water be the cause of disease ?

What purifies slops and other sewage when they are thrown upon the land ?

What is a good way to dispose of the dirty water that flows from a kitchen sink ?

What is a cesspool ?

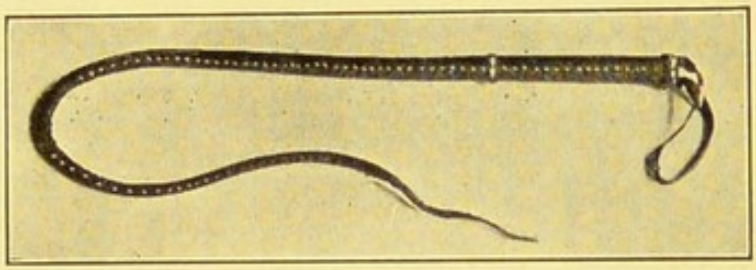
Why is it unhealthful for city sewers to empty into a river, lake, or other body of water ?

Give some reasons why the people of a city should purify their sewage.

CHAPTER XIV

ALCOHOL

What a Stimulant Is. — When we wish a horse to trot fast and far, we may feed him with plenty of oats and hay so that he will have strength to do the work; or we may beat him with a whip, and so compel him to use up all his strength in a single journey. An old Roman name for a whip was *stimulus*, and from this we give the name *stimulant* to anything that acts like a whip to the body.



One Kind of Stimulus.

Strong Drink. — Alcohol is a substance that men often use as a stimulant. They do not use it pure, for it has a peppery, burning taste, but they take it in such drinks as wine, beer, and whisky. These are often called *strong drinks*. All of them are stimulants and act like whips upon the body.

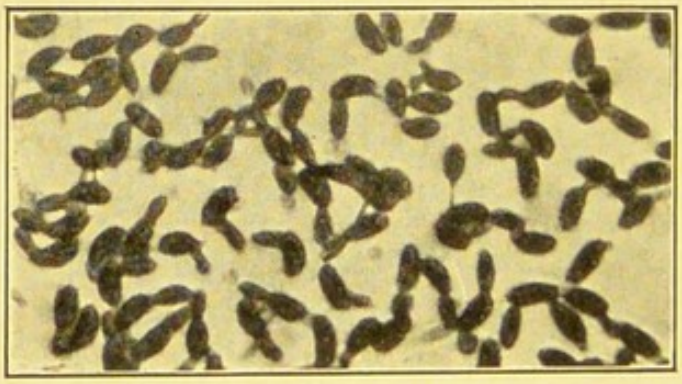
Wine. — The first kind of strong drink that men used was made by squeezing the juice from grapes. After the juice had stood for a few days, it foamed and bubbled as if it were slowly boiling. This

change was called *fermentation*, and by it some of the sugar of the grape juice was changed to alcohol. The fermented juice was called *wine*.

Fresh grape juice is a food. When it is first made, it is as wholesome and as harmless as the grapes themselves, but after it has stood for a short time, it ferments, and its sugar becomes alcohol. The juice is then no longer a safe food, but it is a stimulant.

Beer. — Another form of strong drink is beer. It is made by boiling grain that has sprouted, and then fermenting the liquid. It contains only a little alcohol, but many persons who use it drink it in great quantities and so take a great deal of alcohol. Those who use it are likely to get an appetite for stronger drink, and its use leads them to take the more harmful kinds of liquors.

Yeast. — The change of sugar to alcohol is made by microscopic plants called *yeast*. These plants may live after they are dried, and they are often found floating in the air as dust. Fruit juice or other mixture containing sugar can seldom stand for many hours without having yeast plants fall into it from the air. The yeast plants grow and change the sugar to al-



YEAST PLANTS. (Magnified.)

cohol and a gas. The gas bubbles up and makes the liquid seem as if it were boiling.

Yeast in Bread. — Yeast is used in making bread. A yeast cake consists of dried yeast plants mixed with flour and meal. Bread dough is a mixture of flour, water, and yeast. The yeast plants grow rapidly and form a gas which puffs up the dough until it is full of holes like a sponge. This makes the bread light. When the dough is baked, it becomes so firm that the gas holes keep their shape. A good loaf of bread is full of holes and sounds hollow when it is tapped.

The yeast plants in a lump of dough form alcohol, but the heat of the oven drives all of it away.

Most yeast cakes also contain many bacteria, but they usually grow more slowly than the yeast. If the yeast plants do not grow rapidly in bread dough, the bacteria may grow and produce sour substances. Then the bread will be sour and spoiled. Bread is likely to be sour when the dough is cold or the yeast is poor, for then bacteria grow faster than the yeast plants.

Vinegar. — Fruit juice often becomes sour after it has stood for some days. The souring is caused by bacteria which grow in the juice with yeast plants. The bacteria change the alcohol of the juice to a sour substance, and the liquid is then called *vinegar*. The word vinegar comes from two French words

meaning sour wine. A great deal of vinegar is made from weak wine and beer.

Vinegar is used as a flavoring for food, such as pickles and salad dressings.

Distillation. — Many years ago men learned how to collect the steam from boiling wine, and to cool it to a liquid again. This process was called *distillation.* The distilled fluid acted like wine, but much more powerfully. The new drink was brandy, and contained most of the alcohol of the wine and only a small part of its water. A few swallows of the brandy made a man feel as if he had taken a great deal of wine. A single drink might contain all the alcohol that was in a pint of wine.

Alcohol may be formed in any mixture of sugar and water by fermentation, and may then be separated from the greater part of the water by distillation. In this way whisky, brandy, rum, and many other drinks are made, and pure alcohol is manufactured.

Alcohol. — Alcohol is a liquid which looks like water. It will dissolve many things that water will not dissolve, and so it is largely used in manufacturing. It will burn with a hot flame without smoke or soot, and is often burned in lamps which are used for heating and cooking. It may be used in engines and automobiles in place of gasoline. It will keep decaying things from rotting, and is largely used to preserve substances. Alcohol has valuable uses,

but it is put to a wrong use when it is taken in strong drink.

Most of the alcohol which is made in the United States is used as strong drink. The number of places where strong drink is sold is greater than the number of grocery stores. More money is spent for strong drink than for bread, and yet more harm is done by strong drink than by almost any other thing.

Danger in Alcohol. — Alcohol is called a stimulant, because a little of it rouses the mind like a whip. But its use as a stimulant is not safe, for it acts on the mind and body in the same way that the lashes of a great whip act on a horse. Instead of rousing the animal to work, the blows of the whip confuse the animal. A little alcohol is as harmful as the blow of a whip. The effect of a single teaspoonful of alcohol upon the body can be measured. Men take as much alcohol as this in two or three glasses of beer, or in a single drink of wine or whisky. The wisest and best plan is not to take any strong drink at all.

Alcohol Dulls the Mind. — The sting and pain made by the blow of a whip may be felt at once, but often the harm done by alcohol does not seem painful or sickening until some time after the drink has been taken. If strong drink made a man feel bad as soon as he drank it, he would let it alone. But a man often keeps on drinking because the alcohol in a

drink or two of whisky dulls his mind and keeps him from feeling the harm that it is doing.

The Alcoholic Habit. — Because alcohol dulls the feelings, a drinker often thinks that he is strong and well even while he is being harmed. After the alcohol has left the body, the person feels the harm that has been done, and then he wants another drink to make himself feel well again. He takes a second drink to dull the bad feelings which were caused by the first drink. Strong drink does not satisfy a person. The more drink he takes, the more he wants. A drinker forms a habit of using alcohol, and cannot let it alone, even when he knows that it is harming him. It is not safe for a person to take even a little alcoholic drink, for the thirst may grow so much that it will compel him to drink.

Alcohol and the Warmth of the Body. — Some persons say that they drink in order to keep themselves warm. Strong drink may make a person *feel* warm, but it really cools the body. The feeling of warmth is only in the skin. If alcohol were of any use in keeping men warm, the explorers in Arctic lands would use it, but they have all found that it does more harm than good. Those who drink it are colder and suffer more from frost bites than those who let it alone.

Alcohol and Strength. — Many persons say that they drink in order to make themselves strong. If

strong drink really made men stronger, it would be given to men in armies so that they could march long distances and fight hard without becoming tired. Years ago it was given to most armies, but the men who drank it became tired sooner than those who let it alone. Now the government gives no liquor to soldiers, and the men are better off without it than they were when they had it.

If alcohol made men stronger, it would be given to men who are training to run races. But athletes are not allowed to touch it at all, for after taking it, they are weaker than before drinking. Alcohol may make men think themselves to be strong, but it deceives them. Alcohol is not a safe food, and cannot take the place of food.

Alcohol and Diseases. — Some persons think that alcohol will keep away diseases. We know that it does not do so. Those who take it are more likely to catch diseases than those who let it alone. Drinkers are much more likely to take consumption, or pneumonia, than those who do not drink. They do not get well from a sickness so quickly as those who do not drink.

Alcohol and Long Life. — When a person gets his life insured, he pays an insurance company a sum of money each year. When he dies, the company will pay his family the money for which he was insured. The insurance companies want a person to live as long as possible, and will not insure those

who are likely to die. If a man wants to get insured, one of the first questions which the company will ask him is whether he drinks or not. They have found out that drinkers are not likely to live so long as those who do not drink.

Alcohol and doing Right.—Since alcohol dulls the mind, drinkers often act foolishly and do not know it. Alcohol makes them thoughtless and unkind, and leads them to do things of which they are ashamed when the effects of the drink have passed off. It causes men to commit crimes, and is one of the greatest of all the causes which send persons to jail. It leads men to spend all their money for drink, and often causes them to go to the poorhouse. It ruins more persons in both mind and body than almost any other thing. It does so much harm that many cities, counties, and states have laws forbidding the sale of alcoholic liquors.

QUESTIONS

What did the ancient Romans mean by the word stimulus?
Name some common things that men use as stimulants.
In what respect are stimulants like whips?
In strong drink what is the substance that does harm?
How is wine made?
How is beer made?
What change takes place in a liquid when it ferments?
What is the cause of fermentation?
Of what use is yeast in bread making?
How is vinegar made?
What is distillation?

In what respect is a distilled drink different from a fermented one?

Name some distilled drinks.

How is pure alcohol manufactured?

Name some good uses of alcohol.

What effect does alcohol have on the minds of those who drink it?

Give a reason why the desire for strong drink grows on a drinker.

What effect does alcohol have on a person's strength?

What effect does alcohol have on the heat of the body?

What effect has alcohol on the recovery from sickness?

What effect does alcohol have on the length of a person's life?

What effect does alcohol have on a person's doing right?

CHAPTER XV

TOBACCO

The Tobacco Plant. — Tobacco is a plant whose stalk grows straight up almost as tall as a man. Its leaves are as large as the leaves of an ordinary book. It bears white or pink flowers which are about the size and shape of a very small drinking goblet. It is a beautiful plant and is sometimes grown in flower gardens for ornament.

Tobacco Plants.

Thousands of acres of land are now planted with tobacco, and millions of pounds are raised each year. Nearly all of the crop is used either for smoking, or for chewing, or as snuff.

History of Tobacco. — The people of olden times did not chew, or smoke, or take snuff, for they had

no tobacco until the early discoverers found it in America, and learned its use from the Indians. Then men began to imitate the Indians, and soon the whole world learned the tobacco habit. After Virginia was settled, the principal crop which the colonists raised was tobacco, and the plant was valued so highly that its leaves were used as money.

Use of Tobacco. — Farmers and florists use tobacco in killing insects on plants and animals, for it contains a poisonous substance called *nicotine*. Tobacco was once used as a medicine, but men long ago found out that it was too poisonous to be given to sick persons. Men use tobacco for the sake of the feeling which its nicotine produces.

Effects of Tobacco. — A person does not usually like tobacco when he first tries to use it, for three or four whiffs of smoke contain enough nicotine to make him feel sick. If he keeps on trying to smoke, he may become somewhat used to the nicotine, and can then smoke a cigar or a pipeful of tobacco without feeling sick. But some persons cannot learn to take tobacco at all without feeling sick, and all smokers and chewers have to be careful not to take too much tobacco at one time.

Many persons think that nicotine is not poisoning them if they do not feel sick while they are smoking or chewing. But it has other poisonous effects besides making a person feel sick. It may poison the heart without giving any bad feelings at all. Very

few persons are able to use a great deal of tobacco without showing some of its poisonous effects.

Tobacco Habit. — Those who have learned to use tobacco without feeling sick often learn to like it, and then they want it so badly that they do not stop using it even when they begin to feel its harm. Thus men form a habit of its use, and many have difficulty in breaking themselves of the habit when they feel its harm.

Spitting. — There is enough nicotine in a small chew of tobacco, or in a cigarette, to make a grown person dangerously sick if he should swallow it. But those who chew and smoke do not swallow much of their saliva. The spitting which goes with chewing and smoking is one of the bad things about the use of tobacco, for unhealthy smokers and chewers often spread diseases by spitting on floors and sidewalks (p. 54). Smoking and chewing are the cause of most of the spitting which is done in public places, and so the use of tobacco is often the cause of spreading diseases.

Tobacco and Boys. — Tobacco is a far worse poison to growing boys than it is to grown folks. Boys sometimes think that they can safely smoke the small rolls of tobacco called *cigarettes* which contain only a small amount of nicotine. But the poison that is in a cigarette will harm a boy more than the poison of a pipeful of tobacco will harm a grown man. After a man is grown up, his muscles

and heart and all the rest of his body cannot be easily changed, for they are fully formed and strong, like a great oak tree. But a boy's muscles and heart are growing, and may be harmed as easily as a tender young oak.

Tobacco and Growth. — If a boy does not grow, there is something the matter with him. In many schools and colleges the scholars are measured and weighed each year, and the boys who use tobacco are nearly always found to be shorter, lighter, and more slender than those who do not use tobacco. A boy may think he looks like a grown-up man while he is smoking, but any use of tobacco will hinder him in growing up to be a strong man.

Tobacco and Strength. — Most boys' schools have athletic teams which play games and run races with the boys from other schools. The boys on the teams have to train so as to be strong and healthy. If they wish to have the best chance of winning, they will not do anything which will lessen their strength. One thing which the boys must let alone is tobacco, for few smokers ever win. A boy cannot smoke and be a good athlete.

Tobacco and the Mind. — The teachers of public schools keep a record of every scholar's work. In Chicago and in some other cities, the records of those who smoked have been examined and compared with the records of the rest of the scholars. Not one smoker in twenty was found to be up with

the rest of the class, and almost no boys who smoked were near the heads of their classes. A boy cannot smoke and have a bright mind. Men who hire boys to work for them will not take a smoker if they can help it.

QUESTIONS

When was tobacco discovered?

What are some of the uses of tobacco?

What harmful substance is in tobacco?

What effect does tobacco have on the stomach?

How is the use of tobacco likely to spread diseases?

Why is a cigarette more harmful to a boy than a pipeful of tobacco is to a grown man?

What effect does the use of tobacco have on a boy's growth?

What effect does the use of tobacco have on a boy's strength?

What effect does the use of tobacco have on a boy's mind?

CHAPTER XVI

BLOOD

The Use of Blood. — Every part of the body must have both food and air in order to remain alive. These substances are supplied to the flesh and bones by the blood. If any part, such as a finger, should fail to get blood, it would die within a few hours.

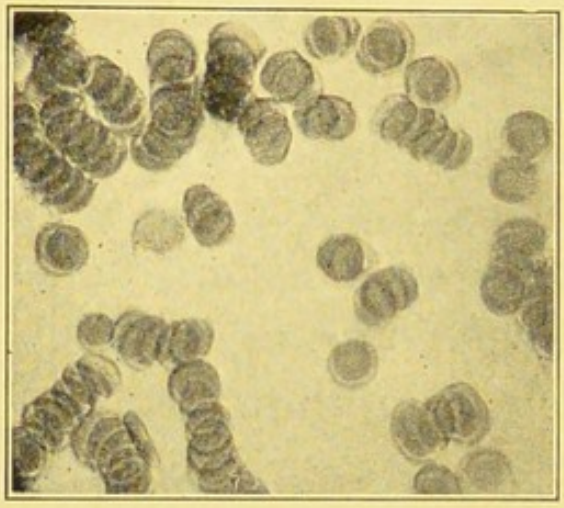
The liquid part of the blood is called *serum.* It looks like yellowish water, and contains food which has been eaten and digested. One of its uses is to become food for those parts of the body which are in need of repair.

The blood may take up other substances besides food from the intestine. When poisons are swallowed, the blood takes them up just as it does food, and carries them through the body. When beer, or wine, or whisky is swallowed, the alcohol of the drink passes into the blood and finally reaches every part of the body.

Red Blood Cells. — A great many tiny round bodies float in the liquid of the blood. Most of these bodies are red, and so they make the blood appear red. These red bodies are called *red corpuscles*, or *red blood cells.* Their use is to take up a

part of the air of each breath, and to carry it through the body.

White Blood Cells. — A few of the bodies which float in the blood are whitish or colorless, and are called *white corpuscles*, or *white blood cells*. One of their uses is to destroy disease germs which may be in the blood and flesh. Every day some disease germs are breathed into the body with dusty air, some are swallowed with food, and a few are rubbed into cuts and scratches on the skin. But most of the germs fail to grow, because the white blood cells seize them and kill them as soon as they enter the flesh.



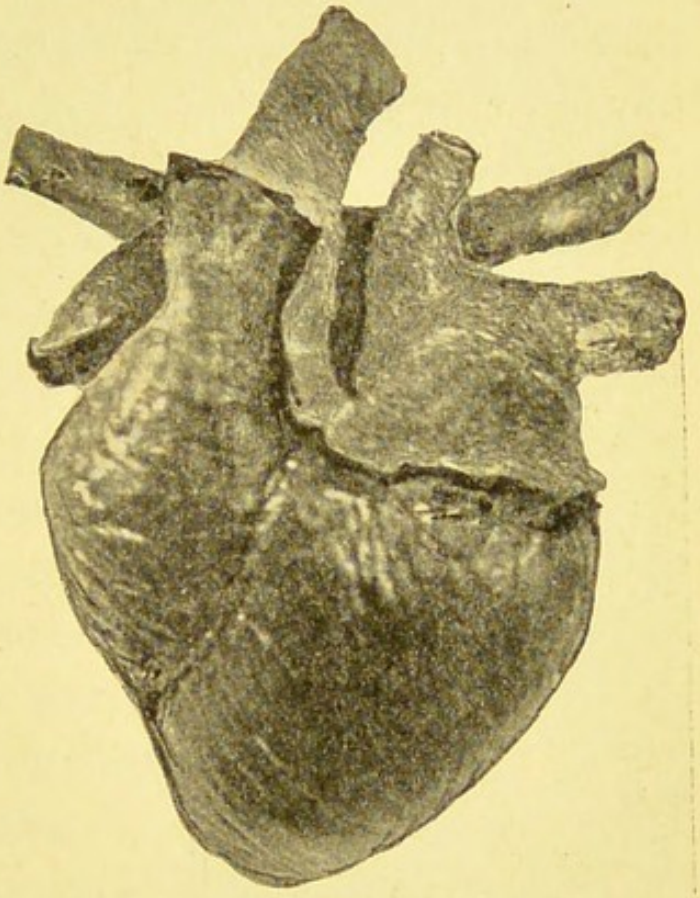
RED BLOOD CELLS. (Magnified.)

The Heart. — While the body is alive the blood is always flowing through all its parts. It is kept moving by a pump called the *heart*.

A person's heart is about the size of his fist. It lies in the front part of the body behind the breast-bone. If a hand is placed over the left side of the chest, the lower end of the heart can be felt beating against the flesh at every stroke which it makes.

The heart is a double pump. Its right side pumps blood through the lungs only, but its left side pumps blood through all the rest of the body.

Each side of the heart consists of two parts. The upper part has thin walls and is called an *auricle*. The lower part has thick walls and is called a *ventricle*. It does most of the work of pumping blood, for its walls are thick and strong.



A Lamb's Heart.

Heart Beats. — A man's heart beats about seventy-five times a minute, but a child's heart beats a hundred or more times a minute. When a person runs fast or does other hard work with the muscles, the heart beats hard and fast in order to supply the working parts with all the food and air that they need.

If a person runs hard until he is ready to drop, his heart may keep on beating hard after he stops running. In this way boys who train for long races sometimes injure their hearts for life. It is a good thing to practice running and lifting, but if a person puts forth all his strength for more than a few minutes in a day, he may harm his heart.

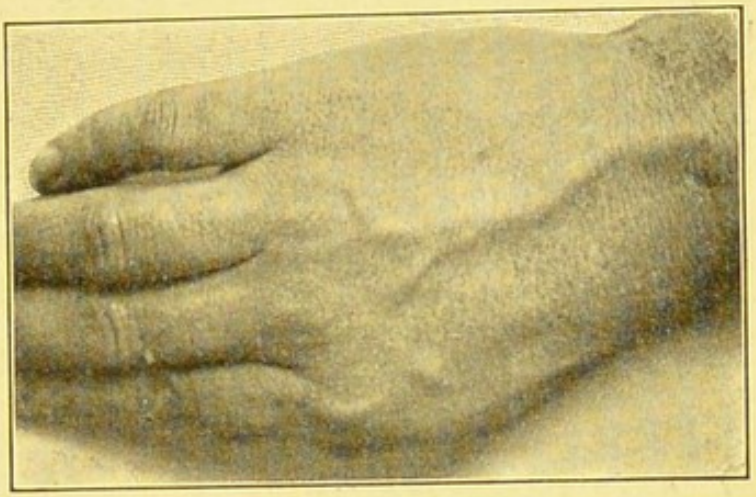
During a fever or other sickness the heart usually beats faster than it does in health. If it beats twice as fast, a person is dangerously sick, for it may soon wear itself out by its rapid work. If you should become very sick, lie still in bed so as to give your heart as little work to do as possible, for every motion will add to the work of your heart.

Arteries. — The heart sends the blood to every part of the body by means of tubes called *arteries*. Each beat of the heart causes a wave to shoot along the arteries. This wave is called the *pulse*. The pulse can be felt wherever a large artery runs near the skin. It may easily be felt on the thumb side of the front of the wrist. When a doctor visits a sick person, he feels of the pulse of the wrist and counts its beats to see how fast and how strongly the heart is beating.

FEELING THE PULSE.

Alcohol and Arteries. — Arteries are wrapped with muscles which shorten themselves and make the blood tubes small when they do not need to carry a large amount of blood. When the muscles are not acting, the arteries are large and carry a large

quantity of blood. The alcohol in a glass of strong drink stops the action of the muscles of the skin, and thus allows a large quantity of blood to flow through the face, and make it red.



Veins in the Back of the Hand.

Veins. — The part of the blood which is not used by the flesh is brought back to the heart by another set of tubes called *veins*. If you hold your hand down at arm's length for a few minutes, blood will fill the veins under the skin. The veins will then look like bluish, raised lines. If you hold your hand above your head, the blood will flow out of the veins and the lines will disappear.

Outline of the Lungs, Heart, and Stomach.

Capillaries. — Blood goes from the ends of the arteries into the beginnings of the veins by passing through tiny tubes called *capillaries*. The capillaries are so small that they cannot be seen without a microscope. They are so close together that

they make the skin appear pink. Press the end of a finger upon the back of your hand. On lifting the finger the spot that was pressed will appear white, because the blood will be squeezed from its capillaries. But in a second the blood will return and make the spot pink again.

