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**FIRST LESSONS
ON
HEALTH**

J. BERNERS



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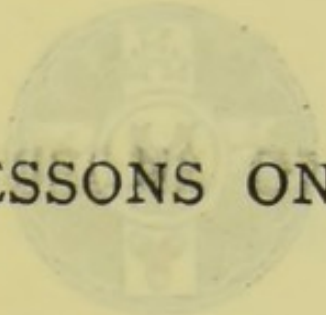


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FIRST LESSONS ON HEALTH.



HEALTH

FIRST

FIRST LESSONS

ON

HEALTH.

BY

J. BERNERS.

NEW EDITION.

London :

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1885.

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FIRST LESSONS

HEALTH

LONDON:
RICHARD CLAY AND SONS,
BREAD STREET HILL,
And at Bungay, Suffolk.



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P R E F A C E.

THIS little book consists of the notes of a number of simple lessons on sanitary subjects given (without any idea of publication) to a girls' class in a national school, and listened to with great interest and intelligence. I have endeavoured to make them as easy and familiar as possible; but the lessons themselves, I should observe, were far more so, being broken into incessant questions and answers, and garnished with as many homely and simple illustrations as could be pressed into the service.

Slight and superficial as they may be, I have good hope that, as far as they go, they are trustworthy. It would be pedantic in so unpretending a volume to be constantly quoting authorities, though I have stated no fact at random; but I may mention, as having been specially indebted to them, the

lectures and writings of Professor Huxley, Dr. Carpenter, Dr Odling, and Dr. E. Smith. One of my main attempts has been, to translate the concise and accurate language of science, into the colloquial "nursery dialect" comprehensible to children.

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LESSONS ON HEALTH.

LESSON I.

INTRODUCTORY.

I AM going to give you some lessons on Health.

You think that it is a very odd subject for lessons, I daresay. Many people that I have spoken to about it have thought so too. Some of them have thought I could not find much to teach you about that, because everyone knows all about it already.

I only wish we did ; for then we should not see so many poor pining children, and miserable pale-faced men and women, as we do ; and many who are now lying cold in the churchyard, might be still well and happy among us.

Other people think that it is rather wrong to try to battle with diseases, because they have a notion that they are God's will and His sending, and that all we have to do is to submit.

I don't think these people can read the New Testament very often. We read there of the most perfect and beautiful life that was ever lived on earth—the life of Christ.

How did He spend His time? Almost always He was doing one of two things: teaching the soul—healing the body. When people were ignorant, He taught them; when they were ill, He cured them. You will see this in Matt. iv. 23; and you must try and understand what the Gospel, or Good News, of the Kingdom really means.

It means that our King loves to see His people, not ignorant and sickly, but wise and healthy and happy.

I think one of the best Collects in the Prayer-book is the one that prays that “we, being ready both in body and soul, may cheerfully accomplish God’s will.” Let us all not only pray, but try for that.

If we once believe that sickness is not God’s will and pleasure, but is brought about by our own ignorance, and sometimes by our own folly and fault, we shall have more courage in trying to get rid of it.

English people have already found out how to conquer and get rid of some illnesses altogether. You have all heard of the Plague, and of the thousands of people who used to die from it. Now that is quite conquered, and it has not been in England for two hundred years.

There is another dreadful disease, called scurvy, which sailors used to be very subject to, when they went long voyages, and which has killed many and many a brave man. Now that is quite conquered too; clever people have found out how to prevent

the long sea-voyages from doing the sailors harm, and they need have no fear of scurvy any longer if they only obey a few clear and certain rules.

Many other illnesses also, which we read of in books of history, are now got rid of for ever.

A great many more may be conquered, and, indeed, we are on the way to conquer them already. Cholera, small-pox, and other diseases are already partly subdued ; and if all the people in the country were more sensible and more careful, they would be quite done away with.

Besides all those illnesses which are so terrible that we cannot help taking notice of them, and trying in one way or another to save ourselves from them, only think what a number of smaller illnesses there are, which we don't think so much of, but which nevertheless kill many people, and make many others miserable and useless.

How many people are always catching cold , how many have bad headaches ; how many feel weak and languid ; how many have boils and sore places ; and, indeed, I need not remind you of any more such misfortunes, because we are all seeing or feeling them nearly every day of our lives. I daresay we are none of us quite as strong and healthy as we might be if we knew perfectly well how to manage our way of life.

We do know more about this than our grandfathers and great-grandfathers did ; therefore, on the whole, people are healthier and live longer now than they did

then ; but a great number still die who need not, and a great many live sickly and wretched who might be well and happy.

Many wise and clever men are constantly trying to find out how to fight and conquer disease ; and though we do not yet know how to do away with all unhealthiness, we know enough to do away with a great deal.

And this is what I am going to try to teach you.

Now let us see if we can find out what things we all need for Life and Health.

You can only think of food and clothes ? Well, though you are all wrong, I am not much surprised at it ; it is just because people in general don't so much as know of the other things they require, that they take no pains to get them ; and that is the grand reason why there are all those troubles and sicknesses we were talking of just now.

However, let us think it over. Shut up your mouths, hold your pocket-handkerchiefs tight over your noses, and begin to think.

But why are you not doing so ? How is it I see you all with your mouths and noses wide open ?

You could not breathe, you say. Well, what of that ? you have on your warm clothes ; you have had your breakfast ; you will have your dinner by and by ; is not that all you want ?

Ah ! now you begin to see there is something else, beside your two necessaries ; and because we keep on wanting that something, fresh and fresh, thirteen or

fourteen times every minute of our lives, we will put that down first on our list :

NO. 1.—FRESH AIR.

After that, we will put down what you very rightly think is quite necessary for us also :—

NO. 2.—FOOD AND DRINK.

Before we put down clothes, let us try and think what use they are to us : (I mean as far as health goes.) There are places where people (savages, of course) live with no clothes, or next to none. What sort of places are those? Mostly very hot places. Then we judge by that, that the real use of clothes is to keep us warm. We cannot possibly live without a certain quantity of warmth, and you know we try other ways of warming ourselves besides clothes ; we want houses with good thick walls, and we want fires. So clothes, blankets, houses, and fires will all come in under one :—

NO. 3.—WARMTH.

But there are still some other things which we need, though many of us do not think so. A very good way of finding out what these are, is to notice young children. Babies are such little tender frail things, that they actually cannot do without some things which stronger and older people do not care much about.

Now, whatever is really necessary for a baby, we may judge pretty surely is also necessary for us ; that

is, we shall be all the better for having it, and all the worse for not having it.

There is one thing which almost everybody, even the most careless, knows a young baby must have, though they may not think it signifies to anyone else. Can you guess what that is?

The most neglectful people I ever knew, unless they were downright wicked, and did not care for their baby at all, would try and wash it every day. Even the most silly and dirty woman knows that a baby's delicate skin must be kept clean, or it cannot thrive. I don't say they always wash them nicely or thoroughly (I knew a woman who washed her baby in a pie-dish), but they have a notion of it. Well: babies cannot possibly thrive if they are dirty. No more can grown-up people, if they did but know it.

So we will next put down—

NO. 4.—CLEANLINESS.

There is another thing babies all love dearly, and so do all of us in our hearts, though we don't think much about it. What is the first thing a baby takes notice of?—long before it knows its mother; as soon as ever it begins to look at anything? If you watch a baby, you will soon find out; it is always gazing earnestly at the window, or at the fire, or at the candle. It loves the light. Well; no one can thrive in the dark. Plants turn white and weak if they are kept in the dark, and will try all they can to get to the light; and people who live in dark houses, where

they never see the sunshine, also get white and weak. They ought to do as the plants do, try hard to reach the light.

No. 5.—LIGHT.

If we go on thinking of the little children, we shall soon remember something else they are always wanting, and which they will get too. When you are minding your little brothers and sisters, what is it gives you most trouble?

You can tell me in a minute; they are always wriggling and moving about, crawling, or running; they are "never still a minute," you say; and the healthier they are, the more active they will be.

Now, all this is for their good; and I am sure you would not like it, if they sat or lay still all day long. All that moving about, stretching out their arms and legs, using their little fingers, &c., makes them grow strong. Any part of us that we do not use gradually pines, and gets so weak that, at last, we perhaps could not use it if we tried.

I knew a child who had a weak back, and was not allowed to run or walk about; he was well fed, and he had fairly good health; but if you had seen his legs, you would have been surprised; they looked just like two little sticks, so thin, and no shape at all. After a time, his back got well, and he was allowed to walk; but at first he could not stand on his legs, they were so weak, because they had never been used. By degrees he was taught to exercise them, and after a little while they began to get big and strong, and

soon they looked as pretty and round as other little boys' legs.

So you see it is necessary for us to have—

No. 6.—EXERCISE.

And, lastly, after all this moving about, what will our baby do next? And what do all of us want, when we have done a good day's work? Then we want a good night's sleep. We should not feel very bright the next day, without it; but if we get that, we are quite ready to start afresh.

After Exercise comes

No. 7.—REST.

I will write all these out in order now, so that you may learn them, and I shall have several things to say to you about each.