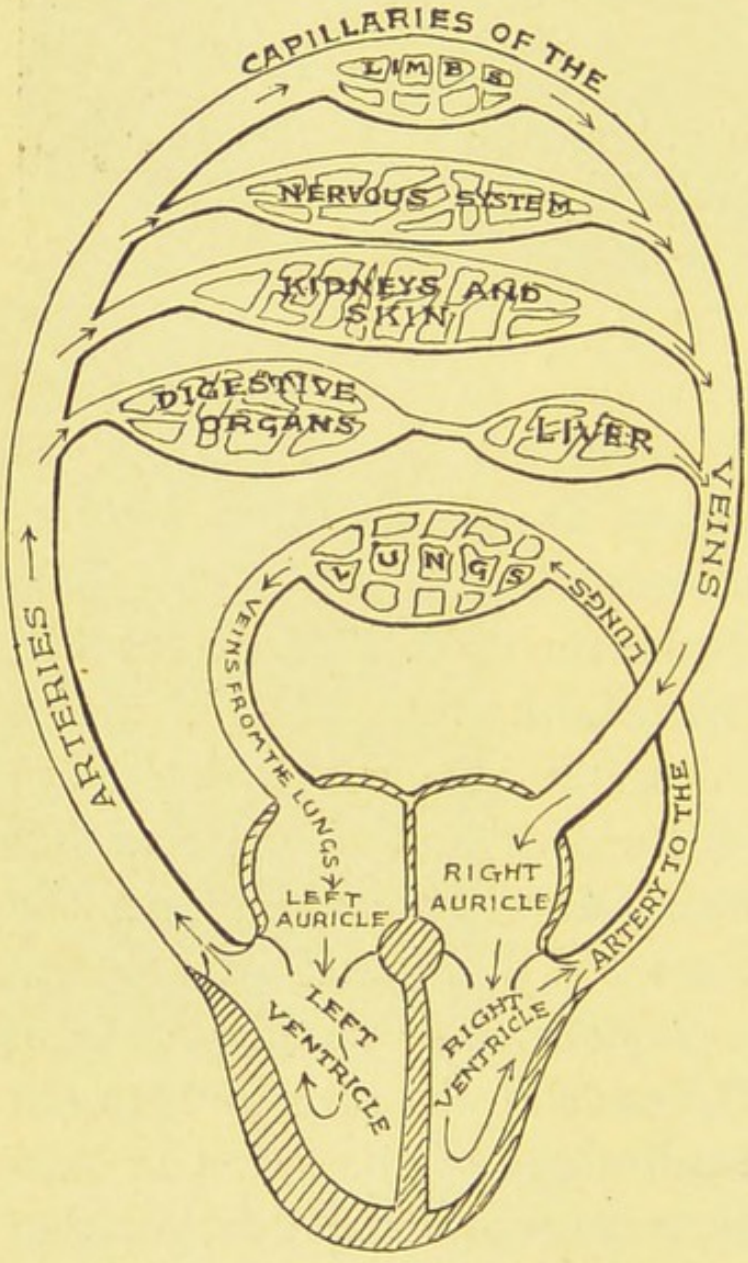


DIAGRAM OF THE CIRCULATION.

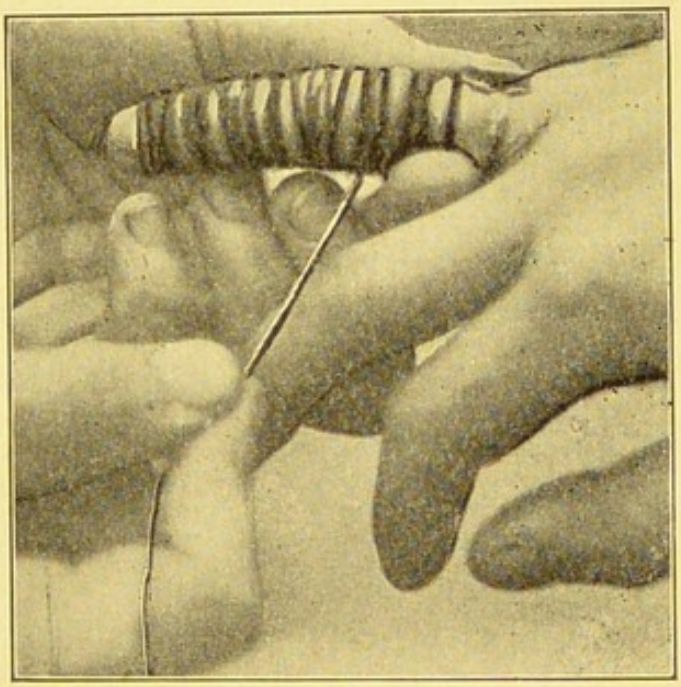
Substances go back and forth between the blood and the flesh by passing through the sides of the capillaries, like water soaking through a thin sheet of paper. In this way food and air pass from the blood to the flesh, and waste matter goes from the flesh into the blood.

The Circulation.—Blood flows from the heart through the arteries, then through the capillaries, and then through the veins back to the heart. This flow of blood through the body is called the *circulation*.

If a drop of blood leaving a finger were to go back to the finger, it would flow to the right side of the heart, then to the lungs, then to the left side of the heart, and then to the finger again. It would do this in about half a minute.

The blood in the body is always flowing in a swift and endless stream. The only part of the stream which fails to return to the heart at once is the small quantity which passes through the sides of the capillaries into the flesh.

Tight Clothes. — Tight bands around any part of the body will press upon the veins and will hinder the flow of blood. Wear your clothing loose so that it will not press upon the blood tubes, but will allow the blood to flow freely. Tight garters around the legs may make the feet swollen and painful by pressing upon the veins. In place of garters that press against the skin wear stocking supporters that hang from the waist.



Removing a Tight Ring.

A tight ring may press upon the veins and keep the blood from flowing out of the finger. Then the finger may become

so swollen with blood that the ring cannot be taken off. The blood may be squeezed out by winding a small string round and round the finger, beginning at the tip. The ring may then be slipped off while the finger is squeezed small.

Fainting. — A bad fright, or a sickness, or an injury may cause the heart almost to stop beating. The skin will then look pale, the head will get but little blood, the mind will stop acting, and the person will fall down in a *faint.*

If you see a person fainting, lay him on his back, and keep his head low so that the blood may flow to it. Throw a little cold water into his face to rouse him. In a moment his heart will beat strongly again, and his mind will be as clear as before.

Tobacco and the Heart. — When a person is made stomach sick by tobacco, he looks pale, because his heart is also poisoned and does not pump blood so well as it should. Even if tobacco should not make a person sick at once, yet it will often slowly weaken his heart. Many persons have to give up the use of tobacco because they cannot do hard work when they use it.

Alcohol and the Heart. — Alcohol causes the heart to beat too hard and too fast. The heart becomes tired from its useless action, and then it cannot do its duty when the rest of the body works hard and calls for an extra supply of blood. Thus alcohol will make a person weak instead of strong.

QUESTIONS

What two things does the blood carry to every part of the body ?

What is the color of the liquid part of the blood ?

What makes the blood appear red ?

Of what use are the red cells in the blood ?

Of what use are the white blood cells ?

Of what use is the liquid part of the blood ?

What makes the blood flow throughout the body ?

Where is the heart situated ?

Why does the heart beat fast when a person runs ?

Where may the pulse be felt ?

What is the cause of pulse beats ?

What is the name of the tubes that carry blood away from the heart ?

What are capillaries ?

What is the name of the tubes that bring blood back to the heart ?

Where may veins be seen in the body ?

In which set of blood tubes do food and air leave the blood and go to the flesh ?

Why does a spot of skin become white when it is pressed ?

Through what tubes does the blood flow in its circulation ?

How may a tight ring be taken off a finger ?

What should be done for a person who has fainted ?

What effect does alcohol have upon the heart ?

What does tobacco do to the heart ?

CHAPTER XVII

WOUNDS

Danger from Wounds.— The epidermis of healthy skins will not permit poisons and disease germs to enter the flesh (p. 24). When the skin is cut or torn, poisons and disease germs may enter the flesh through the wound and make it sore. The poisons and germs may pass from the wound through the body and cause a dangerous sickness. The wound may also open a large blood tube, and produce a severe bleeding.

When a person has a wound which breaks the skin there are two things to do; first to stop the bleeding, and second, to cover or *dress* the wound so that poisons and disease germs cannot pass through it and enter the flesh.

Bleeding.— If the skin is pricked with a pin, a drop or two of blood is all that will flow out, for the wound is very small. If the flesh is cut without touching an artery or a good-sized vein, there will be a little bleeding, but it will not be dangerous. If the gash cuts a good-sized vein, blood will ooze from it for a few minutes and will then stop flowing. A wound does not usually bleed

for many minutes unless it opens an artery as large as a pin, or larger.

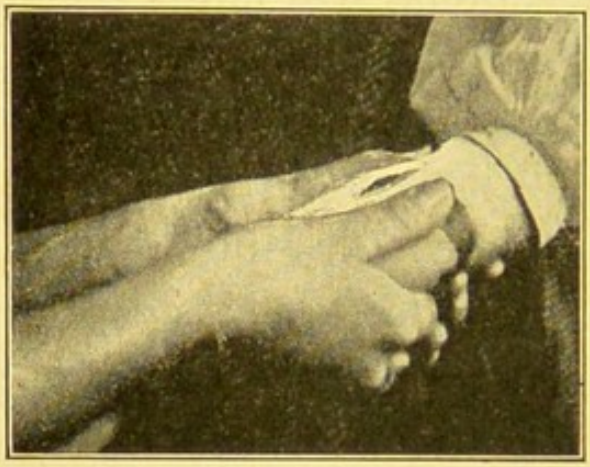
If a gash cuts a large artery, blood will spurt from it with each beat of the pulse. A small gash that opens an artery will bleed far more than a large gash that cuts only veins and capillaries. One or two cupfuls of blood may be lost without much harm, but the loss of a quart of blood is dangerous.

Most wounds do not bleed much, for there are only a few large arteries near the surface of the body. Nearly all of them lie deep in the flesh where they are out of the way of danger. If the arteries in the skin were as large as the veins, the bleeding from every cut would be dangerous.

Clotting.— A moment after blood runs from a cut, it becomes solid like jelly. This blood jelly is called a *clot*. The effect of clotting is to stop bleeding. If a capillary, or a vein, or a small artery is cut, the blood will soon clot and stop the bleeding by forming a plug in the bleeding tube. If a large artery is cut, the blood may push the clot away as fast as it is formed, and then the bleeding will not stop without help.

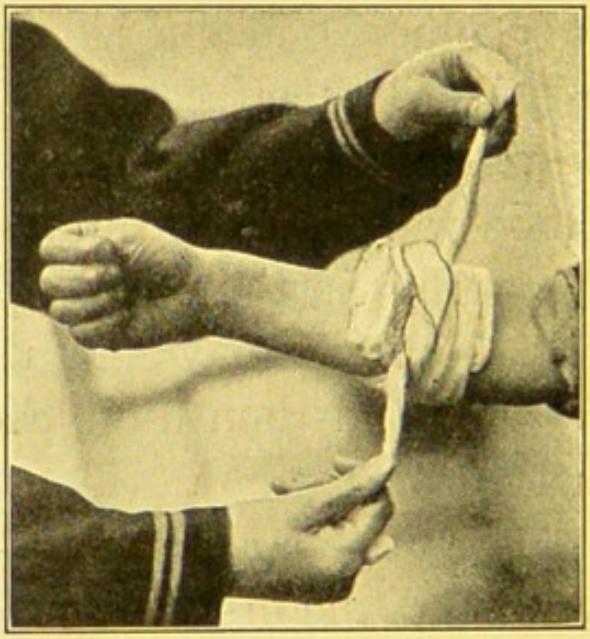
How to stop a Bleeding.— When any one is badly wounded, the first thing to do is to stop the bleeding. Do not waste time in looking for a cord, or a cloth, or a handkerchief, or a bandage, for you can stop a bleeding by pressing upon the wound with your finger. Do not be afraid of the blood, but quickly

grasp the flesh around the wound, and hold the sides of the cut together with your hands. You can easily squeeze the flesh hard enough to close the largest arteries. In most cuts the bleeding will stop after you have held the wound for five or ten minutes.



HOLD THE SIDES OF THE CUT TOGETHER.

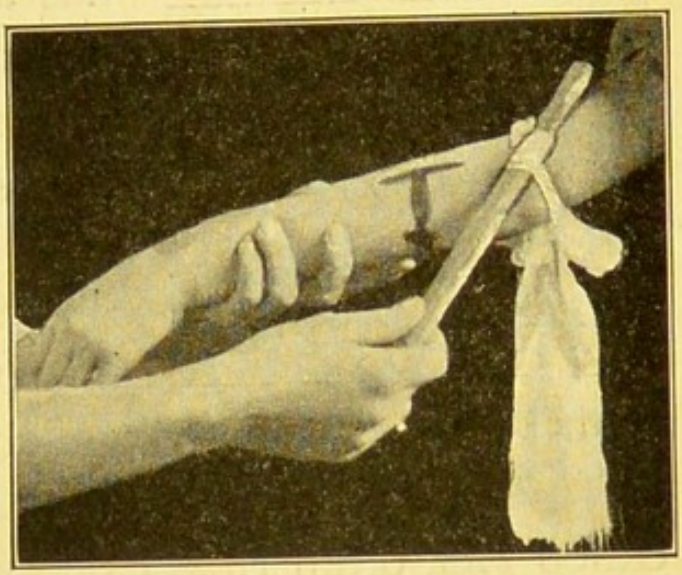
If bleeding goes on after you have loosened your hold on a cut, try a second way to stop the bleeding. Bind up the wound with something that will take the place of your hands. You can do this by crumpling a handkerchief into a firm ball and tying it firmly upon the wound with another handkerchief. This will hold the artery closed so tightly that blood cannot flow from it. Be careful to use a clean handkerchief, for dirt in the wound might cause blood poisoning.



TWO HANDKERCHIEFS MAY BE USED TO STOP BLEEDING.

If a very large artery is cut, or if a finger, or arm, or leg is badly cut or torn, you may not be able to

put a dressing over the wound tightly enough to stop the bleeding. Then try a third way to stop the flow of blood. Tie a cord or handkerchief tightly around the bleeding part between the wound and the heart, and tighten it by thrusting a stick under the cord and turning it round and round. This will stop the bleeding in the largest arteries. But a wound will seldom bleed so much that the cord and stick will be needed.



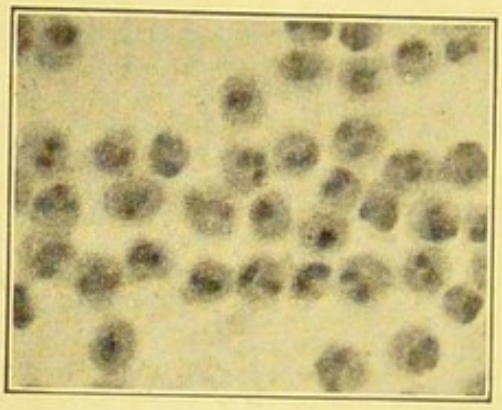
THIS WILL STOP BLEEDING IN THE LARGEST ARTERIES.

Nosebleed.— If your nose bleeds, sit still and press the nostrils with your thumb and finger for a few minutes while you breathe through your mouth. This will close the bleeding spot and allow the blood to clot. While your nose is bleeding, do not blow it, for that would blow the clot away from the bleeding spot, and cause the blood to flow faster than before.

TO STOP NOSEBLEED.

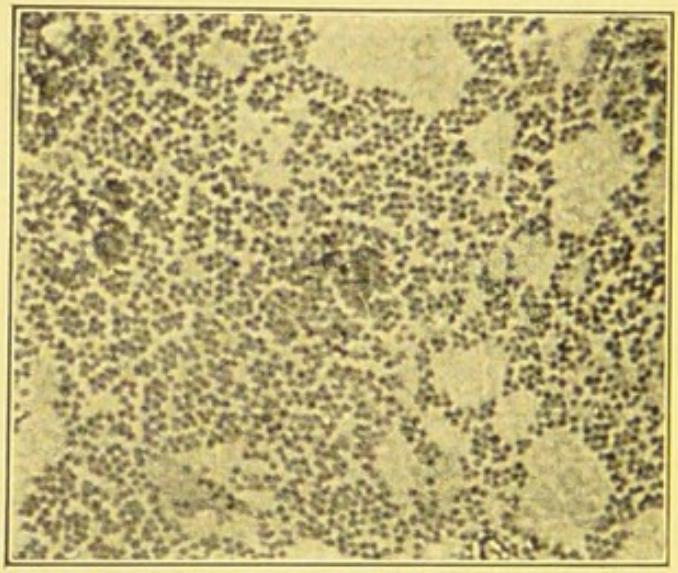
Taking Cold in Wounds. — A wound sometimes

becomes red and swollen, and remains sore for days and weeks. Then we say that the wounded person has taken cold in the wound, or has blood poisoning in it. Some persons suppose that the soreness is caused by cold air and dampness, but this is not so. The soreness is caused by disease germs which grow in the wound.



White Blood Cells in Pus. (Magnified.)

A white, creamy matter, called *pus*, often runs from a sore wound. The pus is mostly white blood cells which have been killed while they were trying to destroy disease germs (p. 122). Pus in a cut or a wound is a sign that disease germs are growing in the flesh. The white matter in a pimple or boil is pus, and is usually caused by disease germs growing in a hair root.



Bacteria which produce Pus in Wounds. (Magnified.)

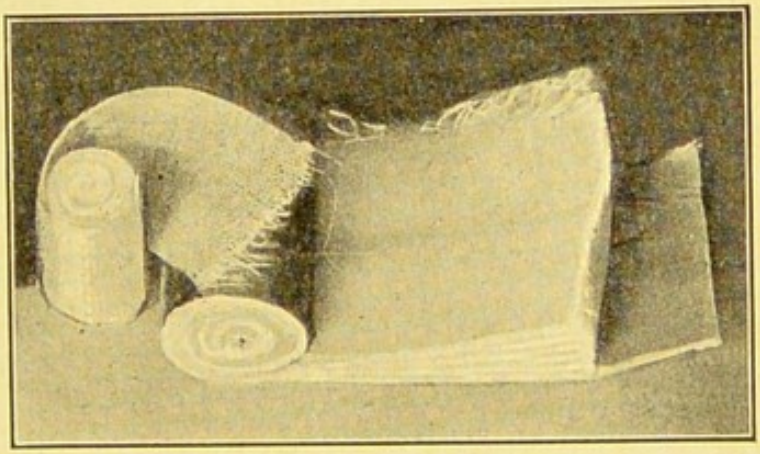
Healing Wounds.— If a wound is kept clean and free from disease germs, it will not be sore or painful, but the flesh will grow together within three or four days. If a wounded spot contains dis-

ease germs, it will be sore for many days, and will heal very slowly.

Dressing Wounds. — Most persons often have slight cuts or scratches, or small pimples, from which a small quantity of pus runs. But pus from them often becomes dried and turned to dust, and so disease germs from sores become scattered nearly everywhere. For this reason germs are almost sure to get into every wound unless it is covered with a dressing. The principal reason for dressing a wound is to keep disease germs out of it.

Another reason for dressing a wound is to hold its edges together, but if a wound is large it will gape open unless its edges are sewed together. Sewing the wound will hurt only a little if a small, sharp needle is used.

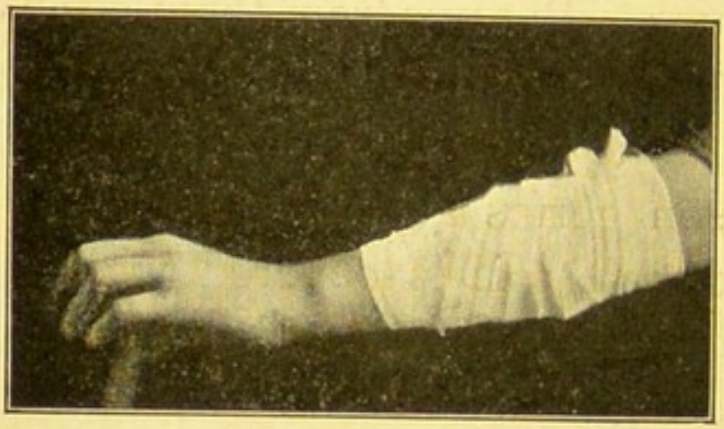
How to dress a Wound. — After bleeding in a wound has been stopped, the next thing to do is to cover the wound with a dressing of cotton or linen. Strips torn from an old handkerchief, or from a worn-out sheet or undergarment, will make good dressings, if they are clean. One of the best of all dressings consists of sheets of cotton called *absorbent*



Roller Bandage and Absorbent Cotton.

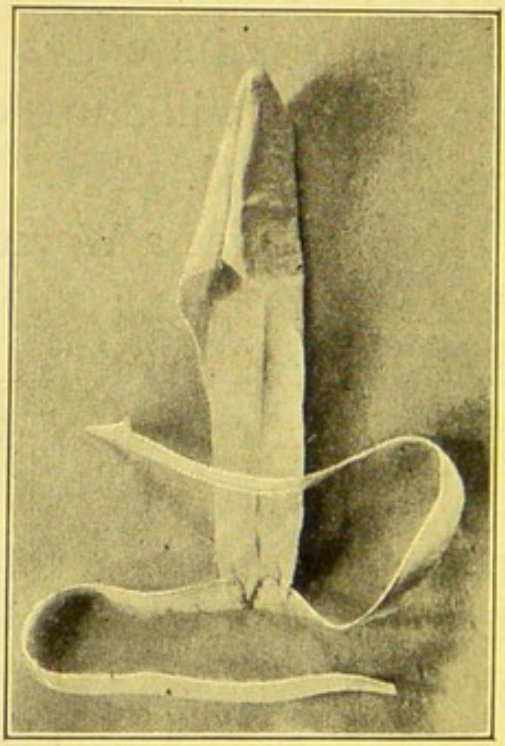
cotton. Rolls of absorbent cotton may be bought at drug stores.

When a dressing has been placed on a wound, it must be held in place with a bandage. A handkerchief makes a good bandage. Fold it cornerwise as if you were about to tie it over your eyes in playing blindman's buff. Lay the thick part over the wound, and wrap the ends around the wounded part and tie them. You may also hold the dressings in place by using a roller bandage such as may be bought at a drug store.



A Bandaged Arm.

A few disease germs which produce pus in wounds may nearly always be found in the skin. These germs may grow in a wound when a water-tight dressing is used. For this reason court plaster and sticky salves are not good dressings.



Finger Stall.

Finger Stall. — If a finger has been cut or is sore, it may easily be dressed by wrapping a little absorb-

ent cotton around it and putting it into a finger stall. The stall is made of muslin and is shaped like a glove finger. It has a strip reaching down the back of the hand, and strings on the end for tying around the wrist.

Cleanliness. — Before you handle a wound, wash your hands with hot water and soap so as to remove the dirt and disease germs which may be on them. If the wound is dirty, wash it in water that has been boiled, for the heat of boiling will kill all disease germs that might be in the water. If you use unboiled water, living disease germs from it may pass into the wound.

Always use clean dressings. Anything that is washed and ironed is usually safe, for the heat of ironing will kill the disease germs (p 43).

Wet Dressings. — If the skin around a wound is dirty, or if the wound already contains pus and the flesh around it is red and sore, wet the dressing with something that will kill the disease germs. Put a heaping tablespoonful of borax into a pint of clean boiled water, and pour some of the liquid on the dressing every hour or two, in order to keep it wet. Change the dressing every day. If you dress a wound in this way, you need not be afraid of taking cold in it. If the wet dressing is used, the disease germs will soon die, the soreness will pass away, and the wound will quickly heal.

Alcohol and Healing Wounds. — Some persons think

that wine or whisky is a good thing to take when they are hurt, for they suppose that the alcohol in them will help to heal the wound. This is not so. Alcohol will hinder the healing of wounds.

Alcohol will also weaken the white blood cells, and then they will not be able to fight disease germs so well as they should. The wounds of drinkers are much more likely to become sore and full of pus than the same kinds of wounds in persons who do not drink.

QUESTIONS

What are two great dangers from wounds?

How much blood may be lost without danger?

In what way does a cut artery bleed differently from a cut vein?

Of what use is the clotting of blood?

If you should see a person bleeding badly from a wound, what is the first thing to do to stop the bleeding?

What is the second thing to try in stopping bleeding?

What may be done to stop the bleeding when a very large artery is cut?

How may a nosebleed be stopped?

What is meant by taking cold in a wound?

What is pus?

What is the cause of pus in a wound?

How may disease germs be kept out of a wound?

How should you use a dressing of absorbent cotton and roller bandages?

How should you use a handkerchief as a bandage?

How should you use a finger stall?

How should you use a wet dressing?

CHAPTER XVIII

ACCIDENTS

Fright. — After a person has been hurt, first find out what his injury is. If you are hurt, or if you see some one else hurt, do not cry, or shout, or run around, but keep quiet for a few seconds and try to think. Then you will soon be brave and cool, and can see what the matter is, and can also think what to do.

Pain. — Nearly every person who has been hurt feels a pain in the injured part. You can often lessen the pain by holding the injured part firmly, or by tying a handkerchief or bandage over the painful part. Do not move the part or rub it unless you are sure that no bones are broken.

Alcohol and Pain. — One reason why an injured spot is painful is because too much blood rushes to it. Giving a drink of wine or whisky to an injured person will not help him to bear the pain. The alcohol in the drink will make the pain worse, for it will make the arteries large, and will cause them to carry an extra quantity of blood through the parts.

Some persons wish to give a glass of wine or whisky to any one whom they see hurt. The drink

seldom can do any good at all. It nearly always will do a great deal of harm.

Bleeding. — When a person is hurt, find out whether or not he is bleeding. If there is any bleeding, try to stop it before you do anything else, for a person may bleed to death before a doctor can be called (p. 131).

Broken Bone. — Another thing to find out when a person is hurt is whether or not a bone is broken. If a bone of an arm or leg is broken, the limb will be painful when it is moved. The pain is caused by a bending of the bone, and may be lessened by holding the bone straight.

A Broken Arm bound to a Board.

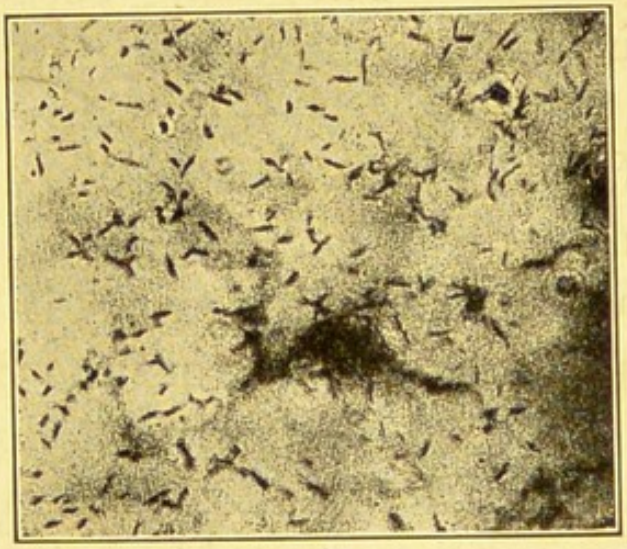
The thing to do for a bone that is badly broken is to bind a stick or a thin board along the whole length of the limb so as to keep the ends of the bone in place. Then the injured person may be carried home without danger to the broken part.

Bruise — When the flesh is bruised, as by a blow or a fall, some of the capillaries will be torn. A little blood will then flow out and make a bluish stain under the skin. A bruise is not dangerous if

the skin is not broken, for the skin will keep disease germs out of the flesh. Soaking the bruised spot in hot water will help to stop the bleeding and to ease the pain.

Splinters in the Skin. — A splinter or a thorn may remain in the skin for days without causing pain. Then the spot may suddenly become sore, because the splinter keeps a hole open through which disease germs may pass into the flesh. If you get a splinter, or a thorn, or a needle in your flesh, have it taken out as soon as possible. If the splinter is a large one, or if the flesh becomes sore, cover the spot with a wet dressing so as to kill the disease germs that may be in the flesh (p. 137).

Lockjaw. — Many persons are wounded by stepping on nails and other sharp things which lie on the ground. These wounds are often dangerous because the sharp points may carry the germs of lockjaw deep into the flesh. The germs of lockjaw may often be found in the ground, and for this reason wounds made by stepping on nails are more dangerous than the same kinds of wounds made in other ways.



BACTERIA OF LOCKJAW. (Magnified.)

If you run a nail into your foot or hand, put a wet dressing upon the wound (p. 137). If the wound becomes sore, go to a doctor at once and have it dressed.

Wounds made by firecrackers and other fireworks are also likely to contain germs of lockjaw. If you receive a bad burn on the Fourth of July, go to a doctor at once and have the wound dressed.

Bee Stings. — When bees or wasps sting the skin, they leave a poison which makes the flesh smart and swell. There is no danger from the stings unless they are very numerous. Putting a little ammonia or cold water on the part that has been stung will help to stop the pain.

Usually, when bees or wasps buzz around you, they will not sting if you do not make a sudden motion. They sting because they think some one is trying to hurt them.

Clothes Afire. — When your clothes are afire, the first thing to do is to lie down. Then the fire will not spread fast, just as the flame will not spread on a burning match when it lies flat. Also roll over and over to crush out the flames.

If you see a person's clothes flaming, throw him to the ground and roll him over and over. If you can get a coat, or blanket, or carpet quickly, wrap it around him. This will help to smother the fire.

Burns. — One of the best things to do for a burn or a scald is to hold the burned part in cold water

until it can be dressed. Bandage the burn just as you would a wound, and soak the dressings in an oily liquid. A good thing to use is a mixture of linseed oil and limewater. This makes a yellow liquid called *carron oil.*

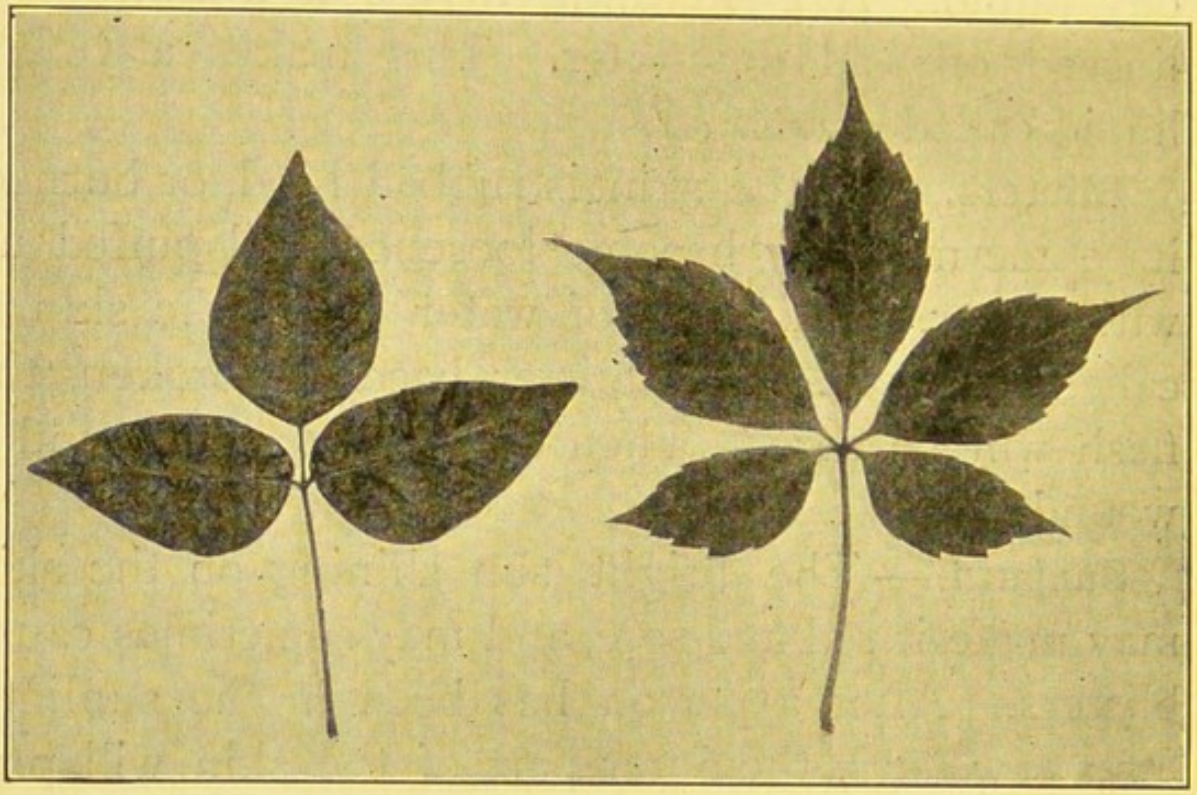
Blisters. — If the skin is rubbed hard, or burned, its epidermis may become loosened and puffed up with water. This bag of water under the skin is called a *blister.* If a blister becomes broken, the flesh will be sore. Then dress it as you would a wound.

Sunburn. — The bright sun shining on the skin may make it red and sore, and may sometimes cause blisters. After a person has been in the sunlight for a few days, the outer part of the skin will produce a brown coloring matter called *tan.* The tan is like a dark curtain. It tends to keep the light from reaching the flesh and burning it.

You can keep from being sunburned by letting the sun shine upon your skin for only a short time each day until the tan is formed. If you are sunburned, rub the skin with a greasy ointment, such as cold cream.

Poison Ivy. — The skins of some persons will become sore and blistered a day or two after they have touched poison ivy or swamp sumac, but other persons can touch the plants without harm. If you have been near the plants, you can get rid of the poison by scrubbing the hands and face well

with soap and water. If you do this as soon as you get home, you will not be likely to become poisoned.



Poison Ivy. Virginia Creeper.

Poison ivy is a vine that creeps over trees and fences and stone walls. It looks much like a harmless vine called Virginia creeper, but each leaf stalk of the ivy bears three leaves, while each leaf stalk of the Virginia creeper bears five leaves.

QUESTIONS

What should be done to help a person who has a broken bone?
What is the cause of the bluish stain of bruised flesh?
What should be done for a bruise?
What is the danger from a splinter in the flesh?
What is the danger from thrusting a nail into the foot?
What should be done for insect stings?

How may the flames be put out when a person's clothes are afire?

What should be done for a burn?

What should be done for a blister?

What is tan? Of what use is it?

What should be done to prevent poisoning by poison ivy?

CHAPTER XIX

BREATHING

Need of Breathing. — Breathing is one of the principal signs of life in a person or animal. Every living thing must breathe in order to live. Breathing, and the changes produced by the air which is breathed, are called *respiration.*

A great deal of poor health is caused by improper respiration. Many of the bad effects of overeating, and of taking alcoholic drinks, are caused by disturbances of respiration. The good effects of fresh air and exercise are due principally to their effects on respiration.

Burning and Oxidation. — When a fire burns in a stove, air from the draft unites with the fuel in the fire box, and the air and fuel together become changed to smoke and ashes. Not all of the air from the draft is used in the burning, but only that part which is called *oxygen*, and which forms about one fifth of the air. The joining of oxygen to the fuel is called *oxidation.*

Oxidation in the Body. — Oxidation like that in a stove is always going on in every living body. The fuel which is oxidized in the body is food and living flesh, and the oxygen comes from the air which is breathed into the body.

Oxidation always produces heat. In a fire oxygen unites with the fuel rapidly enough to make great heat and a flame. In the body oxidation goes on slowly and gently, and yet the oxidation of food and flesh keeps the body warm, and produces the same quantity of heat that the food and flesh would have made if they had been burned in a stove.

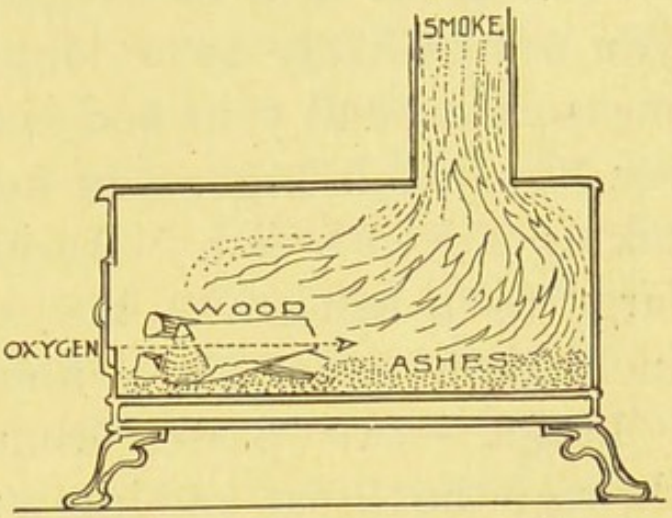


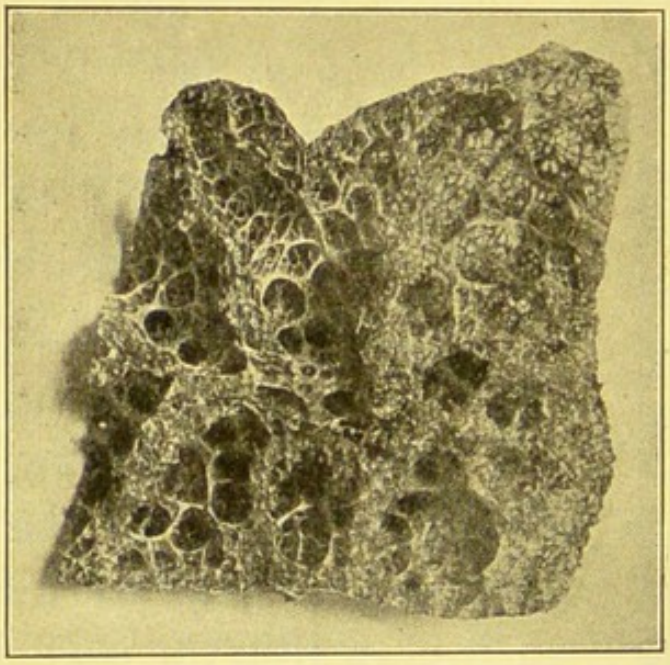
Diagram of Oxidation in a Stove.

Measuring the Chest.

Breathing. — The object of breathing is to supply the body with oxygen. A person takes a breath by raising the ribs, and thus making the upper part of the body larger. This allows air to flow into the body. He expels a breath by letting the ribs fall, and thus making the upper part of the body smaller. A grown person usually breathes from fifteen to twenty times in each minute, or once every three or four seconds.

If you can increase the size of your chest a great deal when you take a breath, you will be able to take a great deal of oxygen into your body and you will be likely to be long-breathed. Put a tape measure around your body just under the arms, and see how much larger you can make your chest by taking a deep breath. An increase of two inches is large for a half-grown boy, and an increase of four inches is large for a grown man.

Lungs. — Air passes from the nose or mouth through the throat, and into a tube called the *trachea*, or *windpipe*. The windpipe divides into small tubes called *bronchi*, and the bronchi open into the *lungs*.



Lung of a Turtle.

The lungs are two masses of flesh which fill most of the upper part of the body under the ribs. Their use is to supply oxygen to the body. They are full of tiny air spaces. When a breath is taken, these spaces are filled so full of air that the lungs become large like a blown-up balloon. When a breath is blown out from the body, the air spaces are partly emptied.

The sides of the air spaces are covered with

capillaries through which blood is always flowing. While the blood is passing through them, the red blood cells take up oxygen from the air in the air spaces. The blood then flows through the body and carries the oxygen with it to all the flesh.

The blood also takes a little oxygen from the air while it flows through the skin. If the air spaces in the lungs were all opened and spread out, they would make a sheet large enough to cover the whole body sixty times. The blood can therefore take from the lungs sixty times more oxygen than it could get if it had to take all its oxygen from the skin.

What the Body does with Oxygen. — When the blood reaches the capillaries of the arms and legs and other parts of the body, the oxygen leaves the red blood cells, and unites with food and flesh, and oxidizes them. The weight of the oxygen which the body uses each day is about double the weight of all the food and flesh that is oxidized.

The oxidation within the body produces waste substances which consist of oxygen joined to food and flesh. They are like the smoke and ashes of a fire, and are harmful to the body. They are taken up by the blood and are carried away in its stream. One of the principal waste substances is called *carbon dioxide*. This gas is carried to the lungs, and there is given off to the air spaces, and is breathed out with the breath. Other waste substances are given off by the skin and kidneys (p. 25).

Arterial and Venous Blood. — The same blood stream which carries food and oxygen also carries waste substances. While blood is flowing away from the heart, it is called *arterial* blood because it is then flowing through arteries. Most arterial blood contains an abundance of oxygen, and only a small quantity of waste substances, and is bright red in color.

While blood is flowing toward the heart, it is called *venous* blood because it is then flowing through veins. Most venous blood contains a great deal of waste substances and only a little oxygen, and is dark red or purple in color.

Blood changes from arterial to venous in all the capillaries of the body except those of the lungs. The blood changes from venous to arterial in the capillaries of the lungs (p. 126).

Breathing and Life. — The fire in a stove uses up oxygen as fast as air passes through the draft, and stops burning almost as soon as the draft is closed. The oxidation in the body also stops almost as soon as breathing stops. When the oxygen in the body is nearly used up, a great shortness of breath is felt. All the oxygen that the lungs and blood can hold will not last the body longer than about a minute. If a person should not breathe for two minutes, his life would be in great danger. A person must breathe fifteen or twenty times a minute in order to feel comfortable.

Breathing and Strength. — When you run hard you quickly use up all the oxygen which your blood can carry. Then you feel short of breath and have to rest until the blood can take up more oxygen. Thus your breathing will have a great deal to do with your strength. You can work as hard as your breathing will allow. If your lungs are large and you breathe deeply, you will be able to run fast and do other hard work. One reason why physical training, athletics, and military drill will increase your strength, is because they will teach you to breathe so deeply that you will not get out of breath easily.

Breathing and Health. — Your breathing has a great deal to do with your health. If oxidation does not go on properly, the waste substances of your body will be like the gases in a coal stove which does not burn well. They will be more poisonous than they should be, and your body will not be able to get rid of them easily. They will make you feel weak and dull, and they may make you dangerously sick. Many persons are weak and in poor health because they do not take enough oxygen into their bodies to carry on oxidation in the right way.

Overeating and Oxidation. — When a person eats too much food, the lungs do not supply enough oxygen to oxidize the food properly. The poisonous waste matters of the body then cause head-

aches and backaches, and the pains which are often called rheumatism. A cure for the most of the aches and pains is to go without food for a meal or two, in order that the food that is already in the body may be oxidized. Another cure is to take hard exercise in order to increase the quantity of oxygen in the body.

Alcohol and Oxidation. — Alcohol is often used in burners and small stoves because it is readily oxidized. Alcohol is also readily oxidized in the body. It takes oxygen which belongs to the food and flesh, and disturbs the oxidation in the whole body. Alcohol cannot safely be oxidized in the body any more than it can be burned safely in a coal stove.

Exercise and Breathing. — The principal way by which you can cause the oxidation in the body to go on properly is by taking exercise. While the muscles are put to hard use, the body becomes warm, and the breathing is deep and fast, for a great deal of food and oxygen is used up. Then oxidation is perfect, just as it is in a stove when the fire is hot and the drafts are open wide.

When a fire is once started in a stove, it will burn slowly and steadily for some hours after the drafts are closed. The oxidation in the body does not need to take place rapidly all the time, but it will go on too slowly unless some exercise is taken two or three times a day.

Deep Breathing. — Another way of making the

oxidation in the body go on properly is by taking deep breaths often. After you have been sitting still for some time, you may feel dull and short of breath because you take too little oxygen into your body. Then you may make yourself feel bright and comfortable by throwing your shoulders back and breathing deeply. Taking deep breaths of air will often help you to learn your lessons when you begin to feel dull and sleepy.

Deep Breathing and Health. — Dust and disease germs are often breathed into the lungs. If deep breaths are not taken, only a part of the lungs will be filled. Then the germs may lie in a still corner of the lung. There they may grow undisturbed and cause a lung disease. Those who have consumption usually have small, flat chests, and do not breathe deeply. If you take deep breaths several times a day, fresh air and blood will fill every part of the lungs, and disease germs will have but little chance to grow there. Deep breathing is one of the best of all means for keeping the lungs healthy and strong.

Mouth Breathing. — The folds of the inside of the nose warm the air which is breathed, and strain out dust and disease germs from it (p. 51). But the mouth cannot do this nearly so well as the nose can. If air is breathed through the mouth, cold air, dust, and disease germs will pass into the throat and lungs. Those who breathe through their mouths are likely

to catch colds, sore throats, and diseases of their lungs.

Many persons think that it is natural for a child to breathe through his mouth. This is not so. A child will breathe through his nose if it is clear and open, and will keep his mouth closed at night as well as in the daytime. If you have to breathe through your mouth while you are at rest, go to a doctor and have your nose and throat treated.

The most common cause of mouth breathing is adenoids (p. 53).

Stooped Shoulders. — When you sit or stand with the shoulders bent forward, your arms will hang like weights upon the chest. Then you will not be able to breathe well, but will feel short of breath and uncomfortable.