- | | |
|--------------------|-----------------|
| 1. Fresh Air. | 4. Cleanliness. |
| 2. Food and Drink. | 5. Light. |
| 3. Warmth. | 6. Exercise. |
| 7. Rest. | |

LESSON II.

ON FRESH AIR.

You know very well that we cannot live without breathing; it would be only wasting our time if I were to say much about that.

People sometimes take a good deal of trouble to convince us that we want air to breathe. I once saw

a man put a little bird under a glass jar, and then, with a curious kind of pump he had, draw all the air away from under the jar, till the poor little creature fainted and almost died; when it was nearly dead, he let the air in again, and, if I remember right, the bird recovered: but I never wish to see it done again, and I do not think you would like it either; we all of us know quite well that we cannot live without some air, and I do not see the use of tormenting poor little birds or mice to prove it.

But what we do *not* all know, or do not all think of, is that we want not only air, but good air. We are apt to take it for granted that any air will do for us; stale air, stagnant air, dirty air, even poisonous air; and many of us take no pains at all to see about getting it good.

What makes the matter worse is, that if there were nothing else at all to spoil the air (and there are a good many things, as I shall tell you by and by), we cannot help spoiling it ourselves by the very act of breathing.

All the time we are breathing, we go on spoiling the air as fast as possible; and if people are shut up in rooms where the bad air cannot get out and the good air cannot get in at all, it is sure to make them ill, and if they stay long enough, to kill them outright.

Perhaps you have read histories of this kind. I will tell you one which I have read. Some people in Scotland thought they would have a merry Christmas party, and invited their friends to come to a dance.

As it was such cold weather, they no doubt tried to make it as snug and comfortable as they could, so they shut all the doors and windows tight, and then they began to dance. It was a small room with a low ceiling, and there were thirty-six people dancing in it all night. By the time morning came the air was so bad that it was really like poison; and very soon seven of the poor dancers were seized with a terrible fever, and two of them actually died.

Why was this?

The reason of this and suchlike things is, that the air we breathe out is different from the air we take in. When we breathe, we do not just draw in the air and send it straight back again, though, at first, one might fancy that was all we did. We send away some things with our breath which were not in the air when we took it in.

1. One of these is water. Sometimes you can see this for yourselves. On a cold frosty day, you know we can see the clouds of steam coming out of our mouths. This steam is only very fine particles of water; if you have a veil over your face, it soon gets quite wet with drops of water out of your breath.

In warm weather we do not see the steam, but the water is there all the same; if you will breathe on a looking-glass at any time, you will make it dim and damp directly with the water of your breath. There is always a little watery vapour in the air; but hardly any compared with what there is in the breath.

2. There is another thing, which we also send out

with every breath. We cannot see this because it is a kind of gas, which is as invisible as the air itself; but I can show you that it is there, by what it does. (This is very easily shown, if you have a wide-necked bottle about one-third filled with lime-water, by just holding your hands round the neck, and breathing into it for a minute or so.)

It turns this clear lime-water thick and milky. If I shake the lime-water up in the fresh air, nothing happens; but if I fill the bottle up with my breath, and then shake it, you see how the lime-water is altered. The gas which does this is called Carbonic Acid gas.

There is always a little of this gas also in the air; but hardly any compared with what there is in the breath.

3. We also breathe out animal matter, little particles of our own bodies just ready to decay and putrefy. Though we cannot see these, another of our senses can find them out, if we take notice. They soon give the air a close disagreeable smell. Good air has no smell at all.

And now I have got something to say to you about the use of *noses*.

I daresay you cannot see much use in the sense of Smell. Seeing, hearing, touching, are very needful to us, we all know; but as to smelling, that does not seem much good.

It is pleasant to smell a sweet rose or violet; and, I believe, smelling really forms a good part of what we call *tasting* too; but we could get on pretty well without it, we think.

Now shall I tell you why smelling is of so little use to us? It is because we do not *use* it. Of all our senses, smell is the one that soonest gets out of practice; so much so, that numbers of people really do not perceive disagreeable smells at all. If they always accustomed themselves to take notice, and to use their noses, they never would consent to live in the horrid air they do.

That is a grand use of the sense of smell. It tells a person who attends to it, that there is some bad or injurious thing mixing itself in the air. A sensible person then sets to work to get rid of that thing, whatever it may be, and to make his air clean again. A stupid person takes no notice; and then his nose gets used to the disagreeable smell, and leaves off perceiving it.

If you go from the fresh air straight into a close room, you will notice the smell at once, though the people sitting in the room already do not know there is anything wrong. Then, if you sit down there too, you will soon get used to the smell, and leave off noticing it; but it will still be there, all the same, and the bad air will be doing you a great deal of harm.

I wish you all to be like the people St. Paul speaks of, who "*by reason of use*, have their senses exercised to discern both good and evil." This is quite as true literally as it is spiritually.

In good air there are (mainly) two sorts of gas.

The first gas is a very lively, active sort of gas, called Oxygen; it is very fond of joining itself with other

things, and burning them, and things burn very fast indeed in oxygen.

The second gas is a very slow, dull gas, called Nitrogen ; and nothing will burn in it at all.

Oxygen would be *too* active for us to live in if it were quite pure ; it is mixed with nitrogen, something as people mix brandy with water, to make it not so strong.

When we breathe, the air goes down into our lungs, which are something like large sponges, inside our chests. These sponges are full of an immense quantity of little blood-vessels, and an innumerable quantity of little air-vessels ; so that the blood almost touches the air : there is only a very, very thin skin between them. Through that little fine skin, the blood sends away the waste and useless things it has been collecting from all parts of the body (the water, the carbonic acid gas, and the animal matter I told you of), and takes in the fresh oxygen which the body wants.

You have often heard man's life compared to a candle, or a taper, have you not ?

I will show you some ways in which they really are very much alike.

When a candle burns, if we keep it from getting any new air, it soon uses all the lively gas, or oxygen, and then it goes out. (This is easily shown, by inverting a good-sized glass jar over a lighted candle.)

When we breathe, if we were kept from getting any new air, we also should go out, or, as we say, die.

If the candle only gets a little fresh air, it burns dim and weak.

If we only get a little fresh air, we are sickly and weak.

The candle makes another kind of gas, not fit for burning.

We also make the same gas (carbonic acid gas) not fit for breathing.

So do lamps, and so do fires.

You see now one great way of spoiling the air. We cannot help constantly spoiling it ourselves, by our breath.

I will here tell you what I think is a great or golden rule to follow, if we wish to have good health.

Everything which comes away from the body is always to be got rid of as quickly and thoroughly as possible.

Whatever nature has done with, and sends away, is sure to do us harm if we let it stay. Now our bodies have several ways of getting rid of their waste. One of these ways is by the breath, as I have just explained to you. Therefore if we obey our golden rule, we must get rid of this spoilt air as completely as we can.

How are we to get rid of this bad air, and to get in fresh air, without being too cold?

In summer time this is pretty simple, but in winter it is more difficult; because it is a very bad thing to be cold, and a thin, cold draught is especially bad. Still, if people will give their minds to it, and use their common sense, they will find out how to manage.

The bad air, loaded with carbonic acid gas, when we first breathe it out is warm. Warm gases are much lighter than cold ones, therefore they are inclined to rise up, just as steam and smoke do ; so the bad air at first goes up to the ceiling ; then, if there is an opening near the top of the room, it goes out, and we are free from it ; but if there is no opening, it by and by gets cold and heavy, and comes down again. Then we have to breathe it.

If you open your window at the top, it will let out the bad air, and you will not feel a draught.

If it is so very cold that you cannot bear the window open, even a little way from the top, it is a good plan to have a ventilator near the ceiling, so as to give some way of escape for the bad air. But it is very seldom that, if you have a nice fire and proper clothing, you cannot bear the window a little way open at the top ; and that is a better way of airing the room than almost any ventilator.

This is just as necessary by night as by day ; because, of course, we go on breathing all night. People who take pains to shut in the bad air, and to shut out the good air, all night long, can never expect to awake refreshed, and as much the better for their sleep as they ought to be.

It is very dreadful to go into the bed-rooms of such people, before they have left them in the morning, and fully explains to me why they are so often languid, pale, and cross, all the first part of the day. I hardly know why it is people are so afraid of letting in night

air, or what harm it is supposed to do ; but those who have tried it, know very well that they sleep better, and wake fresher, if they keep the air of their bed-rooms clean and sweet all night.

There are not many nights in the whole year when it is not safe to keep your window an inch or two open at the top ; and those who do so, are not so apt to catch cold as those who do not. Of course, you must have proper coverings on your beds to keep you warm ; and of course, also, you must have your window shut before you begin washing and dressing.

But do not suppose it is a good plan only to open your window a little way at all times. It is a good plan in cold weather, and when you are sitting in the room ; but it will not keep the room so perfectly fresh, as that it will not need a good thorough airing as well, when you can manage it.

If it is ever so cold, be sure and open the window wide, both top and bottom, as often as you can in a day, while you are out of the room ; and keep your bedroom window open part of every day if it is not raining.

It is not even enough to open the window ; for to air a room or a house perfectly, you want a draught through. This is why it is best to have a fireplace in every room, even if you do not want a fire in it ; the chimney makes another opening for the air to get through ; (not if you stop up the chimney, though, with straw or sacks, as some people do.)

A house ought always to have an open space both behind and before, because then, when you open the

front and back windows and doors, you will have a glorious current of air all through, blowing all the refuse and impurities away.

Thus we get rid of the bad, and receive fresh supplies of good air.

But one would think by and by we should have used up *all* the good air, and have made it all bad. If we consider what an immense number of people there are in the world—how many there are, even in London, always engaged in spoiling the air, pouring out the bad carbonic acid gas from their lungs every minute,—it seems strange there is any air left fit for us to breathe.

What becomes of this carbonic acid gas?

First I must tell you what it is made of. Two very good things, Oxygen and Carbon.

A great deal of our flesh and blood is made of oxygen and carbon (there are some other things mixed with them which I cannot tell you of now); but when the oxygen and carbon are joined together and make this gas, they are of no use to us. You might go to a shop, and buy sand and sugar; but if they got mixed together as you brought them home, you would be able to use neither, unless some clever fairy could pick them apart for you.

Can anything pick the carbon and oxygen in the carbonic acid gas apart, and make them fit for us to use again?

Yes. Almost every plant, every green leaf, every blade of grass, does that for us. When the sun shines

on them, they pick the carbon out, and send back the oxygen for us to breathe. They keep the carbon, and make that fit for us and other animals to eat. The grass makes the carbon fit for sheep and cows; then we eat their flesh, or drink their milk; the corn makes the carbon fit for us to eat (in bread, &c.), so do potatoes, turnips, and all the other vegetables and fruits which we eat. Is not this a wonderful arrangement?

But perhaps you think, considering what an amazing number of people there are in the world (besides all the other animals; for horses, cows, and all creatures which breathe, spoil the air, just as we do,) there can hardly be trees and plants enough to set all the air to rights again, and *decompose*, as it is called, all the carbonic acid gas they make.

Round about London, and large towns, there are certainly more people than there are trees, but in many other parts of the world there are a great many more trees than there are people. I have heard of forests in South America so thick and so large, that the monkeys might run along the tops of the trees for a hundred miles, and never have to come down to the ground once.

So you see there are plenty of trees in the world to do the work.

But then how does all the bad air get out of the towns and cities where men live, and get to the forests and meadows?

The wind carries it. Air is constantly moving

about ; rising up, falling down, sweeping this way or that way, and travelling from place to place. When it is travelling very fast, we call it a high wind or a storm, and we do not like it at all. These high winds really do us mischief sometimes ; but how much more good !

I will now remind you of some other ways of spoiling air, besides by breathing it.

Not only the little particles out of our breath, but anything which gives the air *any* smell, does it some harm. Even nice smells, like roses or lilies, are unwholesome if shut up in a room ; far more, bad smells.

Dirty walls and ceilings and floors give the air a musty, close smell : so do dirty clothes, boots out of the muddy roads, cooking, and washing. Some of these ought not to be in the house at all ; others remind us to open our windows wide.

But the worst smell of all is from drains. If ever you smell the drains at all, you may be quite sure that it is poison. If to save yourself a few minutes' trouble you lift up the trap of the sink, you know what a terrible strong smell comes up. Remember that is a *poisonous gas*, which you are inviting into your air.

If you find a disagreeable smell without lifting up the trap, it is a sure sign there is something wrong ; and you must never rest satisfied till you have got rid of it. Sometimes pouring a good quantity of clean water down will wash it away, but

if it does not, you may be sure the drain wants looking to, and you must get a proper man to do it.

Never feel easy as long as there is any smell from a drain in or near the house. These smells encourage fevers and illnesses, and have killed many people.

Perhaps you think I am making rather too much of this, and that you have never known anyone killed so. That may be ; but there are a great many degrees of ill-health, short of being absolutely killed ; and I daresay you have known many people made and kept in very poor health by this very thing, only neither they nor you knew what was the cause of their being so weak and ailing.

When I see people neglectful of these things because they are not killed outright by them, it seems to me just as sensible as if they were to say, "Though a whole table-spoonful of a certain poison would kill me, I don't think a tea-spoonful would, or half a tea-spoonful ; I don't see why I should not take that." We should call a person who spoke so, an idiot or a lunatic ; and we should say, "If it does not kill you, it will keep you from being well and strong. Don't take one atom of it ; don't keep a scrap of it in your house ;" should we not ? Well, we ought to feel just the same about bad and poisonous air.

All the things I have been saying to you about pure air apply still more to sick people than to healthy ones ; for two reasons :—

First, because sick people want every possible chance to help them to get well,—good air, just as much as good food. Second, because everything that comes from a sick person's body is still more injurious than from a healthy person's, and may be downright poison. The cleverest doctors now believe that many diseases are really sown in our bodies by a kind of very small seeds, much as plants are sown in the earth. For instance, scarlet fever has its own seeds, or germs, as they are called, which come away in multitudes from the body of a person who is suffering from it. Some of them float in the air, and if we breathe them in they are quite likely to give us the fever too. (I believe that if a person nursing a patient with scarlet fever wears a pretty thick piece of cotton wool as a respirator, the cotton wool will catch all these germs, and never let them get into his mouth at all.)

I hope now you quite understand, and will never forget, how needful it is for us to have pure air to breathe.

If ever you have to choose, or help to choose, a house to live in, recollect to look out for, and try to get—

Wide streets, and not too high.

An open space at the back as well as the front, so as to have a draught through.

Windows that open top and bottom.

Open chimneys.

Good drainage.

It is a great advantage to live, as we do here, near a nice large common or green, where there is always a great store of good air. Even if you cannot get all the other things I have mentioned, you must still remember the proverb, "If the mountain won't come to Mahomet, Mahomet must go to the mountain;" and whenever you possibly can, take a good walk or run on the common, and carry your little brothers and sisters there with you.

But try and make "the mountain come to Mahomet" also.

LESSON III.

ON FOOD AND DRINK.

How do we know the difference between a living and a dead body?

The one great sign of life is change or movement. A living body is always at work.

Now for every bit of work the body does, some of it is wasted. Every step I take, every word I speak, wastes a little bit of my body.

Some of the work we do we can all see and notice; for example, walking, talking, lifting weights, pulling, pushing, &c.

All these waste us, and make us get smaller.

Then there is other work which we do without trying or noticing at all, for instance breathing, heart-

beating, &c. ; these go on without stopping even when we are asleep.

All these waste us too.

If I had been weighed very accurately before I came out this morning, and were weighed again now, there would be a difference. I have been walking and talking ; and I weigh lighter.

So do all of you.

We have all been *working* and *wasting*.

You know very well where some of this waste is gone. Out of our lungs in our breath.

There are other ways, too, in which waste is got rid of out of the body. Altogether, I believe a grown-up person loses six or seven pounds in a day.

Then why don't we dwindle away ?

If I were weighed again to-morrow, at the same time, I should weigh just as much as I did this morning—you, I hope, would weigh a little more.

How can this be ?

Well, fortunately, we shall all be doing something else part of the day, besides working and wasting. I suppose the very first thing you do, when you get home, will be to eat your dinner. That explains the whole mystery. Our food and drink come in to supply the place of what is used up or wasted. You see I must take into my body every day just as much as I waste. You, who are growing, must take in a little more.

Nearly all of the waste is made good by our food and drink ; the rest of it is made good by the oxygen we breathe.

You cannot see that the food you eat looks much like your body, which it is going to form part of?

Perhaps you think the meat is rather like it; but how about bread, potatoes, water, milk, cabbages, and butter? How does all that get turned into flesh, bones, hairs, skin, &c.? How, indeed, does it ever get to them?—to your heads, fingers, knees, for instance?

The blood carries it.

You know that the Bible says “the blood is the life.” Without the blood no part of the body could have any life at all. I told you, in our last lesson, how the blood brings away the waste matters *from* every part of the body. It also carries nourishment *to* every part of the body.

The blood travels about in pipes or tubes, which go through almost every part of your body. (The few parts which have no blood-vessels in them are yet so close to them, that they can draw their nourishment from the blood.) The smallest of these pipes are so close together, and so numerous, that you cannot put a needle point in anywhere without pricking one and making the blood come out.

These little pipes have such very thin walls that the blood is able to get through them into the flesh or skin, or whatever it may be which lies next them. They are much thinner than the thinnest blotting-paper. These very small pipes are called capillaries, which means that they are like hairs; but they are really much finer than hairs.

So that, you see, the food must be changed a good deal before it can get through them.

And how does it get into the blood at all?

When we swallow our food, it passes from the back part of our mouths into a pipe, which begins at the top of the throat, and goes all through the body. This is called the alimentary canal, or canal for the food. At one part of its passage through the body it opens into a sort of bag, which is called the stomach, and where the food stays some time. The walls of the stomach are full of blood-vessels, and some of the food has to make its way through the fine lining of the walls, into those blood-vessels.

At the other end of the stomach the canal goes on again, and some more of the food has to pass through its fine lining, into the blood-vessels which there are in its walls.

Some of it has to get into other little pipes, which by a roundabout way pour it into the blood at last.

Well, what should you do, if you had all that food—meat, bread, water, &c.—and I told you to send it through a number of little pipes, as thin even as a straw? or to send it through some blotting-paper, without tearing it?