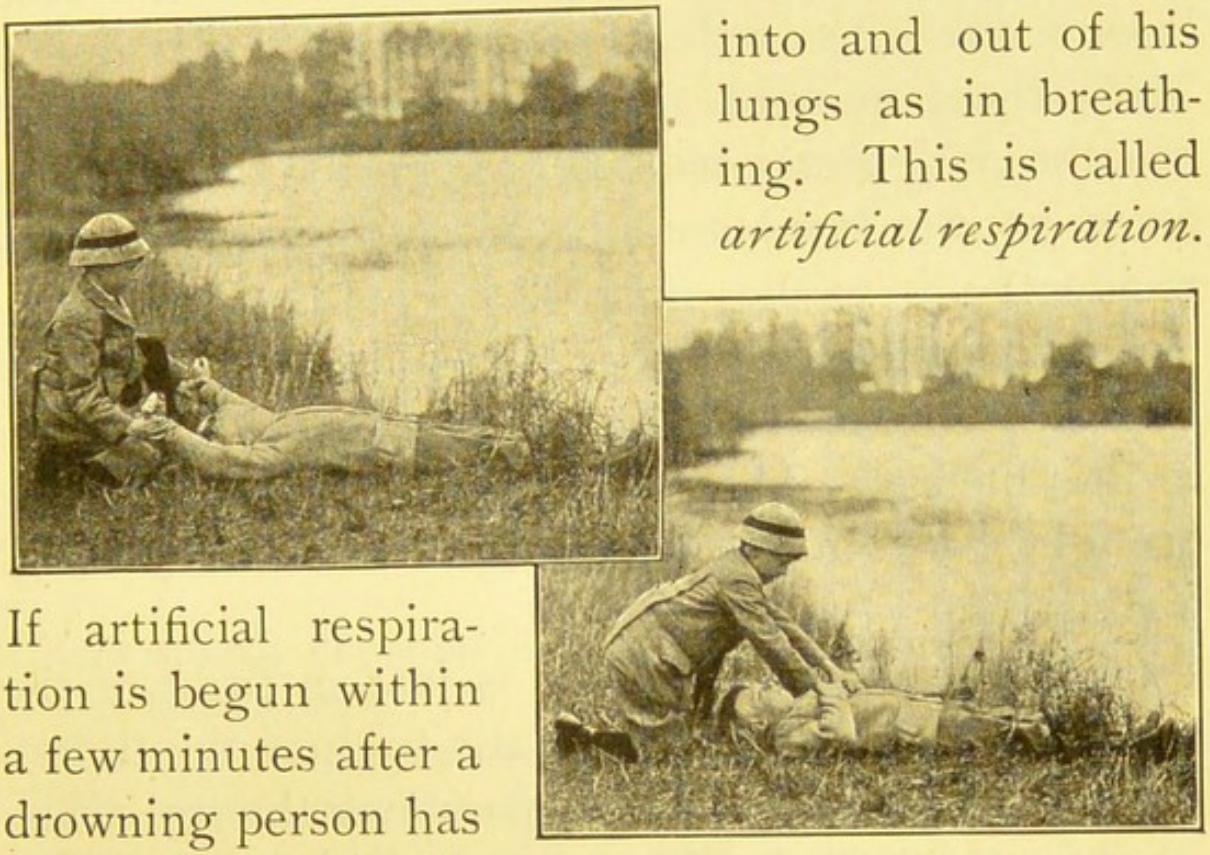
Wrong Position at a Desk.

Correct Position at a Desk.

While you are writing or studying, sit up straight and throw your shoulders back, so that your arms

will be supported by the muscles of your back instead of the muscles of your chest. Then you will be able to breathe freely, you will feel bright and active, and will be ready for hard work or play.

Artificial Respiration. — When a person has been almost drowned, he may be brought back to life if air is made to pass into and out of his lungs as in breathing. This is called *artificial respiration.*



ARTIFICIAL RESPIRATION.

If artificial respiration is begun within a few minutes after a drowning person has stopped breathing, it may save his life.

When a drowning person is taken from the water, there is no time to wait for a doctor or a nurse, but a life may be lost unless artificial respiration is started at once. Learn how to do artificial respiration, for it is easy to learn, and by doing it you may be able to save a drowning person when no doctor is at hand.

Here is a good way to do artificial respiration. Lay the drowning person on his back, kneel behind his head, and do the following motions: First, raise the person's arms until they extend in a straight line beyond his head. This raises the ribs and lets air into the lungs. Second, carry the arms down beside the body and press them against the chest. This lowers the ribs and drives air out of the lungs. Make these motions about as often as you usually breathe. You may have to do artificial respiration for an hour or two before the drowning person begins to breathe.

Electric Shock. — A strong shock of electricity may stop a person's breathing and make him seem to be lifeless. Then the person may often be brought back to life by doing artificial respiration just as if he were drowning.

Coughing. — The windpipe is just in front of the food pipe and both begin in the back of the throat. Whatever is swallowed must pass over the top of the windpipe. A thick fold of flesh, called the *epiglottis*, acts like a lid and helps to keep the food from dropping down the air tube.

A crumb or a drop of liquid falling into the windpipe causes a tickling or a painful feeling, and a cough. The effect of the cough is to blow the bit of matter out of the air tube.

Choking. — If a person's windpipe is stopped up, we say that he *choked*. Some persons have a habit

of holding pennies or buttons or other small things in their mouths. Sometimes a small object becomes sucked into the windpipe and cannot be taken out. It is dangerous to carry anything in your mouth when you are at work or play, for it may slip down the throat and cause choking.

If any one is choking, he needs help quickly. The first thing to do is to hold him so that his head hangs down. You can hold a child up by his feet, and you can lay a grown person across a chair with the head hanging down.

The next thing to do is to shake the choking person, or slap him on his back, so as to make the object drop out of the windpipe.

QUESTIONS

What substance from the air is used up in a burning fire?

What is oxidation?

How is the oxidation in a living body like the burning in a stove?

What substance does breathing supply to the body?

How much should a person be able to expand his chest in taking a deep breath?

What are the lungs?

How does the blood get oxygen from the lungs?

What does the blood do with oxygen?

What is done with oxidized substances in the body?

What is the difference between arterial and venous blood?

What is the cause of shortness of breath when a person runs fast?

How does overeating disturb the oxidation in the body?

What effect does alcohol have on the oxidation in the body?

Why is it healthful to take deep breaths often?

What harm comes from breathing through the mouth?

What harm comes from sitting or standing with stooped shoulders?

Of what use is artificial respiration?

How may artificial respiration be done?

What should you do for a person who has been shocked by electricity?

Of what use is a cough?

How can you help any one who is choking?

CHAPTER XX

FRESH AIR

How Air is made Impure. — If a person stays in a small, closed room for an hour, a large part of the oxygen of the air will be used up, and its place will be taken by waste substances from the body. Then the air of the room will not be fit for breathing. If a person were shut in an air-tight room for a few hours, he would die from the lack of oxygen.

A lighted lamp also makes the air of a room impure, for it uses about as much oxygen as a man, and gives off nearly the same kind of waste substances. Air in houses may also be made impure by dust and dirt in the rooms, and by decaying substances in the cellars.

Disease Germs in Foul Air. — When any one talks, or coughs, or sneezes, or blows the nose, tiny drops of mucus or saliva often fly from the nose and mouth. These drops of liquid contain disease germs when they come from some one who has a cold, or tonsillitis, or tuberculosis, or other disease which is catching. The drops soon dry and their disease germs may float in the air as dust. Then the next person who breathes the air may catch the disease.

Many persons have sore throats, consumption, or other diseases in a form so mild that they keep at their work and go among other people just as if they were well. These persons often give off disease germs just as they would if they were severely sick. For this reason, any air which has been made impure by breathing is likely to have disease germs in it.

Effects of Foul Air. — While any one is breathing foul air, he feels lazy and dull, for he is taking poisons and waste matters into his body, and does not get as much oxygen as he should. No one can do his best work in foul air. Scholars in a close schoolroom cannot put their minds on their lessons. Those who breathe foul air day after day are likely to be weak and sickly. The purity of the air which is breathed has a great effect upon the body.

The worst effects of foul air are caused by disease germs which are nearly always found in it. More colds, consumption, tonsillitis, and other diseases of the air tubes are caused by breathing foul air than in any other way. Diphtheria, measles, mumps, and scarlet fever are often caught in the same way.

How to know Impure Air. — You can usually tell foul air by its smell. Air that has been made impure by breathing has an unpleasant odor. If you can smell it when you come into a room, the air of that room is unfit for breathing.

After you have been in a room full of foul air for a few moments, you may no longer notice its smell,

but the air will then be as harmful as when you entered the room. If no one could become used to the smell of foul air, everybody would be likely to keep the air of their houses pure and fresh. But because the sense of smell soon becomes dulled after breathing foul air, many persons fail to notice when the air of their houses becomes impure. They often keep on breathing foul air, and thus do a great deal of harm to their health.

The way to keep the air of a room pure is to change it often for pure air from out of doors.

Purity of Outdoor Air. — Outdoor air is nearly always pure. People give off impurities from their lungs when they are in the open air, just as they do when they are in houses. But outdoors the wind supplies new air, and carries impurities away as fast as they are formed. In a closed room the air is breathed over and over again, and is soon made impure.

Ventilation. — Changing the air of a room for fresh, outdoor air is called *ventilation*. Some fresh air comes into a room when the doors are opened, and some comes in through cracks in windows, doors, and floors; but in a well-made house the cracks are too few and too small to let enough fresh air into a room.

The simplest way to ventilate a room is to open a window in it. But an open window may allow cold air to enter a room in a large stream called a *draft*.

Many persons do not ventilate their rooms because they suppose that a draft of cool air will cause them to take cold. A draft will not be the cause of a cold if the air is fresh, for there will be no disease germs

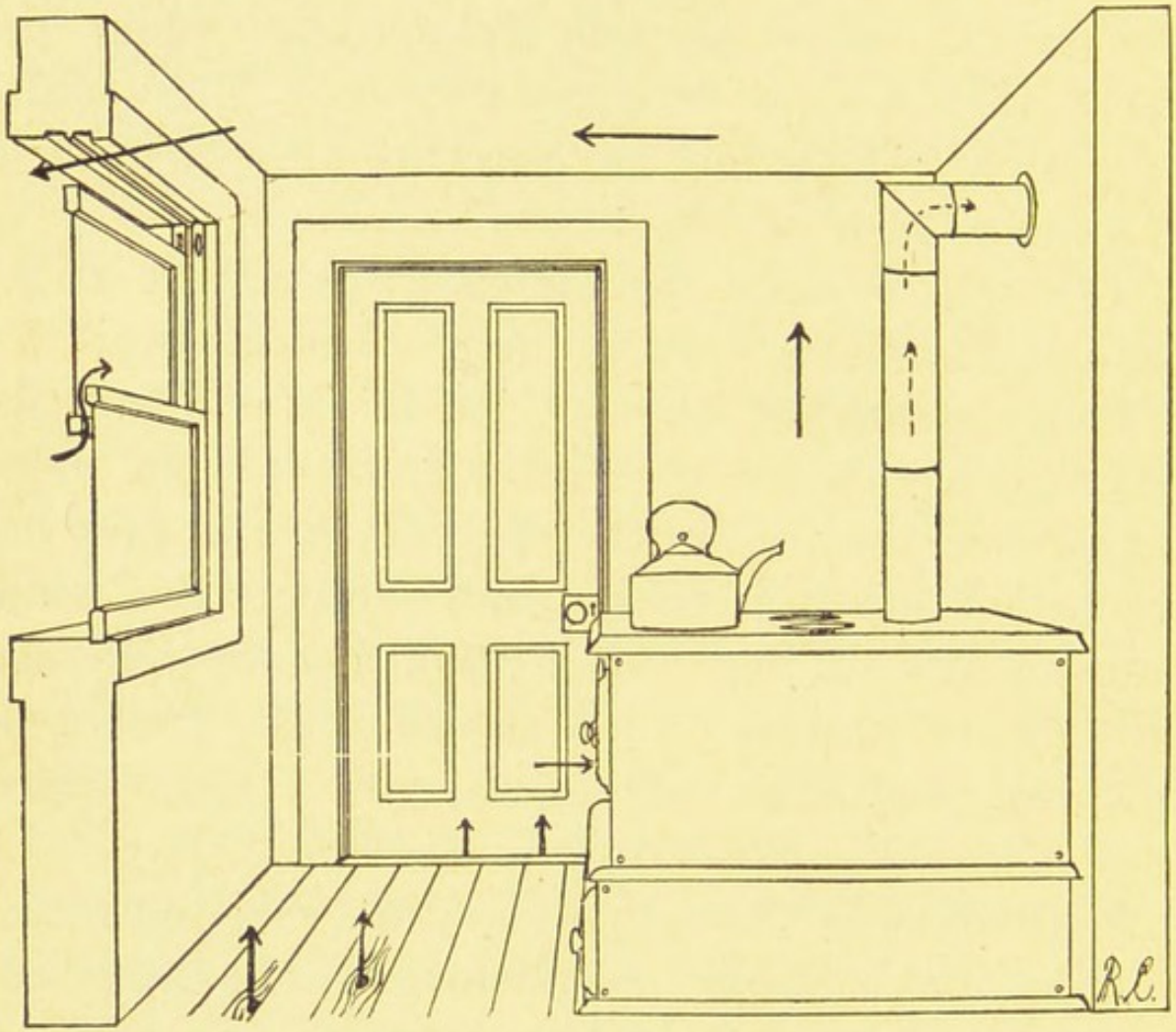


Diagram of Natural Ventilation.

in it. A person may catch cold by breathing disease germs from the foul air of a room, whether there is a draft in it or not. You can easily ventilate a room without producing a draft.

Warmth and Ventilation. — The air of a heated room is warmer near the ceiling than near the floor,

for warm air is lighter than cold air, and rises above it. The air near the ceiling of a living room is more foul than the air near the floor, for breathing warms the air and causes it to rise. If an opening is made in the ceiling or near it, warm air will flow through it out of the room; but if the opening is near the floor, cool air will flow into the room.

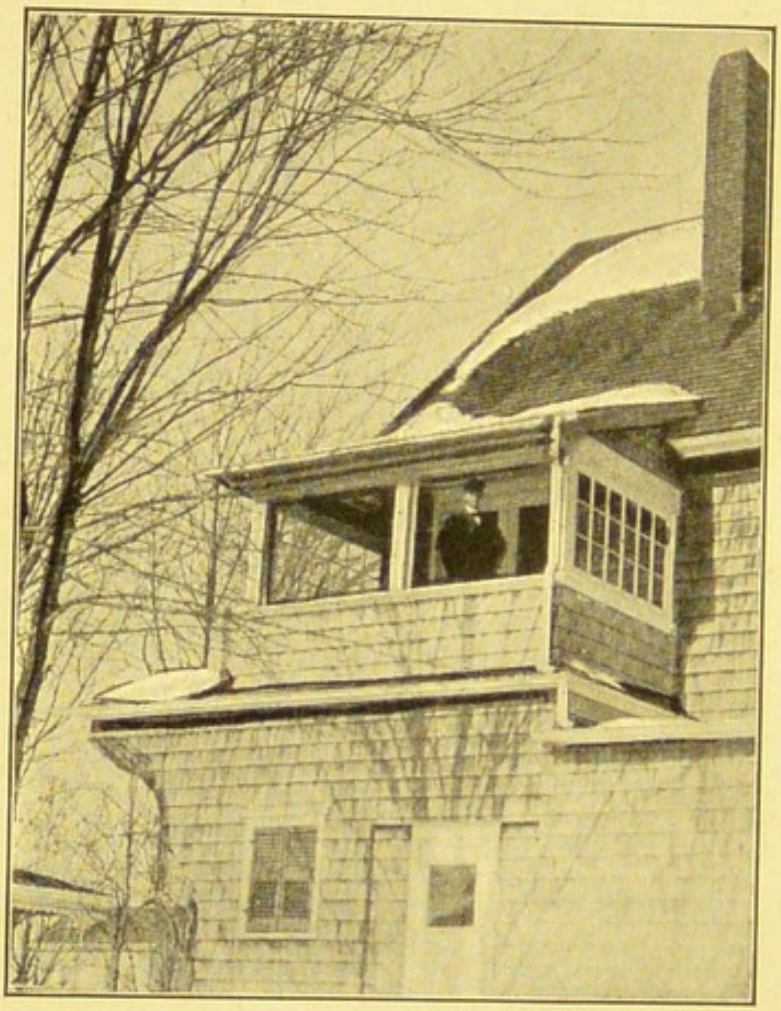
It is easy to ventilate a heated room by dropping the upper sash of a window. Warm, foul air will flow out above the sash, and its place will be taken by cooler air which enters the room through cracks in the floors, windows, and doors. The streams of fresh air will be small and will spread through the room without causing drafts.

Another way to ventilate a room is to raise the lower sash of a window. When this is done, the direction of the stream of air will usually be into the room, and drafts will sometimes be formed. The drafts may be prevented by covering the opening with a sheet of thin muslin. The cloth will allow air to pass through it, but will prevent the wind from blowing through it in a draft. It may be tacked to a frame and set in the window like a fly screen.

Ventilating Cold Rooms. — Many persons think that there is not so much need of ventilating their rooms in winter as in summer, because foul air does not smell so bad when it is cold as when it is warm. The body burns food more rapidly in winter than in summer, for it must keep itself warm, and so it

gives off more waste substances in winter than in summer. The air of a cold room will usually become impure more quickly than the air of a heated room, but the smell of bad air in a warm room is more unpleasant than in a cold room. Ventilate your room whether it is warmed or not.

Night Air. — Many persons sleep with the doors and windows of their bedrooms closed because they think that the outdoor air is harmful at night. Do not be afraid of the night air. It is usually purer than air in the daytime, for but little dust is stirred up during the quiet hours of the night.



A Sleeping Porch.

Ventilating Bedrooms. — Some persons clean their bedrooms and air them every morning and then close them up until the next morning, thinking that the fresh air will last all through the night. If you sleep in a bedroom which is not

ventilated, the air in it will become used up in an hour, and you will breathe foul air all the rest of the night. If the air of a bedroom smells bad in the morning, it shows that the air has been bad during the night.

You cannot get ventilation enough by leaving your bedroom door open, for that lets in air from only another part of the house. You also need fresh air from outdoors. Sleep with a window of your bedroom open, and if the room is cold, keep yourself warm by using thick bed covers.

Sleeping Outdoors. — The best way to make sure of breathing pure, fresh air all night long is to sleep outdoors. A person is no more likely to catch cold by sleeping out of doors than by taking a ride. Many weak persons sleep on a porch for the sake of their lungs. They cover up warmly and wear a hood on their heads, and in the morning they waken bright and refreshed.

QUESTIONS

What are some of the things that make the air of houses impure?

How does a lighted lamp make the air of a room impure?

What harm does impure air do to a person?

What are some of the diseases that may be caught from foul air?

How may impure air be distinguished from air that is pure?

How may the air in a room be kept pure?

What is ventilation?

How may a room be ventilated without a draft?

How would you use a screen of muslin to prevent a draft?

Why do cold rooms need as much ventilation as warm rooms?

Why should a person sleep with his bedroom window open?

Why is it well for persons having weak lungs to sleep in the open air?

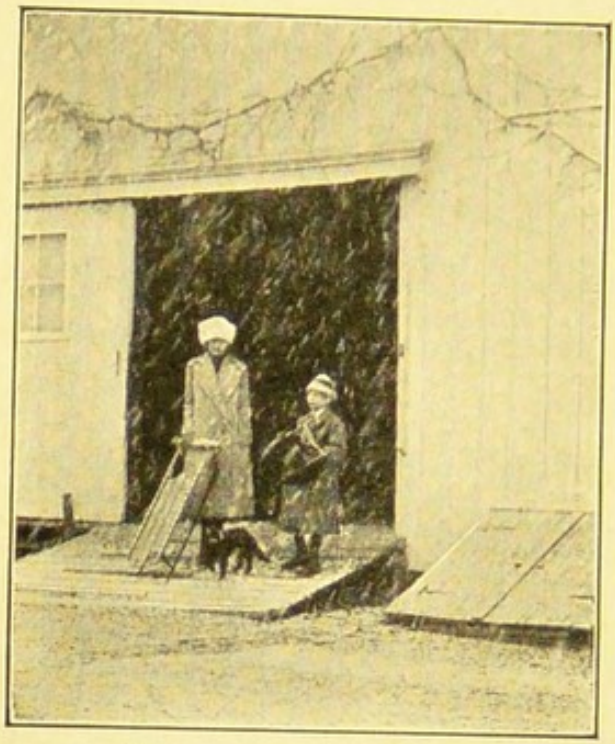
CHAPTER XXI

BODY HEAT

The Warmth of the Body. — The body is warmed by the slow burning or oxidation that is always going on within it (p. 146). Some parts of the body make more heat than other parts. The muscles and the liver make more heat than the bones and the skin. Yet all parts of the body are nearly equal in warmth, for the blood stream warms them all as it passes swiftly back and forth through the flesh. The only part that changes much in warmth is the outside of the skin. This may be warmed or cooled by the air, or by other things which touch it.

The Skin and Warmth. — The feeling of warmth is mostly in the skin. If your skin is red with blood, it will be warm and you will feel warm all over. If your skin is pale and contains only a little blood, it will be cold and you will feel cold all over, even if the inside of your body is too warm. If you feel cold or chilly, you may become warm by doing something that will force the blood through the skin, such as taking exercise, or rubbing the skin. You do not mind cold weather if a good supply of blood flows through the skin.

Thick Clothing. — You cannot become hardened to cold weather by wearing thin clothes, or going without a cap, or warm shoes, or mittens, and then trying to stand the pain of a cold skin. If you do this, you will weaken your body instead of making it strong.



READY FOR WINTER.

You will not become used to cold if you wrap yourself up in very thick clothes, for the skin will not have a chance to touch the cold air. But if you exercise or work hard in the cold air, the warm blood will flow through the skin and you will keep yourself warm without needing to bundle up with thick clothes.

How the Body is Cooled. — The body is always producing heat, and would soon become too warm if it did not lose heat. It is cooled by the air and by the perspiration.

The air is nearly always cooler than the body, and therefore it cools the skin by its touch. The body loses heat rapidly on a cold day, and thick clothes may then be needed to prevent the loss of too much heat.

If the day is very warm, the air alone may not

take heat from the skin fast enough to keep the body cool. The skin then produces an extra amount of perspiration which cools the body in the same way that a bath of water would cool it. A person is not likely to become overheated on a hot day if he perspires freely.

Sunstroke. — If the stomach, or lungs, or skin, or other part of the body is out of order, the perspiration may not be formed freely, even when the day is hot. The heat will then remain in the body and will cause faintness and weakness. If a person is made sick by heat, we say that he has a *sunstroke*.

If you feel faint from the heat, lie down in a cool spot, and bathe the head with cold water so as to cool it.

Warming his Hands.

Cold Hands and Feet. — Almost the only thing which keeps the fingers and toes warm is the blood which flows through them. If the hands or feet are cold, wrapping them up may not always make them warm, for the covering neither makes heat, nor causes blood to flow through the cold part. But if the parts are

first warmed and then wrapped up, they will stay warm.

You can warm any part of the body by doing something which will make a great deal of blood flow through it. If the ears are cold, you can warm them by rubbing them briskly. You can warm your hands by clapping them together, or by whipping your arms hard around your back. You can warm your feet by stamping them on the ground. In these ways you will make the warm blood flow through the cold part.

Frozen Parts.— When a finger, or toe, or ear is frozen, it will usually get well if it is thawed very slowly. Do not take a person who has a frozen part into a warm room, but keep him in a room where the air is almost freezing cold. Then warm the room slowly. Put the frozen part in cold water and let it thaw slowly while the water grows warmer with the room. Another good way to thaw a frozen part is to rub it with snow. A part that has once been frozen is likely to itch and smart whenever the air around it is either very warm or very cold.

Heating Houses.—The temperature of our bodies is about $98\frac{1}{2}^\circ$ F. When the air around us is as warm as this, we feel extremely warm and uncomfortable. Our bodies feel most comfortable when the temperature of the air around them is about 70° F. If the temperature of the air of a room is less than 60° F., the room will feel too cold for comfort. In

cold weather houses are usually warmed either with fireplaces or stoves in the living rooms, or with furnaces in the cellars.