Would not you try to pound and melt up all the solid parts and mix them well with the water, so as to make it all liquid? and when it was all thoroughly pounded and melted and dissolved and mixed up, it would be what we call *digested*.

Now we have got all the apparatus we want for pounding and dissolving our food inside us.

What do we pound or grind it with? Our teeth and jaws.

I want you to understand how necessary it is to use our teeth, and well bite and grind up our food before swallowing it.

People who eat very fast and swallow their food nearly whole, get very little good from it; because great, hard lumps cannot get through the thin walls and little vessels, so they are wasted, and have to be got rid of; and before they are got rid of they cause people to feel very uncomfortable, and give them indigestion, which makes them ill, cross, and unhappy. Children are very often made ill and fractious by not biting or "masticating" their food. Now you know why.

Well then, besides pounding the food, it has to be dissolved in the water, because even very small solid pieces, the smallest we could grind, could not get into the capillaries.

Some things will dissolve in water. Salt will, sugar will. If you drink water with salt or sugar in it, it will quite easily get through the inner lining of your stomach into the little blood-vessels of its walls, and so be carried all over the body by degrees.

But some food we eat will not dissolve in water. Starch will not, for one; yet we eat a good deal of starch. You did not think we did eat starch? What is starch made from? From flour or potatoes, is it not?

So when we eat flour or potatoes, we eat the starch that is in them.

Several other parts of our food also will not dissolve in water. But there are different kinds of juices in our bodies which will dissolve all these things.

One of these juices is in our mouths, mixed up with a great deal of water, that helps to dissolve part of our food, the starch. This is another reason for well masticating our food ; to mix it up well with this juice.

And lower down, in the stomach and other parts of the alimentary canal, there are other curious sorts of juices, which go on dissolving and preparing all the rest.

Besides all that, the stomach is a very moveable sort of bag, and turns all the food and drink about a great deal. At last it gets mixed and dissolved and changed till it looks very much like milk, and passes by degrees into the blood. Then the blood carries it everywhere, and each part of the body, muscles, bones, skin, hair, &c., take out of it what they want.

Whatever remains, that cannot be digested, is got rid of out of the body.

Now that we have seen how essential it is for us to be well nourished by our food, let us think what sort of food our bodies want.

What a great many different things we eat and drink !

Is that a good thing or a bad thing? A good thing. All human beings, everywhere, eat several

different kinds of food ; and it is found they flourish best so. I do not mean being greedy, and wanting all sorts of different dishes at every meal ; but having such a variety as I spoke of before—meat, bread, butter, vegetables, and so on.

But though we eat such a number of different things, there *is* one thing which human beings can and do live on for a very long time, without wanting anything else, either to eat or drink ; and it not only keeps them from wasting away, but they get bigger and fatter on it.

What is that? Milk. You know a baby can live on milk for months, and is all the better if it gets nothing else.

Yet I said just now, it is right to live on several kinds of food !

Well, if you come to think of it, milk *is* several kinds of food. Let us try and find out what things we can get out of it, and, whatever they may be, we may be sure they, or something like them, are necessary articles of food.

I. CHEESE.—What cheese is made of (though it tastes so different) is almost exactly like what the lean of meat is made of ; it is called Protein ; and no animal can live at all without some of that. There is a great deal of the same sort of thing also in corn, in fish, in eggs, in peas and beans ; and more or less in all vegetables. You can see it in its purest state in the white of an egg. This protein, then, must always be part of our food.

2. BUTTER.—That is nothing else but fat, separated from all the other parts of the milk; and though it tastes nicer and more delicate, it is made of just the same things as oil, or suet, or dripping. If you melt butter, it looks just like oil, you know. Well then, that shows we require to eat some sort of fat; either butter, or some other kind.

3. SUGAR.—How sweet milk is! it has in it a great deal of a sort of sugar. You think, I daresay, that all sugar comes from sugar-canes, and must be bought at the grocer's, but that is quite wrong; there is a little sugar in wheat, and a good deal in some other things we eat,—peas, oatmeal, beet-root, and in fruits, cherries, gooseberries, grapes, and many other things. Well, then, we want sugar too.

Besides that, I told you of something else which we eat, which the juices in our mouths and other parts *turn into sugar*—starch. So, if we don't eat much sugar, we must eat the more starch. There is plenty of starch in bread, potatoes, rice, &c.

All these things—the Protein, the Fat, and the Sugar,—have in them some of that carbon which I told you the vegetables get out of the air for us.

4. MINERALS.—Besides all these, there is a little of some other things in milk, which we cannot exactly see or taste, but which clever chemists have found out. These are different sorts of salt and other minerals, which we want in some parts of our bodies (for instance, in our bones, to make them hard).

Some of these are always to be found in meat and

vegetables and fruits, and common salt we eat separately.

Is that all? If we got all the cheese, all the butter, all the sugar, all the salts and minerals, out of a quart of milk, what should we have left?

A great quantity of *water*.

So we also want a great deal of water. We may mix it with other things, and make it into beer, or tea, or coffee; but, one way or another, we must take, and you know we do take, a good deal of water every day.

I will now make a list of the things we have found to be needful for our proper nourishment:—

1. Protein.
2. Fat.
3. Sugar (and Starch).
4. Salt, and some other minerals.
5. Water.

You see how perfect milk is, in containing all the different things the body wants, and you know how well babies thrive on it. That is because (1) all the things are properly mixed, and made into the easiest form for a baby to digest, (2) and because there is the right quantity or proportion of each thing. I mean there is not too much sugar and too little fat, or too much fat and too little water. Everything is just right.

I shall say a little more about babies, and then I will go on to food for grown people. If a baby is to thrive, it is much best for its mother to nurse it

(provided she is healthy). If, from any reason, it has to be brought up "by hand," as they call it, the best thing for it is good milk, with a little water and sugar. (This is because a cow's milk is not exactly like its own mother's milk.) But it is necessary to be very careful indeed in bringing up a baby in this way. If you let the milk turn sour, or let the bottle get dirty, or give it to the child too hot or too cold, it will do harm instead of good.

A young child cannot digest solid food, and when people give it bread and biscuits and so forth, before it is of the right age, they are all wasted, and worse—worse in two ways: they will most likely give it indigestion, and injure its inside; and they will hinder it from taking what would do it good, namely, milk.

People often say in a tone of triumph and pride about their baby, "Oh! it will eat anything." When they say that, I wish they would consider whether it will also *digest* anything. Nature has plainly taught us how babies should be fed, and those who have the care of them ought to take the trouble to feed them properly, and not, out of idleness or ignorance, give them "anything."

Children very often have fits, caused by giving them food which they are too young to digest; and children are sometimes *starved* to death, when their mothers think they are giving them plenty of food.

If there is a great difficulty in getting milk enough, beef-tea and broth, not too strong, and with a little fat left, are the next best.

Remember, even if a baby does not get quite so bad as to have fits, or to be starved, it may yet be made very ill and weakly, and may perhaps have bad health all its life, if it is not properly fed.

As people get older they want solid food, and it is necessary they should have it, though always, and for everybody, milk is very wholesome, and should be a good part of the food.

I told you we were all the better for variety of food, and our bodies are so made as to need it. Animals like cats (lions, tigers, &c.), which naturally live altogether on animal food, have very small stomachs indeed. (Remember that the stomach is a bag inside the body, and the body contains a great many other things as well.) Animals that live only on vegetables have very large stomachs; because vegetables are much harder to digest than meat. Some animals, as cows and sheep, have even four stomachs. Human beings are between the two: their stomachs are larger, in proportion to their size, than lions' or cats'; and smaller in proportion than cows'; that is, in order that they may eat both meat and vegetables.

The teeth also of animals which live upon meat, are different from those of animals which live upon vegetables: man has some of both sorts.

So it is best to eat both meat and bread; though we *could* live on either, but we should not thrive as well. But when I say bread, I must explain myself. I do not think we could live long on the bread we generally

buy at the baker's, unless we added some other things to it—milk, cheese, eggs, or meat.

Yet next to milk, which I took as our model, a grain of wheat is the most perfect little specimen of human food. Just like milk, it contains some of all the things necessary to nourish our bodies ; protein, fat, sugar, starch, salts, and minerals ; though not quite in the same proportions. Only it contains very little water.

Then if we eat wheaten bread and drank some water with it, surely it ought to be nearly as good as milk ? Yet, when men once tried an experiment of this kind, and fed some dogs for forty days on baker's white bread, at the end of that time all the poor dogs were dead.

Now why do you think this was ? It was because we in England have got into the habit of thinking the sign of good bread is that it should be very white, and we fancy browner bread is coarse and not nice.

The whitest part of the wheat is the starch, and the browner part, which lies outside the starch, contains nearly all the protein which is necessary for our flesh, and nearly all the minerals which make our bones and teeth hard, and nourish our nerves and brains. Almost all of this the millers carefully take away, so as to leave hardly anything but starch for our nice-looking white loaves.

It is no wonder, therefore, that the dogs died ; but

some other dogs, which were being fed at the same time on real wheaten bread, throve and flourished, every one of them.

Thus, you see, white bread does not deserve to be called "the staff of life"; but wheat-meal bread would make a very good staff, if we only added to it a few little things, such as butter or fat, salt, and some fruit and vegetables.