Pure Air and Heating Houses. — Many persons forget about the purity of the air when they heat their houses. They close their windows to keep the warm air in the room and the cold air out. Then the air soon becomes foul and unfit for breathing. A heated room needs ventilation (p. 161).

A fireplace will ventilate a room as well as heat it, for the fire will cause a large stream of air to flow from the room up the chimney. A stove in a room will not help the ventilation much, for its drafts will take only a small quantity of air from the room.

There are three ways of carrying heat from a cellar furnace through a house: 1, by means of hot water; 2, by means of steam; and 3, by means of hot air. Neither hot water nor steam used to heat a room will ventilate it, for neither will cause air to flow either into the room or out of it. A hot-air furnace sends a steady stream of hot air into the room.

Moisture in the Air. — If air contains all the vapor of water that it can hold, we say that it is moist. If it contains only one third or half as much water as it can hold, we say that it is dry. Warm air can hold a great deal more water than cold air. Moist air that is freezing cold becomes dry air when it is warmed to a comfortable temperature. For this reason the air in heated houses is often too dry for health.

When you warm a room, keep a pan of water in the furnace, or on the register, radiator, or stove, in order that its vapor may make the air moist.

Oil and Gas Stoves. — Most stoves which burn oil or gas have no pipes running to the chimney, and so they pour harmful gases into the room. They are not safe unless the room is kept well ventilated. They can be made safe by having them fitted with pipes which will carry the gases up the chimney.

Gas Poisoning. — Coal stoves sometimes give off a poisonous gas. When it is breathed, it unites with the red blood cells and keeps them from taking oxygen from the air. This gas is also found in the illuminating gas which is burned for lighting houses, and is sometimes formed by stoves which burn oil or charcoal. It can be recognized by its unpleasant smell. Air that has the least smell of the gas is dangerous.

Effects of Alcohol on the Heat of the Body. — Men often take strong drinks because it makes them feel warm. It does this because it causes a great deal of blood to flow through the skin. The blood in the skin gives the person a feeling of warmth, but the alcohol really makes a person cold because it brings the blood to the surface of the body where it loses its heat. A person is able to stand the cold better when he lets strong drink alone than when he takes it.

QUESTIONS

What warms the body ?

How are all parts of the body kept equally warm ?

How does exercise help the body to endure cold ?

In what part of the body is the greatest feeling of heat and cold ?

What effect does the perspiration have upon the heat of the body ?

Why does a person not get overheated when he is perspiring a great deal ?

What should be done for a person who has a sunstroke ?

If your hands are cold when you are far away from a fire, how may you warm them ?

How should you care for a frozen part of the body ?

What degree of heat is the most comfortable in a living room ?

Why should moisture be added to the air of a heated room ?

How can you make the air of a heated room moist ?

What effect may a burning oil stove or gas stove have upon the air in a house ?

What is the danger from the gas from a coal stove, or a leaking gas jet ?

What effect does alcohol have upon the heat of the body ?

CHAPTER XXII

COLDS AND CONSUMPTION

What a Cold Is. — One of the most common forms of sickness is what is called a *cold*. This name was given to the sickness long ago, because cold air was supposed to cause it. Now we know that the sickness is infectious and is caused by disease germs which come from other sick persons.

Bacteria of Pneumonia.
(Magnified.)

If the germs of a cold grow in the nose, the sickness is called a cold in the head. If they grow in the throat, they produce a sore throat or tonsillitis. If they grow in the air tubes, the sickness is called bronchitis; and if they grow in the lungs, the sickness is called pneumonia.

Sometimes a sickness which seems to be a slight cold is a very mild form of a dangerous sickness, such as scarlet fever or diphtheria. The germs from a disease will spread just as readily when the disease is mild as when it is severe, and a bad form

of a disease may be caught from some one who has it mildly.

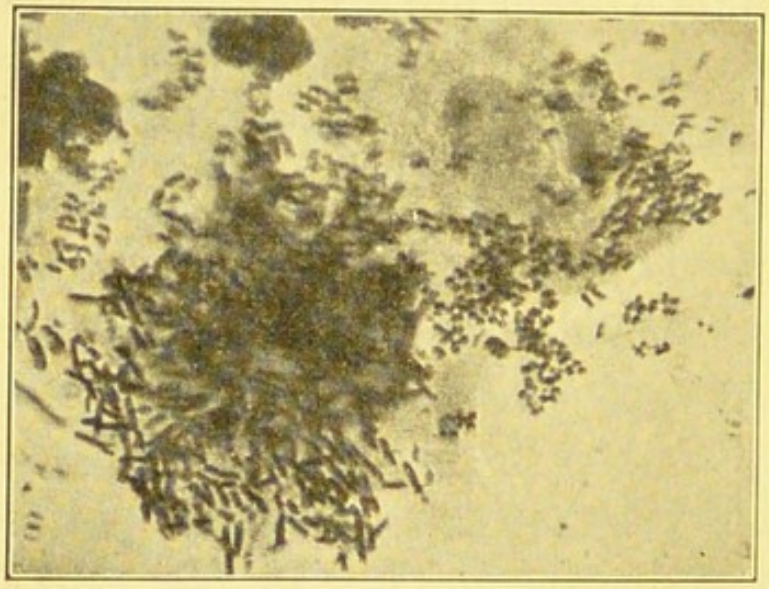
Cause of a Cold. — Many persons suppose that the principal causes of catching cold are cold and dampness, for they often have colds after they have been sitting in a cold wind or after their clothes have been wet. The principal reason why dampness and cold air tend to bring on colds is because many people close their doors and windows during bad weather and then stay in rooms where the air is foul and contains disease germs. Few persons have colds in the summer, because then they usually keep their living rooms and houses open and well ventilated.

Another reason why cold air and dampness help to bring on colds is because they weaken the body, and then the white blood cells are not able to destroy disease germs easily. But the white blood cells are often weakened by many other things besides cold and dampness. They are weakened by indigestion, by overwork, and by loss of sleep more often than they are harmed by cold and dampness. Colds are common among those who stay indoors and do not become cold and wet at all.

Weakening the body and the white blood cells will not cause a cold if disease germs do not enter the body. The men who were with Peary and other Arctic explorers were often wet and cold and overworked; and yet they were free from colds while

they were in the Arctic lands, for in those places they did not meet any one who had a cold or other sickness. Yet these same explorers began to have colds as soon as they reached a town on their way home, for then they took disease germs from other persons.

Drafts and Colds. — The wind blowing upon the body out of doors seldom causes a sickness, because the outdoor air is almost free from disease germs. A draft of cold outdoor air blowing across a room which is full of warm, foul air may injure a person's body slightly and so may prevent it from killing disease germs which enter it. But if the air of a room is pure, a draft of cold air blowing across it will not harm the body more than the wind out of doors would harm it. Many persons fail to ventilate their rooms because they are afraid that a draft will make them catch cold. Foul, impure air in a room is many times more dangerous than a draft of pure air in it.



BACTERIA OF A COLD. (Magnified.)

Other Causes of Colds. — Persons who have colds give off the disease germs with everything which

comes from their noses and throats. The germs will be found on their handkerchiefs and towels, on dishes, napkins, and drinking cups, on their bedclothes, and on pencils which are touched to their lips and tongue. You may catch a cold by touching your mouth or nose to anything which has been soiled by some one who has a cold.

Keeping Colds from Spreading. — If you have a cold, try to keep the disease germs from reaching any one else. Keep away from other persons, and stay away from school, from parties, and from other places where crowds meet. Sleep in a room by yourself, and have a window in your bedroom open all night so that the fresh air will carry away the disease germs which come from your body.

Use of a Handkerchief. — If you should catch all the germs that come from the nose and mouth when you have a cold, other persons would not catch a cold from you. You can do this by the right use of a handkerchief. Use a handkerchief when you blow your nose or clear your throat (p. 51). Do not spit on the floor or pavement, but hold a handkerchief to your nose and mouth when you cough or sneeze. Do not flirt the handkerchief in the air, for you may shake the dried germs from it. Take a clean handkerchief as soon as one is soiled, and wash the soiled ones in boiling water to kill the germs on them.

How to avoid Taking Cold. — One way in which

you can avoid taking cold is by keeping the germs of colds out of your body. Keep your nose and mouth clean (p. 56). Have everything which touches your nose and mouth clean. Breathe air which is pure.

Another way by which you can avoid taking cold is by helping the body to destroy the germs which enter it. Do those things which will help to make the body healthy and strong. Eat properly, take proper exercise, and keep the body comfortably warm.

What to do for a Cold. — A cold will last as long as living germs of the cold grow in the body. It will end when the disease germs stop growing. Medicines will not kill the disease germs, or keep them from growing. Medicines which stop a cough often do more harm than good, for the object of the cough is to remove mucus and disease germs from the body (p. 156). There are four simple things to do in order to cure a cold:

1. Stay at home and rest, in order that the body may use all its strength in overcoming the disease germs and their poisons.

2. Keep your room clean and well ventilated, so that no disease germs will remain in the room.

3. Keep your nose and throat and all the rest of your body clean in order to get rid of as many disease germs as possible.

4. Eat little, in order that your liver and intestine

will have little to do except to remove the poisons of the sickness from the body.

Alcohol and Colds. — Some persons suppose that wine or whisky is a good medicine for colds. Any form of alcoholic drink will do harm, and will make the cold worse, for it will injure the white blood cells and will hinder them in their work of destroying disease germs (p. 138).

Consumption. — Many persons who seem to have a cold really have *consumption*, or *tuberculosis of the lungs*. This sickness is like a cold that has lasted for weeks. It might be called a cold that is caused by the germs of tuberculosis. The poisons of the germs produce a fever and great weakness of the body. If a person is thin and weak and feverish and seems to have a cold that does not get well, it is probable that he has tuberculosis.

Germs of consumption may grow in many other parts of the body besides the lungs. They may grow in the neck and produce the swellings called *enlarged glands*. They may grow in the bones and produce diseases of the hip, or knee, or other joints. They may also grow in the intestine and brain, and in nearly all other parts of the body. But when we say that a person has tuberculosis, or consumption, we usually mean that the disease germs are growing in the lungs.

Consumption is a very common disease. One tenth of all the deaths in the United States are due

to it. During the year 1912 about thirteen thousand persons died from consumption in New York State alone. Yet the disease may be prevented by simple means, such as cleanliness, fresh air, and proper food.

Consumption is often called the great white plague because it is common among white races, and because those who have it are usually pale.

Cause of Consumption. — No person is born with consumption. The only way in which a person will catch consumption is by taking the germs of tuberculosis into his body. The germs come only from the bodies of persons or animals that have the disease. Consumption spreads because the sick scatter the germs. But the germs may easily be prevented from spreading from the body of a sick person, and so they may be prevented from reaching other persons.

Tuberculosis and Milk. —Animals may have tuberculosis, and a person may catch the disease by eating the meat of diseased cattle. If meat is cooked until it is well done, any disease germs which may be in it will be killed.

The milk of a cow that is unhealthy, or that seems to have a cold, is dangerous, for it may contain the germs of tuberculosis. You can kill the germs by heating the milk almost boiling hot (p. 75). Do this if you are not sure of the purity of the milk which you use.

Keeping Tuberculosis from Spreading. — Consumption is spread in the same way that colds are spread

(p. 176). Those who have the disease give off the germs from their noses and throats. If they are careless about coughing or blowing their noses, the germs will become dried and will float in the air as dust. The dust of a room in which a careless person is sick with consumption is likely to contain the germs of the sickness.

If all persons who have consumption would catch and destroy everything that comes from their noses and mouths, the germs would not escape and no one would take the disease from them. Then there would be no more consumption after a few years. The rules which have just been given to keep colds from spreading are also good rules for keeping consumption from spreading (p. 177).

How to prevent Consumption. — You can prevent yourself from taking consumption in two ways: first, by keeping germs out of your body; and second, by keeping your body strong and able to destroy the germs if any should enter it.

You can prevent tuberculosis germs from entering your body by care in cleanliness and ventilation, and by staying away from dirty and dusty places where the germs are likely to be found.

No one thing that you can do will prevent germs of tuberculosis from growing if any should enter your body, but whatever helps to make your body strong and healthy will help it to overcome the germs. Bacteria of tuberculosis will not be likely

to grow in your body if you take proper care in your eating, drinking, breathing, exercise, work, and rest.

Alcohol and Tuberculosis. — A common cause of tuberculosis is strong drink. This is so for two reasons. First, alcohol weakens the body and makes it unable to overcome the germs. Second, drunken persons often lie in unclean places where tuberculosis germs are found.

Danger from Phlegm. — Those who have consumption often cough up a great deal of thick mucus called *phlegm.* This phlegm contains many of the germs of tuberculosis. If the sick are careless about coughing, and spitting, and blowing their noses, they will spread the germs and endanger the health of other persons. But if they are always careful to catch and destroy the phlegm, they may go among other people without danger of giving the disease to them.

Spittoons and spit cups made of earthenware or metal are dangerous, for they cannot be cleaned easily. Flies crawl over them and carry the germs to other persons. The best thing to use to catch the phlegm is a paper cup with a cover. Burn it after it has been in use for a few hours. The cups are cheap and may be bought at drug stores.

When a person who has consumption goes away from his house, he may safely use handkerchiefs if he carries a number of them and puts them in a waterproof pocket as soon as they are used.

Sunlight and Cleanliness. — The germs of tuberculosis may stay alive for weeks and months in dark, dirty rooms, but sunshine will soon kill the germs. Persons seldom catch consumption in clean, light rooms. Keep a consumptive person's room open to the sunlight all day long. Keep the floors and everything in the room clean so that no dust will rise from them. Take up the carpets and rugs every day or two, and clean them out of doors so as to get rid of the germs.

Curing Consumption. — Consumption cannot be cured by medicines, but it may be cured by helping the body to kill the germs, just as a cold may be cured (p. 178). Medicines which are said to be good for the blood are of little use, for none of them will help the white blood cells to do their work. A person may make the white blood cells strong in overcoming germs of consumption by being careful in resting, eating, and breathing.

1. Those who have consumption must rest, for they need to use all their strength in fighting disease germs. They may walk around and even do light work for the sake of the exercise, but they will be harmed by getting tired. If they feel weak and tired, the only safe place for them is in bed.

2. The sick need all the food which they can digest, in order to build up their bodies. But eating more than their stomachs and intestines can digest will do harm. They may usually eat enough to

satisfy their natural hunger, but more food than this will be harmful. It is best to use plain foods, such as milk, eggs, and bread and butter.

3. Those who have consumption need pure, fresh air. Unless they have it they cannot get well. Their lungs are partly filled up, and those parts which are in use cannot supply the body with enough oxygen unless they always have pure air.

It will help the sick to stay out of doors all day long, and to sleep in a covered porch, or in an open tent or shed. If they sleep in a room, they need to have a window open all night, in order to get plenty of fresh air.

One way of getting fresh air is by the use of a window tent which fits around an open window. The sick person lies with his head inside the tent while his body is in a warm room. Thus the tent supplies fresh air without making the room cold.

Killing the Germs of Consumption. — Those who have consumption must take great care to kill all the germs which come from their bodies. Unless they do this, they will take the germs back into their bodies. They may get rid of the germs by catching the phlegm which they spit up, and by always being clean in their bodies, their clothes, their rooms, and in everything else about them. In these ways the sick will help themselves to get well, and will also protect others from catching the disease.

QUESTIONS

What is the cause of a cold ?

How may cold and dampness tend to bring on a cold ?

How may a cold be caught from a handkerchief or towel ?

If a person has a cold, how can he prevent it from spreading to other persons ?

How does the proper use of a handkerchief prevent the spread of colds ?

How can a person avoid taking cold ?

How should you care for yourself when you have a cold ?

What is consumption ?

What are enlarged glands ?

Name some ways in which consumption is spread.

How may milk spread consumption ?

If a person has consumption, from what part of the body are the disease germs given off ?

What should a person who has consumption do to keep other persons from catching the disease ?

What should a consumptive person do with the phlegm which he coughs up ?

How can you prevent yourself from taking consumption?

How do sunlight and cleanliness help to prevent the spread of consumption ?

What should a person do in order to be cured of consumption?

CHAPTER XXIII

FEVERS

Fever. — When disease germs grow in the flesh, they usually make the body too warm. The natural warmth of the body is about 98½° F. A temperature of the body which is warmer than 98½° F. is called a *fever*. It is a sign of danger, for it usually shows that disease germs are growing in the body. A person whose temperature is warmer than 101° F. will usually feel too sick to work. If the temperature is warmer than 103° F., the person will be too sick to sit up, and at a temperature of 104° F. he will be dangerously sick.

Chills. — At the beginning of a fever the skin is sometimes pale and cold while the inside of the body is too warm. Then the feverish person has a cold feeling called a *chill*. If there is only a slight fever, the body may feel cold through all the sickness, and then the sickness is often called a cold. But in a cold there is usually a fever and the body is too warm even though it may feel cold.

Infectious and Contagious Diseases. — Some infectious diseases may be caught much more readily than others. Those which may be caught readily from

living with the sick in the same way that people usually live together, are called *contagious*. Some of the common contagious diseases are diphtheria, scarlet fever, measles, mumps, whooping cough, and chicken pox.

Children's Diseases. — Whooping cough, mumps, measles, and chicken pox are contagious fevers which most children have before they are grown. Very few persons can take either of them the second time. Many persons let their little children take them so that the children may be free from them during the rest of their lives. This might be proper if the diseases were always mild and harmless. But they are often dangerous, and thousands of deaths are caused by them each year in the United States. Those who have any of these diseases are likely to catch other diseases readily, such as pneumonia and bronchitis. Nearly all of this danger and suffering could be prevented if everybody would always try to keep these diseases from spreading.

How to keep Children's Diseases from Spreading. — The germs of whooping cough, mumps, measles, and chicken pox will float through the air more readily than the germs of most other diseases. Yet the germs will not live long outside of the body of a sick person, and are not likely to spread far from the sick room or the sick person.

When you have a contagious disease, there are two things to do in order to keep it from spreading.

1. Keep away from those who have not had the disease. Stay at home, and do not go to school or church, or to stores, or any other meeting place. Do not let other children visit you, and do not go to visit them. Sleep in a room by yourself. Then the germs of the disease will not be likely to pass from you to another person.

2. Destroy everything which comes from your nose and throat, just as you would if you had a bad cold (p. 177). Keep your room and everything in it clean, and keep the air of your room fresh and pure. Then the germs which come from your body will die, and will not reach other persons.

Diphtheria. — A sore throat which is caused by diphtheria germs is called *diphtheria*. This is one of the most contagious and dangerous of all diseases. The germs come only from some one who has diphtheria. They usually form a whitish coating on the tonsils, and on the back of the throat.

If you have a sore throat, let some one look into your throat. If there are spots or a coating on your tonsils or in the back part of your throat, call a doctor to find out if you have diphtheria.

Examining the Throat. — Many children have died from diphtheria and other throat troubles because they were afraid to let any one look into their throats to see what disease they had. Learn to open your mouth, and to let some one press your tongue down and look into the back part of your throat.

Antitoxin. — If a substance called *antitoxin* is given to a person who has diphtheria, it will overcome the poisons of the disease. If it is given to a well person, it will keep any diphtheria germs from growing that he may take into his body. It is so valuable in preventing and curing diphtheria that many cities and states supply it to poor people free of charge.

Examining the Throat.

Boards of Health. — Many ignorant persons do not know how to prevent the spread of contagious diseases, and many others do not try to do so because they are careless. Nearly every state, city, and town has a board of health whose duty is to compel all persons to help in preventing contagious diseases. The doctors of the boards of health visit the homes of the sick and see that every necessary thing is done to keep the disease germs from reaching other people.

Quarantine. — Boards of health have rules that all persons who have contagious diseases shall be kept

away from all other persons except their doctors and nurses, and that nothing which might carry disease germs is taken from the sick room. If these things are done, disease germs cannot pass from the sick to other persons, and the diseases cannot spread. Shutting the sick in rooms or houses by themselves is called *quarantine.*

Disinfection. — Boards of health also have rules that all the germs coming from a quarantined person or room shall be destroyed. Killing the germs of a disease is called *disinfection.*

Many of the germs of contagious diseases may be killed by always having fresh air in the sick room, by letting in the sunlight, and by keeping everything in the sick room clean. All these things must be done with great care, but a great deal more must also be done. Dishes, clothes, and handkerchiefs must be freed from the germs. The easiest and best way to kill the germs on these articles is to boil them as soon as they have been used. The heat will make the articles safe for any one to use.

The disease germs on anything which cannot be boiled may be destroyed by soaking it in something which will kill the germs. Anything which will kill disease germs is called a *disinfectant.*

One of the cheapest and best of all disinfectants is a liquid called *formalin.* Put a tablespoonful of it into a quart of water, and use the mixture in washing the hands, and the woodwork and furniture

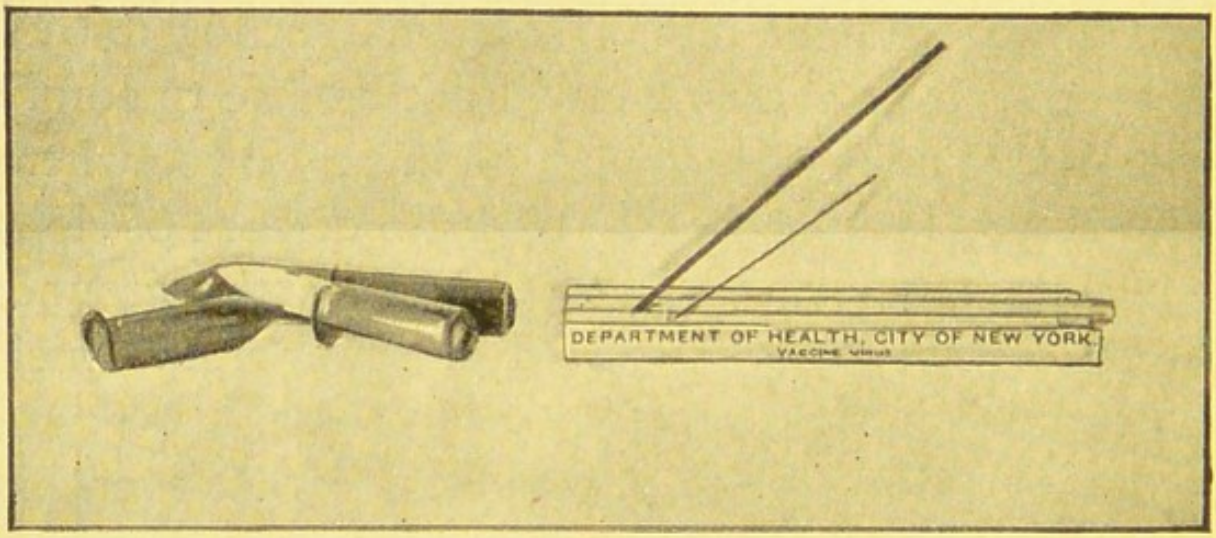
of the sick room. Keep soiled clothes and dishes in the mixture until they can be boiled and washed. But if the soiled articles are put into a wash boiler and boiled at once, it will not be necessary to soak them in a disinfectant.

Sewage. — If a person has a contagious disease, the slops and sewage which come from the sick room will have germs of the disease in them. Many of the germs may be killed by putting at least a tablespoonful of formalin or other good disinfectant into each quart of slops before they are taken from the room. The disinfectant will kill the germs which it touches, but it will not kill the germs which are inside of bits of solid matter, for it cannot reach those germs. It will not be safe to empty the sewage upon the ground, or in any place where flies may light upon it. In order to dispose of slops and sewage safely, either bury them in the ground, or empty them into a cesspool or sewer from which the germs cannot escape.

Scarlet Fever. — If a person has scarlet fever, his throat will be sore and his skin will be covered with fine, red spots. At the end of the sickness the skin will peel off in coarse flakes and scales. The disease is as contagious and as dangerous as diphtheria, and its germs are spread in the same way. Boards of health, therefore, require the same kind of quarantine and disinfection in scarlet fever as in diphtheria.

Smallpox. — When a person catches smallpox, his skin breaks out with small raised spots which look like blisters or pimples. Very few persons ever have the disease a second time. It is one of the most dangerous and contagious of all diseases, and was formerly so common that nearly everybody expected to have it at some time during life. But about the year 1800 an English physician, named Edward Jenner, discovered an easy way of making the body safe from the disease. This discovery was *vaccination.*

How Vaccination is Done. — Cows and calves sometimes have a mild disease in which spots like those



VACCINE.

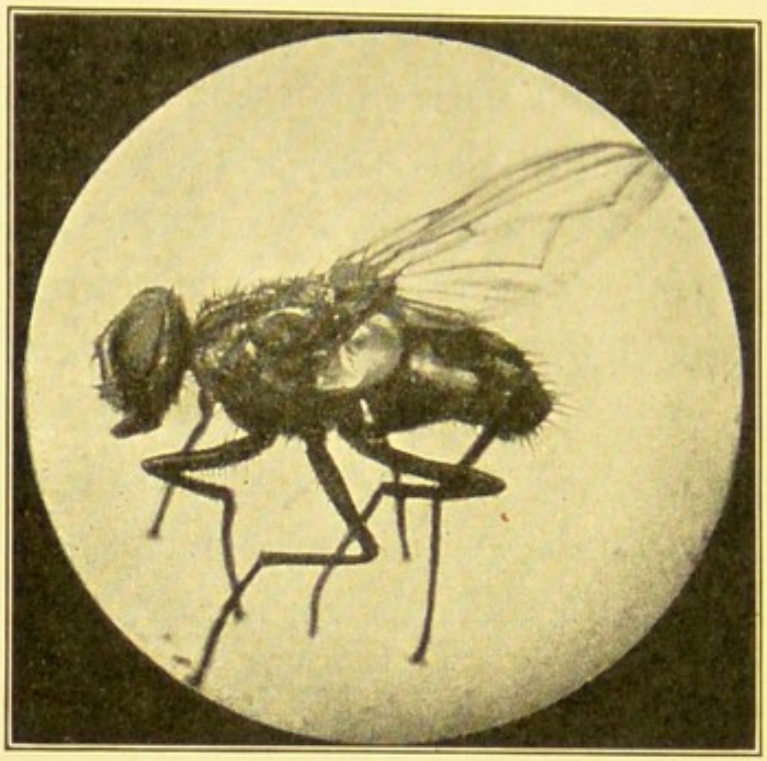
of smallpox appear on the skin. The fluid from the spots contains living germs of the disease, and is called *vaccine.* Vaccination is done by rubbing a bit of vaccine into a small scratch on a person's skin. There the germs grow and produce a sore spot which soon heals. The germs also cause the blood

to form a substance which will keep the germs of smallpox from growing in that person's body.

Smallpox has now become a rare disease, owing to the wide use of vaccination. Germany is now almost entirely free from the disease because the law of the land is that every inhabitant shall be vaccinated. The New York rule for vaccination is that every child shall be vaccinated before entering a public school, and again at about the age of twelve. This has been found to be a sure preventive of smallpox.

Some persons are afraid to be vaccinated because they fear that the sores will make them sick. If a person is made sick by vaccination, it is because either the vaccine or the arm has been dirty. Pure vaccine is now supplied by boards of health or may be bought at drug stores. If pure vaccine is used and the vaccinated spots are kept clean, no one will be made sick by vaccination.

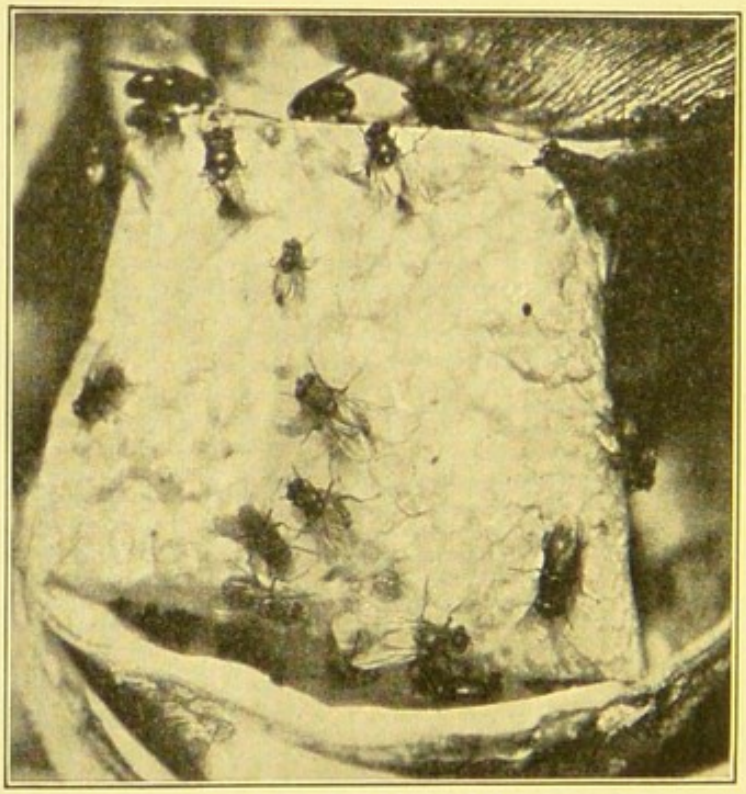
Typhoid Fever. — One of the worst of the diseases of the intestine is typhoid fever. It is usually spread by slops and sewage from the sick room, or by house flies. Many rivers contain sewage which has been poured into them from towns and houses on the river banks. For this reason cities which get their water from a river have often had a great deal of typhoid fever, but many of these same cities have got rid of most of the fever by purifying the water before using it (p. 101). The people of the



House Fly. (Magnified.)

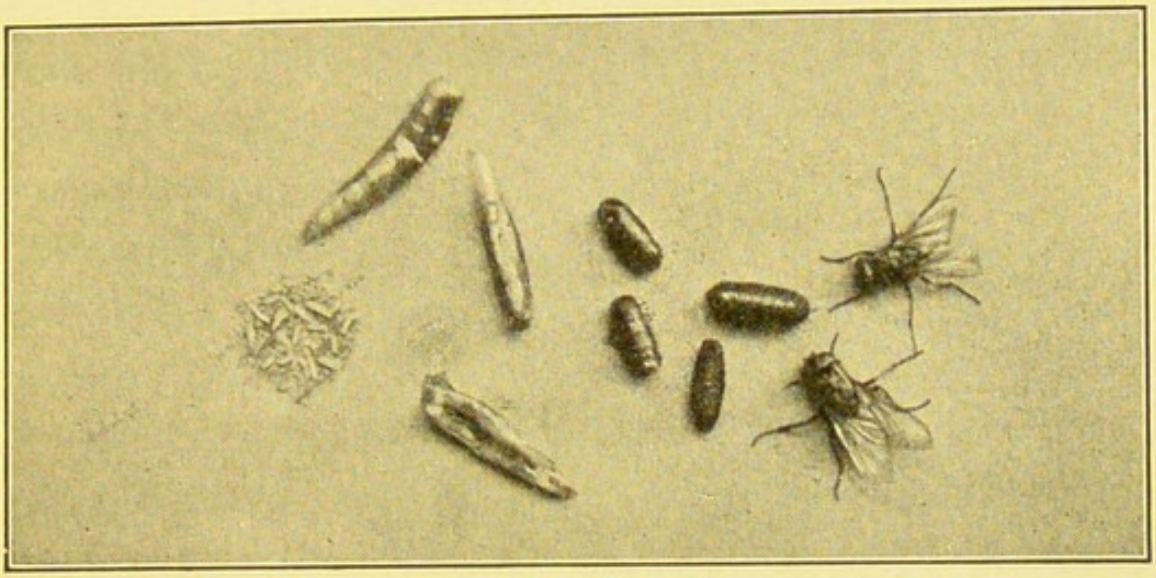
city of Albany use Hudson River water which contains the sewage from the city of Troy. Before the year 1900 the water was used just as it came from the river, but since that year the water has been purified by filtering it before it was used. Ever since the water has been purified, the deaths from typhoid fever each year have been only one quarter as many as before it was purified.

House Flies. — House flies crawl over slops, sewage, and garbage heaps and there pick up disease germs on their feet and bodies. The flies then



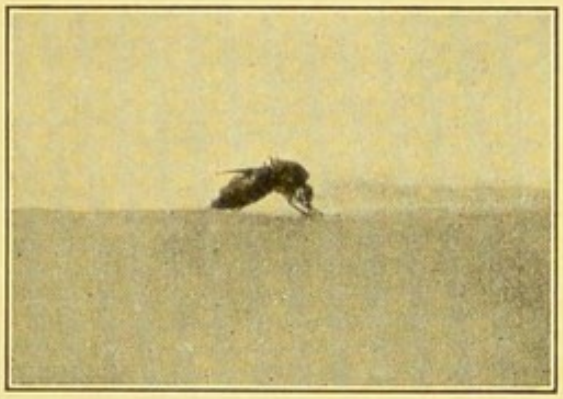
Flies on Garbage.

come into kitchens and leave the germs on dishes and food. Typhoid fever, consumption, and diph-



Eggs, Maggots, and Full-grown Flies.

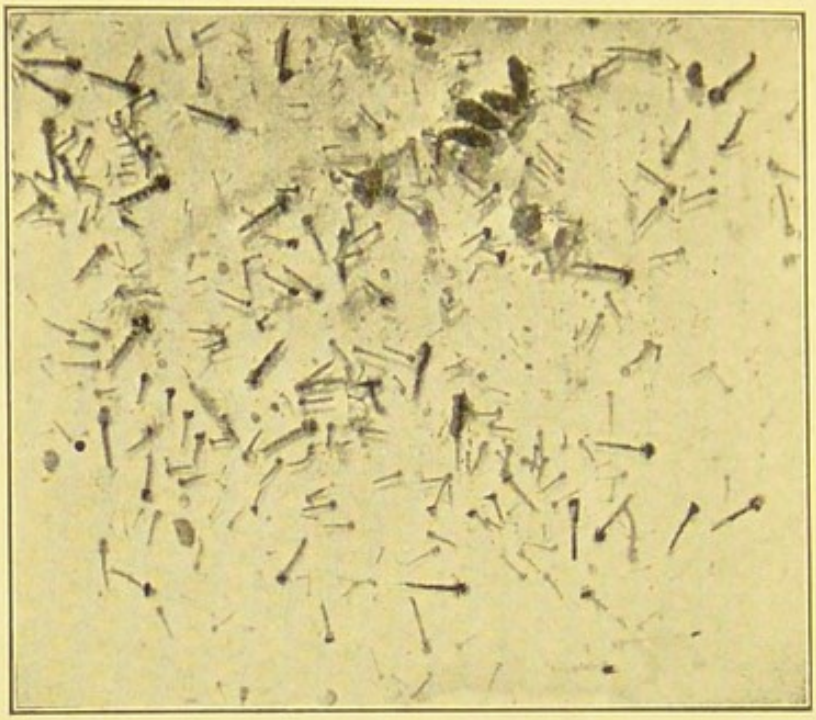
theria are some of the diseases which are often spread by house flies. One reason why fewer persons have stomach ache and typhoid fever in winter than in summer, is that there are very few flies in dwelling houses in winter.



Mosquito sucking Blood.

A great deal of sickness and a great number of deaths may be prevented by putting fly screens in doors and windows so as to keep flies out of houses and away from food. It would be a great deal better to get rid of all house flies. This is much easier than you may think.

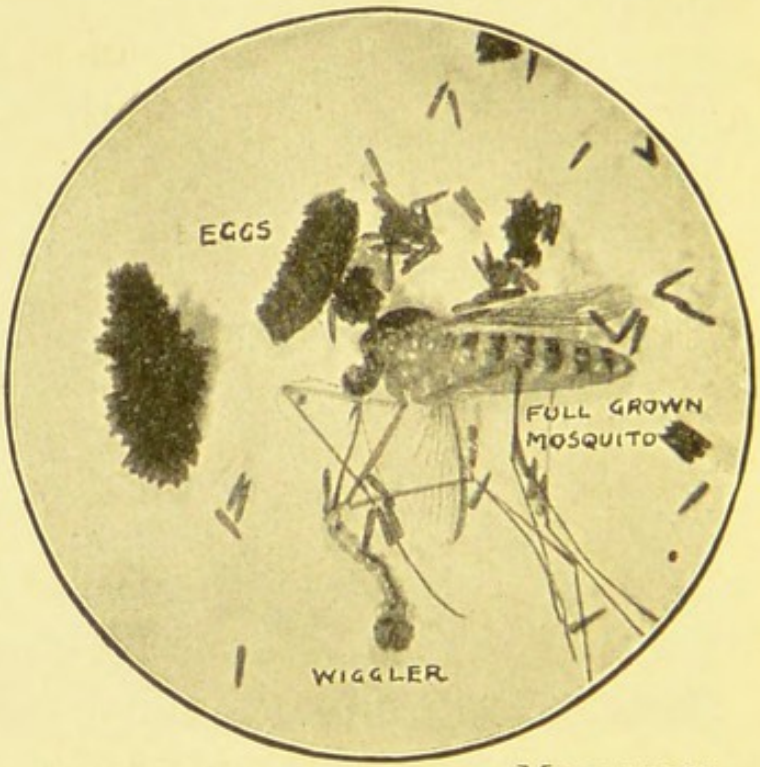
How to get rid of Flies. — House flies hatch from eggs which are laid in manure piles and garbage



Mosquito Eggs and Wigglers.

heaps. The young flies look like worms and are called *maggots*. Each maggot is a young fly. It takes about two weeks for an egg to become a full-grown fly. No flies could grow if all manure piles and garbage heaps were cleaned up at least once a week. There would soon be very few house flies left if all persons who keep cows and horses should take care of their stables, yards, and manure piles.

Malaria and Mosquitoes. — Malaria is an infectious disease, and is caused by germs which grow in the red blood cells of the sick person. The germs are



Photographed through a Microscope.

carried from the sick to other persons by mosquitoes. Not all mosquitoes can carry the germs, but the kinds which do carry them are often found with the harmless kinds. Yellow fever is another disease which is spread by mosquitoes. We may prevent malaria and yellow fever by getting rid of mosquitoes.

WHERE WIGGLERS THRIVE.

Mosquitoes hatch from eggs which are laid in stagnant water. The young are called *wigglers*. They may often be seen tumbling about in rain barrels in the summer. One way to get rid of mosquitoes is to empty out all rain barrels and other collections of dirty water, and to dry up marshes and pools, so that there will be no places in which the young insects may grow. Another way is to cover the water with a little kerosene or other thin oil in order to kill the wigglers.

QUESTIONS

What is the cause of a fever ?
What is a chill ?
What is a contagious disease ?

What is the danger from whooping cough, measles, and other mild children's diseases ?

How may children's diseases be kept from spreading ?

If a person has diphtheria, what may be seen in the throat ?

Why should a child be taught to allow its throat to be examined ?

Of what use is antitoxin in diphtheria ?

How may the germs of diphtheria be kept from spreading ?

What is *quarantine?*

What is *disinfection?*

How should formalin be used in killing disease germs ?

What are some of the duties of a board of health ?

What should be done to keep scarlet fever from spreading ?

What is smallpox ?

Why is smallpox not seen so often now as it was before the year 1800 ?

How is vaccination done ?

Of what use is vaccination ?

How is typhoid fever spread from a person who has the disease ?

How does purifying drinking water prevent typhoid fever ?

How do house flies cause a person to have a disease ?

Where do young house flies live ?

How can you get rid of flies ?

What is the cause of malaria ?

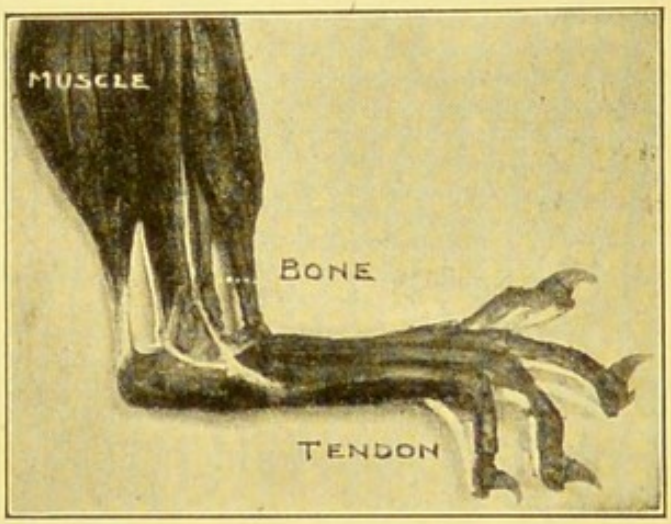
Where do young mosquitoes live ?

How can you get rid of mosquitoes ?

CHAPTER XXIV

EXERCISE

Muscles. — The motions of the body are made by means of *muscles*. An animal's muscles are its lean meat. The most of the flesh of a person's body is muscle that looks like the lean meat of an animal. Over half of a man's body is composed of muscle.

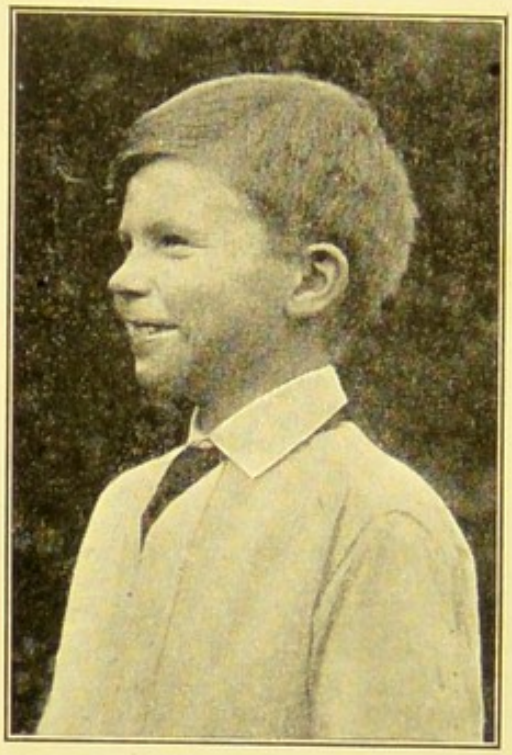


MUSCLES AND CORDS OF A CAT'S LEG.

Each muscle is made of fibers or tiny strings of flesh which are reddish in color. The fibers are bound into bundles by a small quantity of fine threads called *connective tissue*, which are white in color. Red bundles of muscle fibers and white threads of connective tissue may be easily seen on a piece of beefsteak. The smallest fibers and threads cannot be seen without a microscope.

Muscle fibers in meat are soft and tender, but connective tissue threads are firm and tough. If meat contains a great deal of connective tissue, it will be tough.

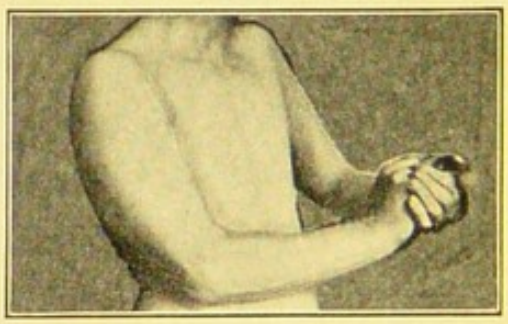
The muscles of the arms and legs are large at their upper ends and taper toward their lower parts, where they end in white cords. The cords are like smooth strings, and are composed of connective tissue. Some of them are as large as lead pencils and are as strong as though they were made of silk. They are fastened to the parts of the body that are to be moved.



Face Muscles in Action.

Cords may easily be felt on the front of the wrist and also on the back of the knee when the leg is bent. Another name for cords is *tendons*.

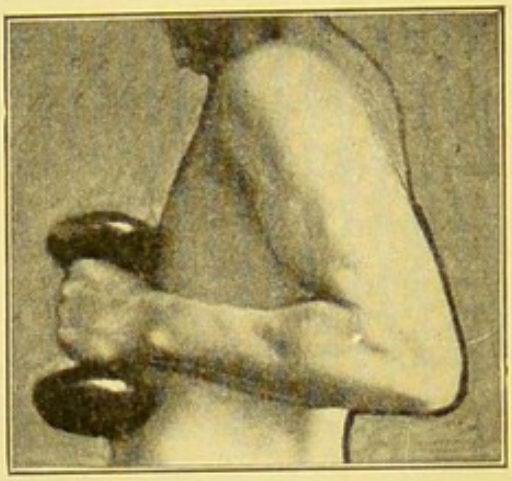
Most of the muscles of the face are in the form of flat sheets and have no cords fast to them. Nearly all of them are fastened to the lips and cheeks, or to the skin around the eyes. They change the appearance of the face in laughing and crying.



Arm Muscles at Rest.

How a Muscle Acts. — When a muscle acts, it swells out its middle part and shortens itself and thus it pulls upon its cord and moves whatever is fastened to the cord.

Grasp your arm above the elbow, and bend the arm as far and as strongly as you can. The muscle which bends the elbow will now feel hard and swollen.

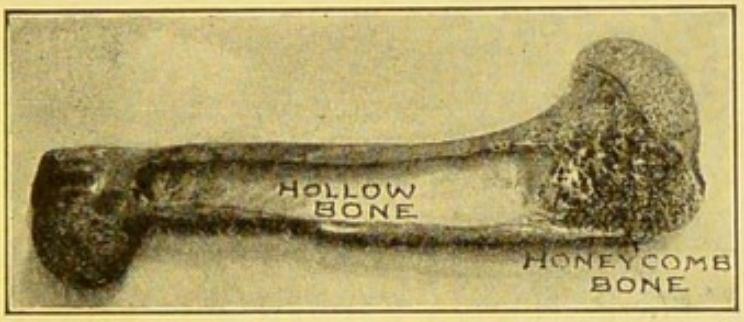


Arm Muscles in Action.

Let the arm drop to your side. The muscle will now feel soft and flat.

Muscles that are used in a proper way grow large and strong. Athletes practice for hours each day in order to increase the size and strength of their muscles.

Bone. — Muscles are built upon a framework of bone. The principal use of bones is to support the soft flesh, just as beams support a house. Most bones lie inside of bundles of muscles. If the bone of an arm or leg is broken in two, the limb will be useless, for there will be nothing to support the soft flesh. A doctor will bring the broken ends into place, and will bind the whole bone to a stiff board or *splint*, to keep the parts from moving. Then a new piece of bone will form, and unite the broken ends. This takes from three to six weeks (p. 140).