By wheat-meal bread, however, I do not mean common brown bread,—that is not very wholesome, nor very nice; it contains coarse little bits of bran and chaff which do not nourish us at all, and disagree with many people's digestion. Wheat-meal bread, if rightly made, looks rather brown, but it has none of those useless things in it. All the chaff and outermost skin is cleared away, and the rest of the wheat ground very fine,* so as to make smooth sweet bread which you will soon get to enjoy very much, even if you do not like it quite so well at first, as the poor, starchy, white bread you have been used to.

Still, even with wheat-meal bread, it is better for us to have a variety of food, and some good meat every day, if possible.

If it is very hard to get meat, fall back on the more milk. Irish peasants do pretty well on potatoes and

* "Wheat-meal should be ground fine enough for it all to pass through an 18-mesh wire sieve."—*Bread Reform League.*

milk, or buttermilk ; but they would do better if they got more meat.

Now, let us look at our list of the things we found in milk ; for I have something to say about most of them.

I. PROTEIN (cheese, lean meat, &c.).—Though cheese is so *nourishing*, yet it is not always *wholesome*. We should never think of giving much cheese to sick people, or young children, should we ?

Why is this ? Because we have to think, not only if the things are nourishing when digested, but which are best and easiest to digest. A strong, hearty person can digest and get good from many things which young, delicate, and old people cannot. Therefore it is very wrong to make children or old people eat all the same things which a strong man eats.

But for everybody, young or old, there are some rules to be observed which we are too apt to forget. After all I told you about the capillaries, &c., I think you can see that hard, heavy, and tough things must be indigestible. How are they ever to get dissolved and pounded and mixed up, so as to make their way through the thin lining of the stomach ? If they ever do, they have given the digesting apparatus far more work than it ought to have to do ; and if they do not, we are all the worse for them.

Heavy puddings, heavy bread, tough meat, all are very bad ; bad even for a strong man, since he cannot get as much good out of his food as he

ought; much worse for children, invalids, and old people.

I hope you will all try and learn to cook well, if you ever get a chance, so as not to make your husbands and children ill, when you are grown up, by giving them unwholesome food.

Some kinds of meat are more wholesome than others; this is because they are easier to bite and grind up, and easier to dissolve in the stomach. People's common sense has found out that beef and mutton are more digestible than pork or veal; though it does not always tell them that tough, hard beef-steaks are unwholesome also.

2. FAT.—Some people, especially children, do not like fat; I think I see some of you turning up your little noses at the mere thought of it! But we all want some, in one form or another. I would never force a child to eat fat in a way he does not like; but I would try some other way. Very greasy meat, or great lumps of fat, are extremely unpleasant; so are suet puddings unless they are nicely made, and the suet chopped very fine; but if you are careful not to disgust a child by things like these, you can generally get him into the habit of eating a little fat with his meat, and he will enjoy a well-made pudding. If he very much dislikes fat in those ways, you must give him the more butter; but as butter is expensive, it is a very good thing not to be too dainty, and to be able to eat other kinds of fat. Sensible people will take notice of all these little

things. It is just the same about milk. Some people do not like it ; or it does not seem to agree with them. But if they cannot take it one way, try another ; if not cold, try hot ; or make different sorts of milk puddings ; put in a few raisins or a little jam ; mash it up in potatoes ; in short, use your common sense, and you will find some way that will answer.

3. SUGAR.—Sugar is very wholesome, and, as I told you, we want some. But children will often eat too much sugar, just as they will eat too little fat. The harm it does them is—(1) it is very apt to spoil the teeth ; (2) it takes away the appetite for other food. If you are always eating sweet cakes and sugar-plums, you will not care for plain, nourishing food. Now what is best for us all, is to have good appetites for wholesome food ; it will do more to keep us in health all our lives than anything else ; and there is a great deal in getting the habit.

One great reason why it is best to like plain food, is that most likely you will only eat the right quantity.

When you are hungry, you will be very glad of good, plain food (you will see, by what I said before, that I do not mean coarse or “nasty” food). And when you leave off being hungry and enjoying it, it is a sign you have had enough. Then, if you go on eating, it does you harm instead of good ; and dainties and “tempting” things make you eat more than you want. If people are ill and cannot eat, then is the time to “tempt” them ; but healthy people don't want tempting.

4. SALT, &c.—I have not much to say to you about this; because most of the minerals we require are naturally mixed up in our food, so that we take them without knowing it. But children will often forget to eat salt with their meat or eggs; and the people who have the care of them ought to remember it for them, until they have got so used to it that they miss it for themselves, and do not enjoy their food without it.

5. WATER.—I have a great deal to say to you about this, for I want you to understand how needful it is to have good water, and what harm bad water can do.

I told you before how drains poison the air; they also poison the water, and most dreadful illnesses are carried about in water. Sometimes, almost a whole villageful of people has been poisoned, by drinking water into which some drain has run, or which has received some poisonous matter through the soil. It people get their water from wells which are not very deep, like some of the old wells in London, they are often liable to terrible diseases, because the refuse out of the drains so easily runs into them.

You know how readily a drain gets out of order: for instance, if there are rats about, they often push the pieces apart, and so make holes; then some of the drainage runs out, and makes its way through the earth into the streams and surface wells. (The wells I was speaking of just now, which are not very deep, are called surface wells.)

Some time ago there was a very bad illness at

Guildford, called typhoid fever. Forty people died of it, and it was found out afterwards that thirty-seven of them had been drinking the water of a particular well. Was there anything the matter with this well?

Yes, the very thing had happened which I said was so likely to happen; something had gone wrong with a sewer near it, and the sewer had been pouring some of its horrible contents straight into the well.

You remember what I told you about diseases having seeds or germs of their own? Some of these little germs float in the air, and a great many get into the drains. Of course, if anything out of those drains can find its way into the water we drink, we shall swallow some of those germs, and very likely catch the disease.

When the cholera comes to England, it is known quite well that the places where it is most deadly are places which are supplied with bad water; and if between two of its visits people have taken care to get better and purer water, the second visit will not be nearly such a dreadful one as the first.

People are now more careful about this than they used to be, though still not half careful enough; and that is why I told you in my first lesson that cholera, and some other diseases, had been partly conquered, but not altogether.

River water, if the river, or the streams which run into it, pass through many villages and towns, or through manured fields, is sure to be full of impurities, and not fit to drink unless it is filtered. Even water

such as we have here, which comes from very deep wells, gets some mixture of drainage into it, and ought to be filtered.

But do you know what a filter is ?

I daresay not. I will show you a very small filter, that you may see what it does. (A piece of filtering paper in a small funnel, set up in a bottle, will give the children an idea of the effect, if some water is mixed with garden earth, and poured gently through.)

We English people think ourselves very clever and wise, but there are some things we might very well learn from people who in many ways are foolish and ignorant. There are a great many priests and monks in Ceylon, who belong to a religion you have perhaps heard of, the Buddhist religion. These men think it right to do many things which we think quite wrong ; for instance, to beg rather than to work. They would not do a piece of useful work on any account ; and they feel no shame in living on other people's charity.

But they are wiser than we are in one thing.

One of their rules is that they are never allowed to possess more than *eight* things in the world ! I will tell you what these eight are. Three articles of clothing—one belt—one dish to hold the food which they get given them—one razor—one needle to mend their clothes—and lastly, a water filter !

Now think what a quantity of things you have got in your houses ; how many clothes, chairs, tables, pots and pans ; and tell me which of you has got a water filter ? (I found that only three out of my

class of twenty-five or thirty had filters in their houses.)

You see, in this we are not so wise as those poor monks.

A larger filter than this little one I have been showing you, instead of this sort of paper, has powdered charcoal in it. I suppose you think that the black charcoal would make the dirty water still dirtier? but instead of that, it catches the little fine particles of dirt out of the water, and keeps them, so that the water runs out at the tap looking quite clean.

Unfortunately, some of the little germs and particles of dirt are so small that even the charcoal cannot catch them. The next best thing after that is to boil the water for a good long time; that will most likely kill them; but the only real cure is never to let them get into the water at all.

Besides solid and liquid things which get into and spoil water, it has also a great power of absorbing gases.

I mean, most gases are easily mixed up in water, and if there is any gas near water, some of it is almost sure to get mixed up with the water. There is a good deal of *air*, for example, always mixed up with water (which the fishes breathe), and you can see the air escaping in bubbles every time you boil water. Well, if there is an unwholesome gas in the neighbourhood, that mixes up in the water just as easily; so it is very necessary to keep water in a clean place where there are no bad gases and bad smells, and to keep it covered up. But if impure gases have got into the water, the black

charcoal powder in the filter will even purify and make them harmless too.

Water in a sick person's room should always be covered up ; and fresh water often brought in.

I said a great deal to you about wholesome food ; I should like to say a little more about wholesome drink.

You know that unwholesome drink can do us still more harm than even unwholesome food. That makes people ill and cross, but the other makes them ill and wicked.

And just as I told you that it is a great thing to have a habit of liking good plain food, so it is a still better thing to have a habit of hating bad, unwholesome drink.

I do not call a moderate quantity of good beer or wine unwholesome, any more than I call a few sugar-plums or tarts unwholesome ; indeed, in the proper quantities, I think both the one and the other may be quite harmless ; but it is when a person is always wanting more and more of them that they become so dangerous and injurious.

As for spirits, I wish nobody would ever touch them, unless by a doctor's order.

This habit of constantly wanting "stimulants," as they are called, is one which people may easily get into, and especially delicate people ; because they feel as if those things really do them good for the time ; but in the end they do them a great deal of harm instead.

There is one rule which every person with a grain

of sense ought to make and keep to ; that is, to take particular notice how much they have had in a day, and never to allow themselves to get in a way of taking a little now and a little then, without observing how much it all comes to in the day.

I have known delicate ladies keep fancying all day long that they wanted a little wine, or something of that sort, till I have thought, "How surprised you would be, if you knew what a quantity you have taken to-day."

Men, sometimes, directly they are thirsty ask for a glass of ale, when a glass of water would do just as well ; so by the time the day is done they have had a great deal more than they fancy.

Everyone should make up their minds how much beer or wine does them good and they can afford, and not allow themselves to go beyond that.

I told you of the way in which the Buddhist monks are wiser than we are. Now I will tell you of a monkey which was wiser than many a man and woman. Somebody had once given him some brandy, and, I am sorry to say, the poor ignorant monkey got tipsy.

But, after that, if people offered him brandy, he would never touch it. And I have read of baboons too, who after they had once been made tipsy, would turn away with disgust if anyone offered them wine, or beer ; they remembered very well what harm it would do them.

These baboons, you see, turned teetotallers. Perhaps it might be better for most of us, especially for you

young ones, to do the same ; but, at any rate, we who have more wits than baboons and monkeys ought to be able to take the quantity which will do us good, without wishing for more.

People who live in close, impure air, who have bad water and dark dirty houses, generally feel as if they wanted more beer, or other stimulants, than will really be good for them ; because bad air and all those other things make people dull and depressed.

The true cure for that, however, is not to take stimulants, but to open your doors and windows wide, to let in the fresh pure air and the cheerful light, to wash your dirty walls, and to try and get good water. Bring up children to like all these things, and when they grow up they will not be half so apt to crave after the others.

LESSON IV.

ON WARMTH.

WHEN we were talking about clothes, in our first lesson, I think I remember that some of you said the use of clothes and of blankets was to make us warm.

Let us think over that a little, and see if it was quite right.

Suppose we were to wrap up a stone in any number of blankets, would they make it warm? No, the stone would still be quite cold, however long we left it there.

But if I were to wrap you in a great many blankets, you would be very warm indeed.

What is the difference ?

Why, that you were warm to begin with, and the blankets kept you warm. You see, they do not *make* us, but *keep* us warm. We have warmth in ourselves, we were all born warm.

But, whatever is hot is always giving away its heat. If I wrap up a bottle of boiling water in blankets, it will be hot for a good while, but if I leave it long enough it will get cold, and may even freeze at last.

Everything which touches something warmer than itself takes some of its heat away from it. If it takes away the heat very fast, it soon makes the warm thing touching it cold. If you put your warm hand on a piece of marble, it will carry away your warmth very fast indeed, and make your hand feel very cold directly ; but if you put your warm hand on a piece of flannel, or on a blanket, it will carry your warmth away very slowly.

There is a great difference between things in this respect. If you feel stone, iron, wood, wool, or other things, you will notice how quickly your warmth goes to some of them, and how slowly to others. But every one of them, even wool, carries some of your heat away.

Why are your blankets warm when you get up in the morning ? Why are your neck-ties warm when you take them off your necks ?

They got all that warmth out of you.

Then, if we are constantly giving away our heat in

this manner, why don't we freeze at last, like the bottle of boiling water ?

If you go out and take a run on the common, some cold winter's day, when it is all covered with frost and snow and a keen wind blowing, you will be giving away heat all the time, yet, when you come home, you will most likely be warmer than before.

What does all this show ?

We are always making new heat for ourselves. Every time you move you make a little heat ; if you move fast and for some time, you make a great deal.

When a person quite leaves off moving, when no part of his body stirs at all, then he makes no fresh heat ; little by little his heat goes away from him ; he grows quite cold : he is dead.

How do we make our heat ?

I will try to make you understand this, by reminding you of what I said before, when I was talking to you about the air. I told you then, that the lively gas oxygen is very fond of joining itself with other things, and burning them. When oxygen joins itself with any other thing, it always makes some heat ; and it is called burning, whether there is any flame or not.

You know I showed you some ways in which a candle is very like one of us. I am now going to tell you of another way. When a candle is burning, what is really happening is, that the different things of which the candle is made are joining with the oxygen of the air ; the carbon in it is joining with the oxygen to make carbonic acid gas ; a sort of gas there is in a

candle, called hydrogen, is joining with the oxygen to turn into water. This is going on very fast indeed, and makes the candle very hot.

Now, you know there is plenty of carbon in our bodies; there is also plenty of hydrogen; and when the oxygen of the air comes near them they join with it and burn, as the candle did, and turn into carbonic acid gas and water (recollect about what I showed you coming out in our breath), and this makes us warm. The great difference is, that they do not burn nearly as fast in our bodies as they do in the candle; therefore we do not flame and blaze up, nor are we nearly so hot as a lighted candle: we have just warmth enough to keep us comfortable.

Well, this burning is going on in every part of our body, every time that it moves or does its work; and the quicker and oftener it moves, the more burning there is.

But some parts of our bodies move more and quicker than other parts; then one would think they would be much the hottest.

And some parts of our bodies, the whole of our skin, and the parts nearest the skin, are giving away their heat every minute: one would think they would be much the coldest.

Yet a healthy person is generally nice and warm all over; and no part of him is much hotter or much colder than any other part.

This seems rather strange, does it not? but I think you will be able to guess how it is.

How do people set about it, if they want to warm a large house or a large church?

They have pipes carried all round and up and down it, do they not, full of hot air or hot water? And now that we have mentioned the word "pipes," you all recollect the pipes I said so much of, in our last lesson, which go all round about and up and down our whole bodies.

And those useful pipes not only carry the nourishment and carry the waste, but they also carry the oxygen and carry the heat. If one part of us would be getting rather too cold from having to give its heat away, the hot blood comes up from another part and makes it warm again.

If another part would be getting rather too hot from working so hard, the cooler blood is brought from another part, and makes it just right again, and the blood never stays long enough in any part to get either very hot or very cold.

When people are well and strong and active, they go on making as much heat or more than they give out; unless they are sitting still in a cold room; *then* they want a fire. When they are asleep they go on making heat (though not so fast) and their blankets keep it in, and so they awake quite warm, though they have had no fire all night.

Old people, young children, and delicate invalids cannot make heat so fast; now, if *they* are very cold, it is no use heaping blankets on them; for, as I told you, blankets and the like do not *make* warmth: you

must get some extra heat for them, by good fires, or hot bottles. It only tires and half smothers them to overload them with wraps.

I will now tell you some of the ill effects of cold.

Many bad things, as colds, inflammations, and chilblains, are caused by the blood being in the wrong place: not running through the pipes (circulating, as it is called) as it ought to do.

I cannot explain to you how, but the cold has an effect on the little pipes, causing the blood to stop and accumulate in them. If this happens in any important part of your body, it makes you very ill; if it happens in your fingers and toes, you get chilblains.

For all these things, recollect that "prevention is better than cure."

If you cover up the skin well, and keep the cold from getting to it, you are not nearly as likely to get inflammation on the lungs, or bronchitis, or diarrhoea, as if you leave it unprotected.

Children often suffer very much with chilblains; they are sometimes nearly as bad as a real illness, for they keep a poor child shut up, and he cannot run about and play as he ought, so he loses his appetite and his spirits, and at last gets to look as pining and wretched as if he were very ill.

Now with proper care, children never ought to have a chilblain at all. I know a lady with several children. One winter, while her eldest little boy was still very young, he had a chilblain on one of his toes. When his mother saw this chilblain, she said to herself, that

she would never see another. And she never did: that was the only chilblain that ever appeared among all those children.

Shall I tell you what she did to prevent them?

She gave the children warm woollen stockings, before the cold weather set in, so that their feet had not time to get chilled.

If their feet ever got cold or damp, she took off not only their boots but their stockings, and she set the children near (but not *too* near) the fire, and rubbed their feet warm and dry.

If their hands were cold or damp, she did the same for them.

Rubbing the feet and hands sets the blood running on again, and prevents it from stopping in one place.

If the skin began to look at all as if a chilblain was coming, she rubbed a little camphorated spirit in; that also helped the blood to move on briskly.

She did all she could to keep the children in good health, and she encouraged them to take plenty of exercise, to run and jump about, which also helps the blood to move or circulate.

All these things you might do for yourselves, and for your little brothers and sisters; and if you do it kindly and pleasantly, the children will quite enjoy being rubbed and warmed. I am sure you will be repaid for your trouble, if you can spare them having those sore feet they so often suffer with in the winter.

Cold to the skin also does us harm in another way.

If I could show you a piece of skin through a microscope, you would see that it is full of little holes (pores, as they are called). Through these holes something watery comes out: you know what that is; we call it "perspiration." One great use of the perspiration is that it keeps us from getting too hot. It may not be very comfortable, but it is very safe.