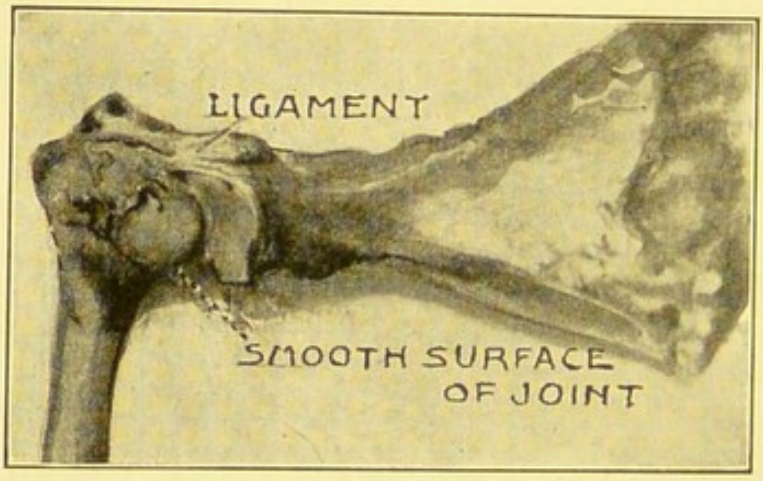


Bone sawed in Two Lengthwise.

The lime which is in bones makes them stiff. The bones of grown persons contain a great deal of lime, and will not bend much without breaking. The bones of babies and young children will bend somewhat without breaking, for they contain less lime than the bones of grown persons. For this reason the bones of children are not injured by falls and blows which would break those of older persons.

There are about 200 bones in the body, and each has a name. For example, the bone of the upper arm is called the *humerus*, the bone on the thumb side of the forearm is called the *radius*, and that on the little finger side is called the *ulna*.

Joints. — Bones are joined together end to end with thick and strong bands of gristle called *ligaments*. Nearly all of the bones of the arms and legs may be turned on their joints, like doors on their hinges. The ends of these bones are smooth and round, and are made slippery by a fluid.



SHOULDER JOINT OF A SHEEP.

Most of the motions of the body are the bending of joints. This bending is done by muscles. One end of a muscle is usually fast to a bone, and the other end, or its cord, is fastened to the bone next

to it. When the muscle shortens itself, the two bones turn at the joint.

Sprains. — When a joint is bent too far, its ligaments will be stretched and torn. Then the joint is said to be *sprained.* A sprained joint is painful and swollen, and the skin around it is often black or blue because of the bleeding from the torn ligaments.

What to do for a Sprain. — If a joint is sprained, put it into a pail of hot water for an hour or two. Add more hot water every few minutes to keep the heat as great as can be borne. This will lessen the pain and swelling. Afterward wrap a bandage snugly around the sprained part, and for some distance on each side of it, in order to keep the joint from moving. But after a day or two use the sprained part in order to keep the joint limber.

Two Objects in Exercise. — The use of muscles is called *exercise.* One reason for taking exercise is to have large and strong muscles. It is a fine thing to be large and strong in body, but in these days great muscular strength is not often needed. Healthy muscles are of more value than strong ones, but muscles will not be healthy unless they are exercised.

A second reason for taking exercise is to keep well in both body and mind. No one can feel well and bright without some exercise. Girls and women need exercise as much as growing boys need it.

Exercise and Health. — Muscles get their power from the burning or oxidation of food, just as an

automobile gets its power from burning gasoline. Exercise produces hunger, because the muscles oxidize food rapidly while they work. It causes shortness of breath and deep breathing, because the working muscles require a great deal of oxygen. It rouses every part of the body to do its best work. It causes the stomach to prepare food, the lungs to supply oxygen, the heart to pump blood, and the kidneys and skin to get rid of waste matter. When your muscles are in good condition, you are likely to be well and strong in body, and bright and cheerful in mind.

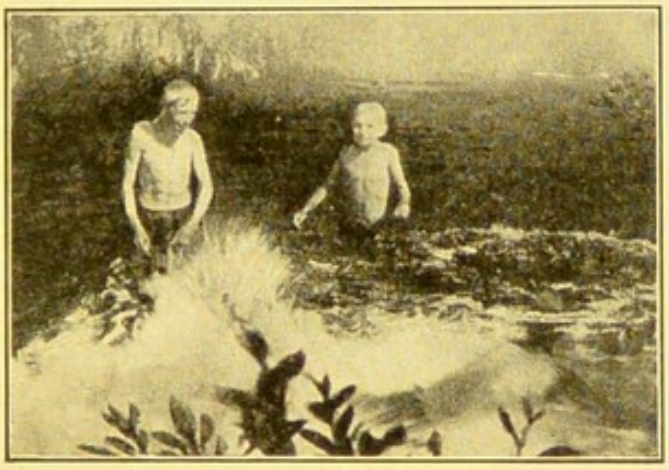
An Erect Body. — When you hold up your head and shoulders, you exercise the muscles of your back. Then the muscles grow strong and hold up your shoulders without your thinking about them. Soldiers are taught to stand straight in order that their muscles will grow strong and their lungs will have great breathing power (p. 154). Always standing straight and sitting upright will help you as much as it will help a soldier.

How Much to Exercise. — The most healthful way to live is to stay out of doors all day doing light work with the hands. Those who sit still and work for hours with their minds will not feel well unless they spend some time each day in taking exercise. Grown persons need to spend at least an hour or two every day at some kind of exercise, but children need to exercise for three or four hours a day.

The Best Exercise. — One of the best kinds of exercise is doing useful work, such as chores in the house and barn. You will take exercise if you work with carpenters' tools, or hoe a garden, or sweep a room, or rake a lawn, or care for hens and horses. All such exercise will help your mind as well as your muscles, and will also teach you to do useful work.

Good Exercise.

If you have to run errands or help your parents around the house or barn, you will get exercise without thinking about it. If you have no work to do, take your exercise by going on long walks, or by working in a gymnasium, or by playing games in which you run a great deal.



A Swimming Pool.

Swimming. — Swimming is good exercise, for it puts nearly every muscle in the body to use. The water also cleanses and refreshes the body (p. 32).

Some persons have a fear of the water if they do not know how to swim. When an accident happens, and they or their friends are thrown into deep water, they are too frightened to help themselves or any one else. On a hot day in the summer of 1910 twenty-two persons were drowned in different parts of New England while they were bathing for pleasure. Nearly all of these deaths could have been prevented if the bathers had known how to swim. Learn to swim, so that you will be cool and helpful when an accident happens on the water.

Rowing. — Rowing a boat will exercise most of the muscles of the body. By rowing you will learn how to handle a boat, and will know what to do if you should need to go out on the water.

Play. — Exercise means not merely the use of the muscles, but the pleasant use of the mind also. When you do not enjoy an exercise, you sometimes feel worse than if you had not taken it. Even though an interesting game may require you to think, and to work hard with your arms and legs, yet you will enjoy it while you play, and afterward you will feel refreshed in mind and body.

Those games are best that require quick thought as well as strength. Such sports as baseball, tennis, and skating are enjoyable forms of exercise which will train your mind to think quickly, and your body to become strong and graceful.

Gymnasium. — Many schools have gymnasiums in

which a scholar can exercise any set of muscles that he wishes. If any part of the body is weak, that part may be exercised and strengthened. If the arms are weak, they may be exercised by pulling upon weights. If the back is weak, it may be strengthened by exercising on a rowing machine.

Outdoor Exercise. — While you are taking exercise, you breathe a great deal of air into your body. You

Outdoor Exercise is Best.

get the greatest good from exercise when you take it out of doors where the air is pure and free from dust. This is one of the reasons why baseball and running games are among the best kinds of exercise.

Too Much Exercise. — If you exercise until your muscles are tired out, you will have no strength left for work. Schoolboys training for athletic contests often run hard or lift heavy weights until they have used up their strength. Then both their bodies and their minds grow weaker instead of stronger. But your feelings will usually tell you whether or not exercise is helping you. If any exercise that you take makes you so tired that a short rest does not refresh you, that exercise is too hard for you.

Alcohol and Strength. — Because strong drink makes the heart beat hard and the blood flow fast, a person who drinks it may feel strong. He is no stronger than he was before he took the drink, for the alcohol is like a whip that gives the body no strength for doing the work. So far from being the stronger, a person is really the weaker and the less able to use his strength because he has taken the drink.

QUESTIONS

Of what is the lean meat of an animal's body composed ?
What substance in meat makes it tough ?
What part of the flesh produces the motions of the body ?
Where is a good place on the body to feel a muscle acting ?
What is a tendon?
Where may tendons be felt in the body ?
Of what use are the bones ?
How may a person who has a broken bone be helped ?
How are the bones joined together in the body ?
What is a ligament?

What happens to the ligaments when a joint is sprained?

What should be done for a sprain ?

What are two reasons why a person should take exercise ?

From what do muscles get their power to work ?

How does exercise refresh the body after a person has been sitting still for some time ?

How may exercise help a person to have an erect body ?

What are some ways in which exercise may help the mind ?

What are some kinds of exercise that train the mind as well as the body ?

Give some reasons why every person should learn to swim.

Name some uses of a gymnasium.

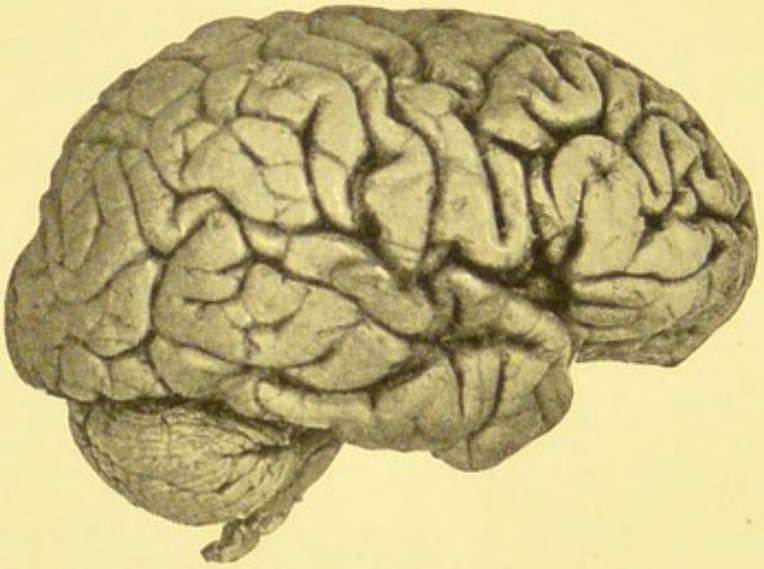
What harm may be done by exercising too much ?

What effect does alcohol have on a person's strength ?

CHAPTER XXV

THE BRAIN AND NERVES

The Mind. — Each person has a body and a mind. The body alone is not the whole man, for it can do only what the mind directs. Neither is the mind the whole man, for it cannot think or act except by means of that part of the body which is called the *brain*.

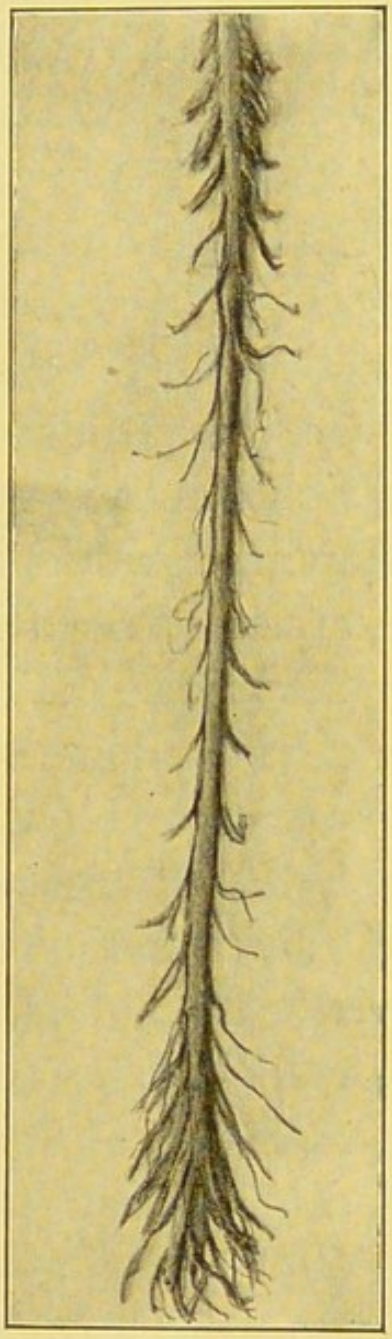


Brain of Man.

The Nervous System. — The brain of a person is about the size of his two fists. It fills the whole top of the head above the eyes and ears. A long cord, called the *spinal cord*, extends from it down the inside of the backbone. Long threads of flesh, called *nerves*, go out from the brain and spinal cord to every part of the body. The brain, spinal cord, and nerves are called the *nervous system*.

Sensory Nerve Messages. — Nerves are like telephone wires, and are always carrying messages back

and forth between the brain or spinal cord and the rest of the body. The nerves carry messages of seeing, hearing, feeling, smelling, and tasting to the brain. By means of these messages the mind finds out what is going on outside of the body. Nearly all that a person knows about what is going on around him he finds out by seeing, or by hearing, or by feeling, or by smelling, or by tasting. Children at school get nearly all their knowledge by means of messages of sight and hearing.



Spinal Cord.

The messages which the nerves carry to the brain are called *sensory* nerve messages. Receiving messages from the nerves is one kind of work which the brain does.

The Use of Pain. — Nerves also carry messages which tell the brain when a part of the body has been wounded or injured. Pain is a message telling you that something is wrong in the part which aches or smarts. If you had no pains and aches when you were hurt, you might lose an arm or leg before you would know of your danger.

A drug, such as morphine, eases pain because it prevents the brain from receiving the message of pain. The drug does not cure the painful part, but it may deceive a person and make him think he is well when he no longer feels the pain. Do not take a drug for pain unless a doctor gives it to you.

Motor Nerve Messages. — Sending messages to the muscles, telling them what motions to make, is a second kind of work which the brain does. These messages are called *motor* nerve messages. Whenever the hands work, the brain sends messages which direct the motions of their arms and fingers. A person works with his brain whenever he takes exercise or does work with any part of his body.

Thinking. — Thinking is a third kind of work which the brain does. The brain keeps a record of the messages which it receives and sends out. This record is the *memory*.

The mind often looks over the memory records which are stored in the brain. This act of the mind is called *thinking*.

Narcotics. — Many kinds of drugs, such as opium and morphine, prevent the brain and nerves from acting. If a person is in pain, they prevent the brain from feeling the pain. They may almost stop the brain from acting, and so they may put a person to sleep. A drug which benumbs the brain and nerves is called a *narcotic*.

Alcohol. — Alcohol is a narcotic, for it benumbs

the brain. If a person's brain is benumbed with strong drink, we say that he is drunk. His brain cannot send out motor messages properly, and so he staggers in his walk. He cannot feel sensory messages keenly, and so he may injure himself without knowing it. He cannot think well, and so he may act foolishly.

When a person has had a drink of whisky, he may suppose that his brain is more strong and active than usual. He is deceived. His brain is benumbed and he cannot feel as keenly as usual. He supposes himself to be strong and thoughtful because he does not notice his tired and sick feelings, and does not think how foolishly he acts.

Tobacco. — Tobacco also is a narcotic. The brain of a boy is easily made tired, and is quickly harmed by those things which may have little effect on a grown man. Any use of tobacco is harmful to boys.

One of the worst effects of tobacco is that it hinders brain growth. If a man is injured by tobacco, he may get well after he stops its use. But a boy cannot make up for the loss of growth caused by tobacco. Boys who smoke cigarettes will almost surely be behind other boys in school work. When they grow up and go out to work for themselves, they will be unable to obtain high positions in life (p. 119).

Where Brain Work is Done. — Each part of the brain has its own kind of work to do. The back

part of the brain receives messages of sight, hearing, feeling, smelling, and tasting; the top of the brain sends out orders to the muscles; and the front part of the brain does the most of the work of thinking. Thus, when you look at an arithmetic, you use the back part of the brain; when you copy an example, you use the top part; and when you think how to do the example, you use the front part of the brain.

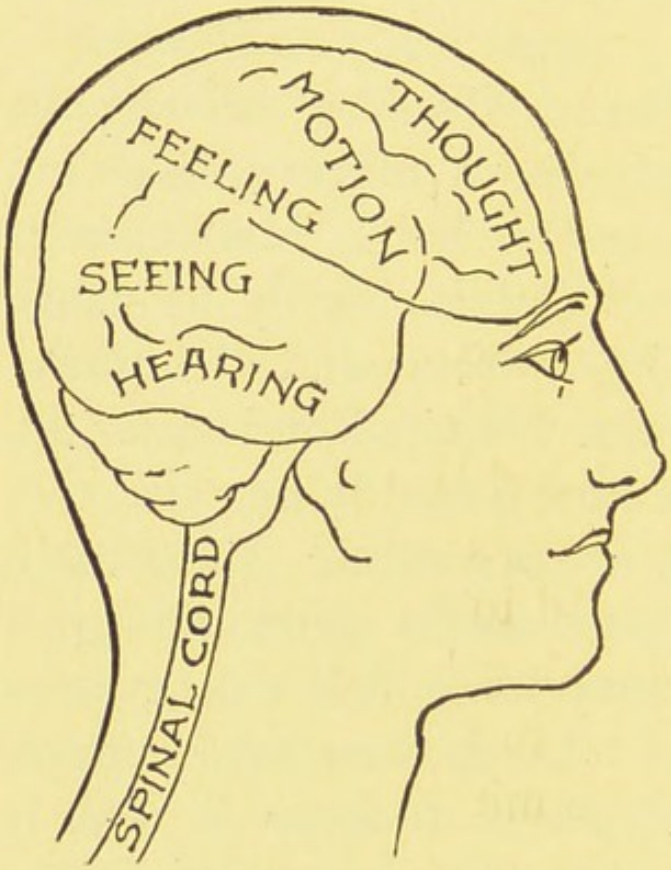


DIAGRAM OF THE BRAIN.

Tired Brains and Muscles. — When a muscle becomes tired, the part of the brain which directs its work also becomes tired. When the hands work, the brain becomes as tired as the muscles which move the hands. Playing ball for an afternoon tires the brain as much as it tires the arms and legs. When you feel tired after exercise, your muscles and your brain are both tired.

Hard exercise for a few minutes at recess will help to brighten the mind if it does not tire the muscles (p. 206). But exercise that tires the

muscles will tire the brain also. Hard play before school often makes a scholar so tired that he cannot learn a lesson well. Practicing long and hard with an athletic team will tire the brain as well as the muscles.

Play and Brain-rest. — When one part of your brain is tired, it may rest if you change your work and use another part of your brain. When you play outdoor games at recess, you make use of the part of the brain which directs the muscles, and you give the thinking part of your brain a rest. The exercise of playing games also makes you breathe deeply, and causes your blood to flow fast. When school is called again, you feel bright and refreshed.

Sleep. — The muscles may be easily rested by lying still, but it is often hard to keep the brain from thinking. One of the hardest of all things to do is to sit still and try not even to think.

The only time when the mind is at complete rest is during sleep. Then the mind almost stops acting, and the brain builds itself up and stores food for the next day's work. Every person must have sleep. The body can go without food longer than without sleep. A child ten years old needs at least ten hours of sound sleep each night. A grown person needs to sleep about seven hours daily. If you have had enough sleep, you will feel refreshed and ready to get up as soon as you wake up. If you are dull and feel like going to sleep after you

have washed and dressed, you have not had enough sleep, or else you are sick. If you sleep well and wake up bright and refreshed, you are not likely to harm yourself by working as hard as you choose all day long.

Sitting up Late. — Children cannot work or play until late at night without being tired the next morning. If they sit up late, they will lose some of their sleep unless they sleep late in the morning. If you expect to spend an evening at a party or entertainment, take a nap in the afternoon before you go. Then you will be rested for the evening's work and will also get your full amount of sleep.

When you have lessons to learn in the evening, you will not be able to do them well if you are tired. Drop your work early in the evening and go to bed. The sleep will rest and strengthen your mind, and in the morning you will be able to think clearly and to learn lessons which you could not understand in the evening.

Children are often cross and fretful in the evening because they are tired and do not know it. When bedtime comes, the place for you is in bed, even though you may not feel sleepy.

Some Causes of Wakefulness. — When a person is asleep, far less blood flows through the brain than while he is awake. Anything that makes a large quantity of blood flow through the brain will make the mind active and prevent sleep. For this reason

working or playing hard just before going to bed is often a cause of wakefulness. Amuse yourself after supper in some quiet way, as by looking at pictures. Then your mind will become quiet, only a little blood will flow through your brain, and you will easily fall asleep.

Some persons do not sleep well because their muscles do not become tired. Those who work the hardest with their muscles can usually sleep the best.

Impure air in a bedroom is often a cause of poor sleep. Keeping a bedroom window open all night is a great help in sleeping soundly.

Sleep and Eating. — A common cause of lying awake is wrong eating. If the stomach does not digest food well, there will often be a headache, or other uncomfortable feeling, which will prevent sleep. Poor sleep and bad dreams are often caused by wrong eating. Sweets, or desserts, or other fancy dishes at night, may cause an indigestion and prevent sleep.

QUESTIONS

What is the brain ?
What is the spinal cord?
What are nerves?
What are sensory nerve messages?
Of what use is pain?
What are motor nerve messages?
What makes the muscles of your arm move?
How does muscular work tire the brain?
What is the memory?

What is a narcotic?

Name some narcotics.

Why does a drunken man stagger in walking?

What effect does tobacco have on brain growth?

Name some ways in which the mind may become rested.

How does play at recess rest the brain?

Of what use is sleep?

How much sleep does a ten-year-old child need?

If you expect to be out for an evening, how may you get all the sleep that you need?

What are some of the things which often keep a person awake?

How may eating keep you awake?

How does exercise help a person to sleep?

CHAPTER XXVI

SEEING AND HEARING

The Eye. — The eye is a hollow globe filled with a clear liquid. Light enters it through a round window, called the *cornea*, and passes through a lens which is like the lens of a photographer's camera. The lens causes the light to form a picture upon nerves which lie in the back part of the globe. The feeling which the light produces in the nerves is called sight.

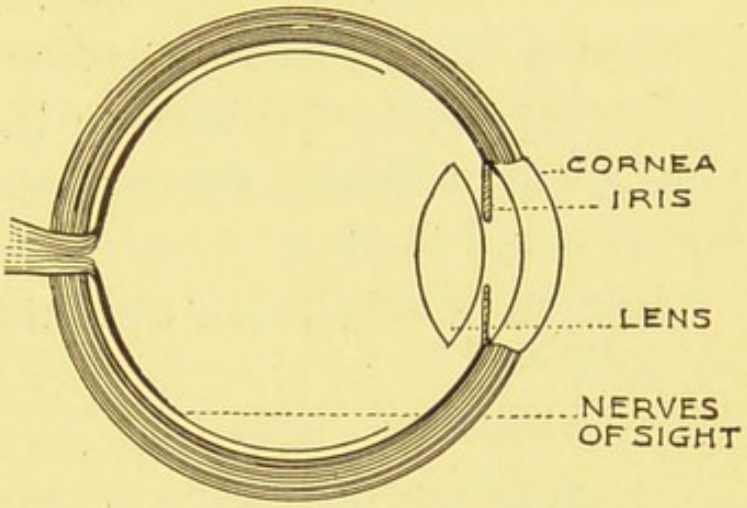


Diagram of the Eye.