Men have even gone into hot ovens where meat was being baked, and not been the worse for it, because the perspiration kept their blood of the right heat.

If those little holes or pores are shut up so that the perspiration cannot get through, we have a fever, or a cold; the skin gets hot and *dry*, and when you have a feverish cold, you know that the first thing you have to try for, is to get into a perspiration.

Now the cold air to the skin shuts up those pores; that is another reason why we ought to keep our skin protected by warm clothing in winter. I have told you why woollen clothes are so useful. Stout calico is also very good, for it does not carry our heat away very fast: linen does.

I think I must say a little more about clothes, now we are on the subject.

In choosing clothes, we have two things to think about—Use and Beauty. It is quite right to like pretty clothes, but if we think about the Beauty before the Use, we are very foolish.

I knew a girl once who was always very shabby, and wretchedly dressed. One day she got a present of some money to buy herself something to wear. What do you think she bought? Some neat stockings, or a warm petticoat? No, indeed; she bought herself a crinoline! She had a notion of being smart, though she had no notion of being comfortable. Her new crinoline, of course, made her much colder than she was before, because all the cold air got up underneath it, and, if she could but have known it, her shabby old frock looked shabbier still when it was all spread out and shown off.

You think she was a silly girl? But I think I have known other girls who, if they had a choice between a fine hat and a feather, and a strong pair of boots, would like the hat best, even if their old boots were quite worn out.

Have you ever read the beautiful description of a virtuous woman in Proverbs xxxi.? She liked handsome clothes, but she liked them good and useful and substantial (verses 21, 22), and she did not spend all her money upon them; she had something to spare for the poor (verse 20). Strength and honour were her clothing. (I do not call it *honour* to be smart outside and shabby underneath; to have a gay frock and ragged stockings.)

But there is another way of thinking of Beauty before Use; that is, the way people have of dressing their babies and young children, leaving their necks and shoulders and arms and legs all bare. Of course

their shoulders and necks are very pretty ; but then, by leaving them exposed to the air, the poor children get bronchitis and diarrhoea, &c., as I was explaining to you just now.

Another temptation comes at the end of the winter, and the beginning of the spring. Then our old winter clothes have got shabby, and we begin to long for something fresh. But we must remember how changeable spring weather is, and how often there is a cold wind even if the sun is hot, and never be in a hurry to cast off our winter clothes. It is better to be rather too warm, or to look shabby, than to catch cold.

Although it has nothing to do with cold or heat, there is one other way I may as well speak of here, in which people fancy they are studying beauty in their clothes, which does great harm to their health : I mean wearing their things too tight. Some girls will pinch themselves in as much as they possibly can, to make their waists thin and small. They little think the harm they do themselves by that ; but if they knew how wonderfully all the parts of our body are arranged, and how they fit one another, they would see that, if they try to alter their shape, they put all this arrangement out of order.

The lungs, and the heart, and the stomach, and the other parts, each fill exactly their right place, and have just room enough to do their work properly. If we try to force them into a smaller space, we hinder them from doing their work, and very likely bring on some

dreadful disease in one or all of them, which will spoil or shorten our lives, all for our silly vanity.

And our ignorant vanity too ; for this sort of pinching and squeezing does not make a girl pretty, but deformed. If she is slim and slight by nature, well and good ; but if she is not, she will never make herself so. By pinching herself too small in one place, she will only grow too big in another, and be more clumsy and awkward-looking than she would ever be if she left it alone.

It is much the same with the feet. People who wear tight boots to make their feet small, will get corns and thick ankles, and will walk very awkwardly ; whilst their feet, if left to themselves, would at any rate be useful and comfortable. If they do not happen to be pretty by nature, be sure the shoemaker cannot pinch them into prettiness.

When does cold do you most harm? Remember who I told you feel the cold most—weakly people, very old, and very young people. Well, when you are most like them, you will suffer most from the cold ; that is, when you are tired, and have been a long while without food. Then is the time to be particularly careful. If you have been a long walk, and are coming home hot and tired, don't be tempted to throw off your warm wraps ; and when you get in, don't sit in a cold room, or in a draught ; because you are then exactly in the state in which you are most likely to catch cold.

On the other hand, we must not forget that too

much heat is also very bad for us. We do not have a great deal of hot weather in England ; but every summer there are many days when it is too hot to be out of doors (if you can help it) except in the morning and evening ; and often there are some days when it is really dangerous to be in the sun ; when, even here, people get sunstrokes from allowing the hot sun to beat on their heads.* Nobody, who is not quite obliged, ought to go out when the heat is so great ; it cannot do them any good, and often does them harm ; gives them headaches, and makes them faint and sick. I often see poor little babies being dragged about in perambulators on such days, looking perfectly miserable, and I wonder what can possibly make anybody bring them out. I suppose the nursemaid used to bring them out in the middle of the day in the winter, and so she goes on, like a machine, bringing them out in the middle of the day all the summer ; without ever thinking that, as other things change, so ought her plans too. I hope none of you will ever be mere machines, but will use your thoughts, and your sense, about the things you have to do.

Now that I have said so much about the harm cold does, I think it is only fair I should tell you of some of the good it does.

Moderate cold does us good, and makes us feel strong and fresh.

A cold bath in the morning, when you get out of

* In one year there died in England 112 persons by sunstroke, and 141 by exposure to cold.

bed warm and quite rested, will make you feel warmer afterwards. It gives you a little shock at first, but your blood runs all the better for it, and you get a glow. If you had been up some time and had begun to get tired, and had had no breakfast, most likely it would make you colder.

Next, I must tell you how cold works in our gardens and fields.

What do men dig and plough for?

To break up the ground, and make it fine and light, fit for the thin roots and fibres of plants to grow in. Now frost does that far more thoroughly than any plough. Did you ever notice how very soft and dirty the ground is after a hard frost? how much softer than it was before?

I will tell you how the frost works.

Most things when they get hotter get larger, and when they get colder get smaller.

Water does just the contrary; that is, it gets smaller for some time as it gets colder; but when it comes near freezing, it begins to get larger instead. This is how it comes to break our water-jugs and water-pipes. Did you think it was the *thaw* which broke the pipes?

No; it is the frost. The water in the pipes when it turns into ice gets bigger than it was before; so you can quite see how it is that the pipes burst; but we know nothing about it till the thaw comes, and melts the ice; then out runs the water through the burst pipe, and we get a little flood.

Well, every little drop of water in the ground, in all its cracks and pores, gets larger when it freezes.

What happens then? It breaks up the ground, as it broke our jugs and pipes; and because the whole ground is full of these little holes and cracks, the effect the frost has is very great indeed, in crumbling and loosening the soil.

That is how the cold works as a ploughman; but he also works as a schoolmaster, in making people clever, industrious, and brave.

You open your eyes rather wide at that; but you will soon see what I mean.

In very warm, rich countries people have only, as it were, to stretch out their hands to get their food. This is apt to make them lazy. "Fulness of bread and abundance of idleness" are very bad teachers.

In colder countries people have to take a great deal more trouble; they must plough and sow, and build barns and storehouses; they must notice what things will grow best, and where they will grow best; and so they get industrious, prudent, and observant.

In hot places they do not want such strong houses to keep out the cold; almost any sort of a shed will do. In colder places men want firm buildings, with thick walls; that teaches them a great deal about stones and bricks, and architecture. Also they want a great many fires; they learn to dig for coals; and so they get to know a great deal about the inside of the earth, and its treasures, and its wonderful history.

If the country is too cold—as it is, for instance, where the Esquimaux live—it is not good for people; it is just like having a schoolmaster who is too severe

and too stern, and who frightens his children into being stupid and dull.

And I do not say that cold alone is enough to do all the things I have mentioned ; it must be a clever race of men to begin with ; but I believe it is quite certain that where everything is too easy and comfortable in surrounding nature, men do not learn to be wise, clever, and industrious.

LESSON V.

ON CLEANLINESS.

I HOPE you still remember the great rule I gave you in one of our first lessons, about whatever comes away from the body ;—that it is always to be got rid of as quickly as possible.

Now, our bodies have several ways of getting rid of this waste and refuse. One, as you know, is by the lungs and breath. Another is through the skin ; that is what I am going to speak of to-day.

I told you in our lesson about Warmth, something about the skin ; that it is full of little holes, called pores, and that something watery—the perspiration—comes out from those pores. You must understand it is not clean, pure water which comes out ; it brings out with it some other waste matters, which would decay and turn to poison if not got rid of.

I also told you that if the cold shuts up those little pores it makes us ill, gives us feverish colds, &c.

Well, if anything else shuts up the pores, it will do us harm also ; because then the waste matter, which is trying to come out by the skin, cannot get through, and has to stay in the body, or to find its way out by some other means. Suppose that the drain-pipes which lead away from a house, and carry off the refuse, got stopped up, you can guess what a dreadful state the house would soon be in. Just so is our body, if the little drain-pipes which fill the skin get stopped up. If a person had his skin varnished all over, so as to stop up all the pores, it would kill him.