A colored curtain, called the *iris*, hangs in front of the lens, and gives the eye its color. The iris has a round hole, called the *pupil*, which becomes large in a dim light and small in a bright light, in order to regulate the amount of light which enters the eye. The pupil appears black, because the inside of the eye has a black lining.

Dirt in the Eye. — The eye is covered with two lids which protect it from dust and dirt. A liquid

called *tears* runs under the lids to keep the eye clean. When you have a bit of sand or other hard dirt under a lid, your eye itches or smarts. Do not rub the lid, for that might make the dirt scratch the eye. Lift the lid, and hold it away from the eyeball for a moment so that the tears may wash the dirt away. If the dirt does not come away, let some one lift the eyelid and pick out the dirt with the corner of a clean handkerchief.

Bathing the Eyes. — Dust and tears sometimes dry on the eyelashes and on the edges of the lids. The dirt may contain disease germs which make the lids sore and tender. One great reason for washing the face often is to wash dirt and disease germs from the eyes.

Sometimes the eyes may smart and become red, and a white matter may run from them. The soreness is often caused by disease germs growing under the lids. A little borax dissolved in the water with which the eyes are washed will help to kill the germs.

The eyes of babies often become sore because they are not kept clean. Flies crawling over their eyes may leave disease germs on them. Many persons are blind because their eyes were not kept clean while they were babies. A baby's eyes will not be likely to become sore if they are kept clean.

Poor Sight. — The eyes of some persons do not form clear pictures of what they try to see. These

persons cannot see well. Their eyes soon become tired, and they often have headaches. Many school children have headaches because they have to strain their eyes in their studies. Some are backward because they have poor sight, and no one is aware of it.

Testing the Sight.— The sight may be tested by finding the greatest distance at which large, plain letters can be read. Test one eye at a time while the other is kept closed. The following table gives the distances at which letters of various sizes may be read by a person with good eyesight.

Height of Letter.	Distance at Which it may be Read.
$3\frac{1}{2}$ inches	200 feet
$1\frac{3}{4}$ inches	100 feet
$1\frac{1}{4}$ inches	70 feet
$\frac{7}{8}$ inch	50 feet
$\frac{3}{4}$ inch	40 feet
$\frac{1}{2}$ inch	30 feet
$\frac{3}{8}$ inch	20 feet

A record of a person's eyesight may be made in the form of a fraction in which the numerator is the greatest distance at which a letter is read, and the denominator is the greatest distance at which it may be read by a person with good eyesight. If a person has to stand only ten feet away from a card

in order to read letters $\frac{3}{8}$ inch high, that person sees only $\frac{10}{20}$, or one half, as well as he should.

Eyeglasses. — A person who has to hold a book less than a foot from the eyes while reading is *near-sighted.* His sight may be greatly improved by wearing glasses. If they are not worn, the eyes will be strained.

If a person has to hold a book at arm's length when reading, he is *farsighted* and needs glasses. Most old persons are farsighted.

The front parts of the eyes of some persons are curved unevenly. This trouble is called *astigmatism.* These persons see things blurred, just as a person with good eyesight would see them blurred when looking at them through a wrinkled window glass. They often have headaches because they tire the muscles of their eyes in trying to see clearly. They may improve their sight and stop their headaches by wearing the proper glasses.

If you cannot see as well as other persons, something is the matter with your eyes. You cannot improve the sight by straining the eyes. Tell your teacher or your parents, and ask them to help you to get fitted with glasses.

Eyeglasses that stay in place by pinching the nose often produce pains. Spectacles do not pinch the nose, but are held in place by bows which loop over the ears.

Cross-eye. — If a person does not turn both eyes

toward an object at which he looks, we say that he is *cross-eyed.* Those who are cross-eyed cannot see well, for everything appears double to them. Their sight may be greatly improved by a doctor.

The Proper Light. — A wrong light is often a cause of eye pain and eye strain. Reading by a dim light, or by one that is unsteady, will strain the eyes and often cause a headache.

If you face a strong light while you read, your eyes will be dazzled and soon become painful. If you place your seat where the window or lamp will be on your left side, the light will be in the best position for reading or studying.

Granulated Eyelids. — Sometimes the inside of the eyelids look red, and feel as if they were covered with grains of fine sand. This trouble is called *granulated eyelids.* One form of granulated eyelids is infectious, and is called trachoma. It may be caught from towels or handkerchiefs that have been used by some one who has trachoma. The disease is becoming common in cities. It is dangerous and may cause blindness, and yet it may easily be cured. Every child who has it should be taken at once to a doctor.

The Ear consists of three parts, which are called the outer ear, the middle ear, and the inner ear.

The outer ear consists of a shell of flesh, and a short tube which extends into the side of the head. The tube ends at a thin skin which is called the

eardrum, because it is stretched over the end of the tube like a drumhead.

Behind the eardrum is a small hollow space called the *middle ear.* The middle ear is filled with air and

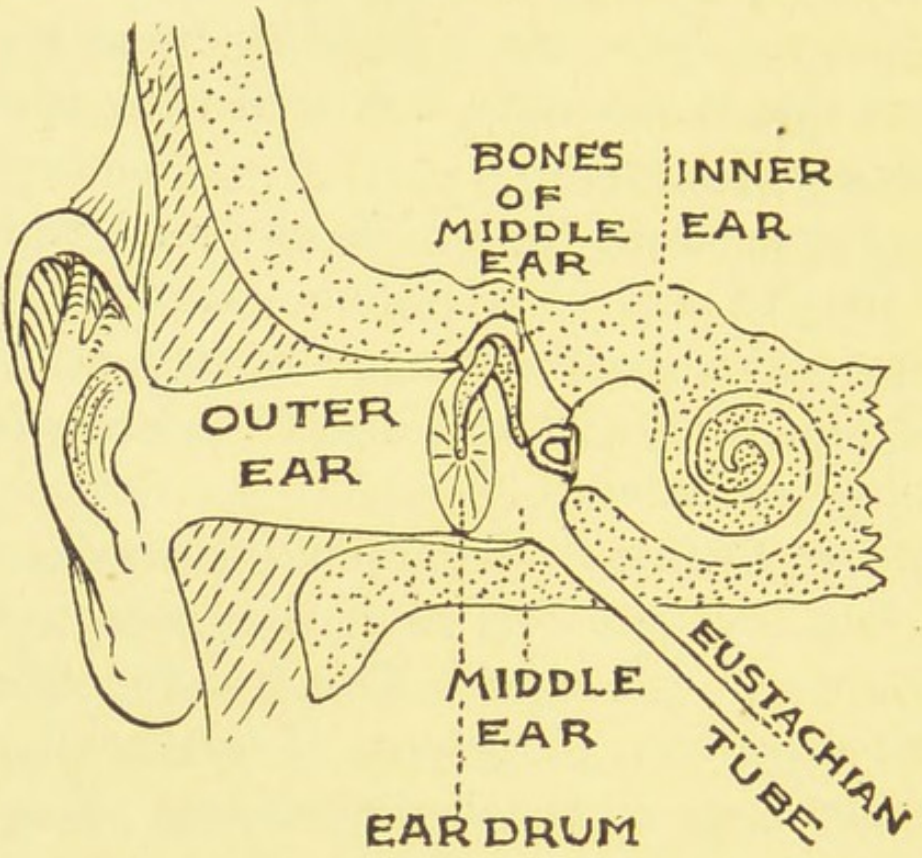


Diagram of the Ear.

is crossed by a chain of three tiny bones that reach from the eardrum to another space called the *inner ear.*

The inner ear is shaped like a snail shell, and is filled with a clear liquid. The nerves of hearing are stretched across it like the strings of a piano. The middle ear and the inner ear are both hollowed out of hard bone, and therefore are not likely to be injured by blows and jars.

How we Hear. — Sound is caused by air moving in waves. A very loud sound, such as thunder, is produced by great air waves which strike against windows and doors and cause them to shake and rattle. When a sound is heard, air waves strike against the eardrum and move the bones of the middle ear, and the liquid of the inner ear. The nerves of the inner ear feel the motion as sound. A person who is hearing a sound is really feeling the motion of the liquid in the inner ear.

Testing the Hearing. — Some school children are dull and inattentive because they are deaf, and neither they, nor their parents, nor their teachers know it. In many schools the hearing of every scholar is tested.

The hearing may be tested by finding the greatest distance at which a whispered word may be heard in a quiet room. Test each ear separately while the other ear is closed with a finger. The person testing the hearing pronounces a number and the person tested repeats it to show that it is understood. A person with good hearing can understand a loud whisper in a quiet room at a distance of about 25 feet.

The record of a person's hearing may be put in the form of a fraction in which the denominator is 25, and the numerator is the greatest number of feet at which a whisper is understood. If a person can understand a whispered word at no greater distance

than five feet, that person hears only $\frac{5}{25}$, or $\frac{1}{5}$, as well as he should.

Eustachian Tube. — A small tube, called the *Eustachian tube*, lets air pass from the throat into the middle ear. Trying to blow the nose hard while holding the nostrils closed will force so much air into the middle ear that the eardrum will bulge out. Then the hearing will be dulled, because the eardrum will not move freely. When a person has a cold or a sore throat, the ears often buzz, and there is a slight deafness, because the swelling in the throat stops up the Eustachian tube, and does not let air pass into the middle ear. Most persons who are deaf are made so by adenoids or other throat troubles which stop up the Eustachian tube.

Earache. — The middle ear is moistened with a small amount of liquid. If the liquid cannot run out through the Eustachian tube, it may fill the middle ear full and press hard upon the eardrum. This causes an earache. The eardrum may burst and let the liquid run out, and then the pain stops. But the ear is likely to be deaf, and matter is likely to run from it for days or weeks afterwards.

If you have an earache or a running ear, you are in danger of being deaf for the rest of your life, but if you go to a doctor, you can usually be cured and your hearing can be saved.

Adenoids and Earaches. — Most children who have earache and running ears have adenoids growing in

their throats (p. 53). The first thing to do in order to cure an earache or deafness is to have the adenoids taken out.

Ear Wax. — The tube of the outer ear produces a brown wax which protects it from injury. Persons often force the wax deep into the tube when they try to remove it, and in that way they make themselves deaf. Let the wax alone, and all that is not needed in the ear will drop out.

Voice. — The sounds of the voice come from the upper part of the windpipe just below the back end of the tongue. They are made by forcing air between two bands of flesh called *vocal cords*. The sounds are made pleasing, and are formed into words by the nose, mouth, tongue, and teeth. You must have all these parts of the body in good order if you would have a good voice.

A person learns to speak by listening to the words of others. Those who cannot talk are usually too deaf to hear. They may learn to talk if they go to a school for the deaf.

What is called a tongue-tie, or a cord hindering the movements of the tongue, is very seldom seen. Very few persons with indistinct speech have anything the matter with their tongues or throats. Nearly every person can easily learn to speak distinctly by practice.

A Pleasing Voice. — If you mumble your words and speak indistinctly, those who listen to you will

have to try hard in order to understand you. If your voice is shrill and unpleasant, it will annoy other persons and make them uncomfortable. Sick persons are often made worse by the loud talk of visitors and nurses, but everybody likes to hear a voice that is soft and pleasant. One of the best recommendations that a boy or girl can have is to speak clearly and in a pleasant tone.

QUESTIONS

In what respect is the eye like a photographer's camera?
Of what use are the eyelids?
Of what use are tears?
How may a speck of dirt be removed from under the eyelid?
What care should be given to the eyes when they become sore?
How does wearing glasses often help a headache?
What is nearsightedness?
What is farsightedness?
What is astigmatism?
When should glasses be worn?
How may the sight be tested?
What is trachoma?
How should the light be arranged for reading?
With which part of the ear is sound heard?
Why do the ears often buzz when the nose is blown hard?
How does throat trouble cause earache and deafness?
How may the hearing of a person be tested?
Why does a deaf baby not learn to talk?
How is the sound of the voice made?
What has a pleasant voice to do with health?

GLOSSARY

A

Absor'bent cotton, purified cotton, used for dressing wounds.

Ad'enoids, soft growths in the upper part of the throat and behind the nose.

Al'cohol, a colorless liquid used for preserving specimens in museums, and for burning. Wine, beer, whisky, and all other kinds of strong drink contain it.

Antitox'in, a substance which will destroy the poisons of disease germs in the body. A common kind of antitoxin is that which is used for curing or preventing diphtheria.

Ap'petite, a desire for food or drink.

Arte'rial blood, blood containing a large amount of oxygen. The most of the blood in arteries is arterial.

Ar'tery, a tube which carries blood away from the heart.

Artifi'cial respira'tion, causing air to pass into and out of the lungs of a person who seems to be lifeless.

Astig'matism, an unevenness of the surface of the eye, causing blurred sight.

Au'ricles, the two thin-walled chambers upon the large end of the heart. They receive blood from the veins.

B

Bacte'ria, the smallest forms of living beings. They are plants, and are the cause of most forms of decay and of most infectious diseases.

Ban'dage, a strip of cloth wound around a wound to protect it, or to hold dressings in place.

Beer, a kind of strong drink made by boiling malt and fermenting the liquid.

Bile, the bitter yellow liquid produced by the liver.

Blis'ter, a collection of the liquid part of the blood under the outer layer of the skin.

Board of Health, a body of officers who have charge of the prevention of infectious diseases, the purity of food supplies, and other matters affecting health.

Brain, the seat of the mind. It fills the upper part of the head.

Bronchi, the tubes through which air enters the lungs.

C

Canning, preparing food by heating it and sealing it in air-tight cans in order to prevent it from spoiling.
Cap'illaries, the microscopic tubes which carry blood from the arteries to the veins.
Carbon diox'ide, a colorless gas formed by most fires, and by the oxidation in the body.
Cesspool, an underground tank from which sewage soaks into the soil.
Circula'tion, the flow of blood through the body.
Clot, blood in a jellylike form.
Cocoa, the ground seeds of the cacao tree. It is a brown powder, and is sometimes called chocolate.
Coffee, the roasted seeds of the coffee tree.
Cold, a mild form of a disease caused by the growth of bacteria in the body.
Connec'tive tissue, the tough, white fibers which support soft flesh.
Consump'tion, a common disease of the lungs caused by the growth of tuberculosis bacteria in the flesh.
Conta'gious diseas'es, diseases which may be caught by being near the sick.
Cooking, heating food in order to make it ready for eating.
Corns, tender, thickened spots upon the outer layer of the skin on a toe, or other part of the foot.
Cor'puscles, the solid bodies which float in the blood.

D

Dan'druff, loose scales of skin among the hair of the head.
Decay, the destruction of lifeless substances by bacteria or molds.
Den'tine, the bony substance of which a tooth is made.
Diges'tion, dissolving food in the body.
Diph'theria, an infectious disease of the throat, caused by the growth of the bacteria of the disease.
Disease germs, microscopic plants and animals which grow in a living body and produce a disease.
Disinfec'tion, destroying bacteria in a substance.
Distilla'tion, separating alcohol from a boiling liquid by cooling the steam.
Dressing, a covering for a wound.
Dyspep'sia, poor digestion of food.

E

Eardrum, the thin sheet of flesh at the inner end of the tube of the outer ear.

Ear wax, a brown, waxy substance which is formed in the tube of the outer ear.
Enamel, the hard, white coating of a tooth.
Enlarged glands, swellings on the sides of the neck, usually caused by disease germs.
Epider'mis, the thin, outer layer of the skin.
Esoph'agus, the tube down which food is swallowed.
Eusta'chian tube, a small air tube leading from the middle ear to the throat.

F

Farsight'edness, the power to see distant things clearly, but not those near to the eye.
Fermenta'tion, changing sugar in a liquid to alcohol and carbon dioxide gas. The gas makes the liquid appear to be boiling.
Fever, a sickness in which the body is too warm. It is usually caused by disease germs.
Filter, a box or tank of sand for removing solid impurities from water.
Food, any substance which the body may safely use for building itself up, or for producing heat.
For'malin, a colorless liquid used for killing disease germs.

G

Gar'bage, solid, decaying waste substances from a kitchen.
Gastric juice, the liquid that dissolves food in the stomach.
Germs, the plants or animals that grow in a living body and produce diseases; bacteria.
Gran'ulated eyelids, a disease of the inner surfaces of the eyelids, caused by disease germs; trachoma.

H

Heart, the muscular pump that forces blood through the body.
Hu'merus, the bone reaching from the elbow to the shoulder.
Hy'giene, the study of the care of the body.

I

Indiges'tion, poor digestion; dyspepsia.
Infec'tious diseases, those forms of sickness which a person may catch from some one who is sick. They are caused by microscopic plants or animals growing in the body.
In'growing nail, a toenail whose edge is buried beneath the flesh pushed against it by a tight shoe.

Intem'perance, satisfying an appetite for the sake of pleasure only.
Intes'tine,. the long food tube below the stomach.

K

Kid'neys, two red masses of flesh which remove waste matters from the blood.

L

Lig'ament, strong bands of flesh which bind bones together; gristle.
Liv'er, the large, red mass of flesh which receives digested food from the intestine and forms bile.
Lock'jaw, a dangerous disease producing a contraction of the muscles. It is caused by disease germs which enter a wound.
Lungs, the spongy masses of flesh in which blood takes oxygen from the air.

M

Mag'gots, young house flies. They look like white worms.
Mala'ria, a sickness in which the body at first is cold and within an hour is too warm. It is caused by disease germs which are placed in the body by mosquitoes when they bite.
Mi'crobes, a former name for bacteria.
Min'erals, the ashes which are left when flesh, bone, or food is burned.
Molars, the back teeth. They have flat surfaces for grinding food.
Mold, microscopic plants which often produce a furry growth on food and clothing.
Motor nerve, a nerve which carries a message away from the brain or spinal cord.
Mucus, the liquid produced by the lining of the nose, throat, and other hollow parts of the body.
Muscles, lean meat. Their use is to produce the motions of the body.

N

Narcot'ic, a drug that produces sleep.
Nearsight'edness, sight in which objects must be held near the eye in order to be seen.
Nerves, long threads or strings of flesh which carry messages between the brain or spinal cord and the rest of the body.
Ner'vousness, lack of control of the mind over the feelings of the body.
Nervous system, the brain, spinal cord, and nerves.
Nic'otine, the principal poisonous part of tobacco.

O

Oil glands, tiny pockets in the skin in which an oil is formed for softening the skin.
Oxida'tion, the joining of oxygen to a substance. The burning in a stove is a rapid form of oxidation.
Oxygen, a substance that forms one fifth of the air.

P

Pan'creas, a mass of flesh in which one of the digestive fluids is formed.
Pas'teurizing, killing bacteria in milk by heating it to a temperature less than boiling.
Perspira'tion, the liquid which comes from the skin when the body is too warm; sweat.
Phlegm, thick mucus from the nose or throat.
Physiol'ogy, the study of the actions of a living body.
Pro'te-in, the substance of which living flesh is composed. It is like the white of an egg.
Pupil, the round opening which admits light into the eye.
Pus, the creamy matter which flows from sore wounds. It is composed of white blood cells that have been killed by bacteria.

Q

Quar'antine, keeping persons who are sick with an infectious disease away from other persons.

R

Radius, the bone extending from the elbow to the wrist on the thumb side of the arm.
Red blood cells, the red bodies which float in the blood. They carry oxygen from the lungs through the body.
Respira'tion, breathing, and oxidation in the body.
Ring'worm, a skin disease caused by a kind of mold growing in the flesh.

S

Sali'va, the liquid of the mouth. It digests starch.
Scarlet fever, a catching disease in which the skin becomes red.
Sen'sory nerves, nerves which carry messages to the spinal cord and brain.
Serum, the liquid part of the blood.
Sew'age, waste water from bathrooms and kitchens.

Sew'age dispos'al, destroying the solid substances and disease germs in sewage.
Sewer, a pipe for carrying away sewage.
Smallpox, a catching disease in which blisters containing pus appear on the skin.
Spinal cord, the cord of nerve matter that lies in the backbone.
Spores, the dust that flies from mold. Each particle is a seedlike ball.
Ster'ilizing, heating a substance boiling hot in order to kill the bacteria in it.
Stim'ulant, a substance that rouses the body to action.
Stom'ach, the bag which food enters after it is swallowed.
Strong drink, any drink containing alcohol.

T

Tan, a dark substance formed in the skin by exposure to bright sunlight.
Tea, dried leaves of the tea tree.
Ten'don, the strong, white cords which connect a muscle to a bone.
Tobacco, a plant used for smoking and chewing, and as snuff. It contains a narcotic poison.
Tonsilli'tis, a soreness of the tonsils, with fever.
Ton'sils, masses of flesh growing in the sides of the throat. They are often the cause of sickness.
Tra'chea, the tube carrying air from the throat to the lungs; the windpipe.
Tracho'ma, an infectious form of granulated eyelids.
Tuberculo'sis, a disease caused by the germs of tuberculosis growing in the body; consumption.
Ty'phoid fever, a disease of the intestine caused by the growth of typhoid bacteria.

U

Ul'na, the bone that extends from the elbow to the wrist on the little finger side of the arm.

V

Vaccina'tion, protecting the body against smallpox by causing the germs of cowpox to grow in the skin.
Vein, the blood tube that carries blood toward the heart.
Venous blood, blood that contains but little oxygen. Most blood in the veins is venous.
Ventila'tion, changing the air of a room for fresh, outdoor air.
Ven'tricles, the two hollow spaces at the pointed end of the heart.

Villi, the velvetlike projections on the lining of the intestine.
Vin'egar, a sour liquid produced by bacteria growing in cider or wine.
Vocal cords, two flat bands of flesh at the upper end of the windpipe by which the sound of the voice is produced.

W

Waste matter, oxidized substances in the body.
White blood cells, the white bodies which float in the blood. They destroy disease germs.
Wig'glers, young mosquitoes in the water.
Wine, fermented fruit juice.

Y

Yeast, microscopic plants that change sugar to alcohol and carbon dioxide.
Yellow fever, a sickness caused by the bite of mosquitoes.

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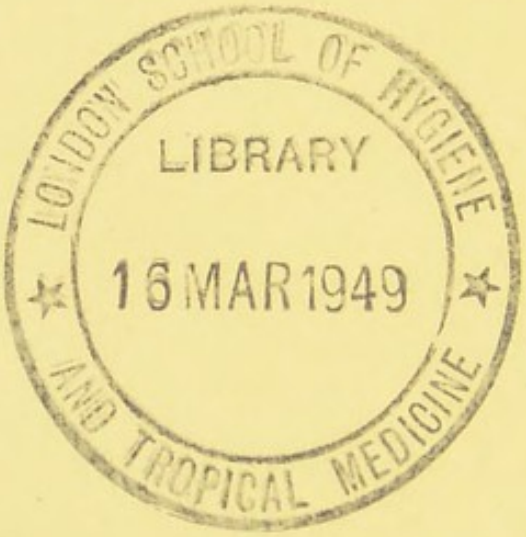
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