And if we do not constantly wash our skin, the dirt lodges there (some dirt which we pick up from outside, and some dirt which is trying to work its way from inside), and many of the holes get stopped up. Then the unwholesome waste which ought to come out, stops in.

In a great many illnesses we see very plainly how nature tries to throw the poison out, through the skin. We can see it in measles, scarlet fever, &c. ; and we all know that if it does not "come out" well, the person is much more ill than if it does. Indeed, as soon as ever it is well out on his skin he generally begins to feel much better.

If you recollect that, in a smaller way, the same thing is always happening in our bodies (though we cannot see it), you will understand how necessary it is to keep these pores open, by constantly washing the skin.

Besides this, the skin itself is always, as it were,

wearing out and rubbing off, and new skin is always rising up from underneath. A snake leaves off its whole skin at once, as we leave off a dress, and sometimes one may find its old skin turned inside out, just as it crept out of it. We do not leave off our old skin like that; it comes off little by little, in such very small particles that we cannot, in general, see them; still they are there, and ought to be washed away. Where the skin is pretty thick, as on the soles of our feet, we can see the dead skin coming off in little rolls, whenever we wash our feet with hot water.

This dead skin, you see, is another of the things which come under the great rule I was reminding you of just now.

Many people think they have done quite enough if they wash their hands and faces, just the parts which show (I knew a girl who thought it "very nasty" to wash all over), but you see it is not so; it is the whole skin all over the body which wants washing. The parts which are covered with clothes do not pick up so much dust, &c. from outside, therefore they do not look so dirty; but if you think of all the dirt which is coming from inside, and which comes most readily from those very parts which are kept warm and covered, you can judge how much they need washing.

Who shall we find to set us an example now? In this matter of cleanliness we shall do well to "consider the fowls of the air." Do you know how fond birds are of washing themselves? It is very amusing

to look at them taking a bath, they do enjoy it so. They do not shudder and shiver at the touch of cold water, as some of us do; on the contrary, they take great pains to throw it over their backs and heads, and to get well washed all over.

We had once a tame jackdaw living in our garden, who expected his bath as regularly as his breakfast. When he had spattered and dabbled himself well all over, he used to retire into an outhouse, which served as his dressing-room, and there he would spend a long time, arranging and ordering his feathers, and making himself neat and respectable for the day. But he did not care to tidy and dress himself till he was washed; and I wish we were all as wise as he was. This bird was so fond of a bath that, one day, when my sister had just poured out some water to wash her hands, and he was somewhere outside and caught sight of it, he came hurrying in through the open window, and plunged right into the middle of her basin, before she had time to turn round.

I told you once before, though I am afraid you did not half believe it, how refreshing and pleasant a bath in a tub of cold water is when you get up in the morning. It also helps a good deal to keep your skin healthy and clean; but you want hot water and soap as well, pretty often. If you look at the water in which you have washed when it is cold, and without soap, and then look at water in which you have washed when it is hot, with soap, you will soon see which takes most of the dirt away.

All that I have been saying about the perspiration, and the skin, will show you what a needful thing it is to have clean clothes. Of course, you see, all which our body is trying to get rid of by the way of the skin, must get into the clothing which is next the skin; therefore we must change that clothing as often as we can, and wash it well. This is why we generally wear white clothes next the skin, because they "show the dirt," and remind us to have them washed.

With our outer clothing, though the cleaner it is the better, yet, as it does not touch our skin, it does not matter quite so much as for our inner; it is not always convenient to have new or washing outer garments, but we must be clean and nice underneath.

When I was little, my nurse used to teach me there was a difference between what she called "clean dirt" and other dirt. "Clean dirt" is the dirt you pick up from outside, which is bad enough; but "dirty dirt" is the dirt which comes from inside, and is much worse; and that is what makes our under-clothing dirty.

I think this is rather a drawback to the coloured flannel and coloured stockings which are made and used so much. People sometimes forget that though they do not *show* the dirt as much as white ones, they really are quite as dirty; and if we wear coloured things next our skin, we ought to remember they must be washed just as often as if they were white.

Clean clothes are very pleasant, and help to make you feel fresh and comfortable. Many a sick person

could tell you that a clean night-dress, and clean sheets and pillow-case, do him more good than his medicine ; and you can see why,—because the dirty linen is loaded with the waste and impurities the body is trying to get rid of.

You think all this will take a great deal of time and trouble? Well, perhaps it will be some trouble, though not so much as you fancy ; but a trouble that will pay you over and over again, by the strength and freshness it will give you. A dirty person almost always feels more or less irritable and uncomfortable, though he does not know why.

I don't say no one with a dirty body can have a pure heart ; but I am sure no one who does not know what it is to be clean, how fresh, vigorous, able, and ready the body feels when clean, can understand what David meant when he said, " Create in me a clean heart, O God."

It used to be thought it honoured and pleased God if people were dirty. I have read of a monk who was fifty years without washing his face or his feet ; and of another who never washed or changed his clothes till they fell to pieces. They must have had very strange notions of God, to think He could like anything so disgusting.

Now *we* have got a proverb, " Cleanliness is next to godliness ;" but I am afraid we are content to let it come a long way behind godliness, or else that we don't care much for either.

When I look at the young leaves and flowers, just

breaking their way through the dusty or muddy brown earth, and see how bright and gay and pure they look, it makes me sad to see many a dear little young child, which ought to be as sweet and pretty as a flower, and not dare to touch it, it is so dirty.

Of course it is very true that it takes a good deal of trouble to wash nicely a family of small children. I have got three things to say about that.

1. If people have children, they ought to do their duty by them, whether it is a trouble or not, and some poor women really do it. I know a few good mothers, who seem to have a whole roomful of babies; but I would gladly nurse and kiss any one of them, for they are always sweet and clean. "Where there's a will, there's a way."

2. It saves a great deal of trouble in the end. I have often observed that the clean children are also the good ones. They nearly always look smiling and happy, while the dirty ones are generally whining and cross. You take notice whether this is not true. I feel sure, that the mother or sister who spends a little extra time in washing the children, saves it many times over in the course of the day, in scolding and slapping.

3. It would not be nearly as much trouble as it is, if you tried to make the children like it. If you pull their hair roughly every time you comb it; if you fill their eyes and mouths with soap every time you wash their faces, if you drag them about anyhow, and scold them, they will hate the very thought of

being washed, and no wonder. Then they cry and kick, and you all get cross together. A nice sensible mother or nurse, or kind little sister, takes care not to hurt the child she is washing, but to make him enjoy it. So he gets a habit of liking to be clean, and feeling the comfort of it.

You will not suppose from what I have been saying, that there is anything wrong in *getting* dirty. No one who has work to do can help that. The disgrace is to *keep* dirty. It is a very good plan for everyone in a family to determine that they will never sit down to a meal together, unless they are all clean and neat. That is showing proper respect and kindness to one another, and is very little trouble. You will then all look pleasant and nice in each other's eyes, and that will help to make you amiable and kind to each other. People's homes, whether rich or poor, are much happier if they attend to things which seem as trifling as this.

A great many men, and I think all girls and women, have it in their nature to be fond of ornaments. But then ornaments are so very expensive! Fine laces and chains and jewels cost a great deal of money. Sham ones look very vulgar, and are not quite honest. (I am sure the "virtuous woman" would not have worn *them*.) Shall I tell you of ornaments which the poorest person may get and wear, and which suit rich and poor equally well?

The nicest and best ornament a girl can wear (and I am glad to see a great many of you wearing it now)

is a kind, cheerful smile ; that does not cost much money, does it? but it makes her look prettier than anything she could buy in a shop.

The next best ornament she can wear, she will find in her water-jug and soap-dish ! Ah, you don't think so, but it is very true ; the ornaments she will find there are far better than all the splendid things we see in the jewellers' windows ; and the finest lady in the land would never think of putting on her pearls and diamonds till she had put on those others first.

And if you have no other ornaments but these, you need not mind. A girl *who* has a healthy, well-washed skin, bright tidy hair, white teeth, and neat clean clothes, will always be pleasant to look upon. There is no pretence about her, no dishonour, nothing to hide away ; she might stand before kings (or queens, either) and not be ashamed.

I spoke to you, in some of our other lessons, about the harm we get from dirt in our houses,—dirty floors, dirty walls, dirty ceilings ; how they spoil the air for us, and make us feel dull and depressed.

People often tell us that their landlords will not do anything for their houses, and a very great shame it is when they will not. When I see, as I often do, the rent-book all duly filled up, and I know what pains it costs to pay it so regularly, I do think it is too bad that the landlord should not keep the house nice, properly papered and painted and whitewashed.

For all that, if he would not do it, I think, if I lived in the house, I would rather take the whitewashing

brush, &c. myself, and make my place nice, than leave it dirty and dingy and wretched. Even if it does look like "rewarding the landlord," I would still like best to have my house clean and wholesome as long as I lived in it.

There is one thing workmen sometimes forget in doing up houses ; that is, to take away the old paper before they put on the new. This is a very dirty and unhealthy plan ; it is keeping in the dirt when we ought to be getting rid of it, and will make a room smell musty and close, however nice it looks.

The one great rule about dirt is to get rid of it. Covering up dirty things, hiding them in dark cupboards or under beds, putting on a clean outside while inwardly there is all uncleanness, may be rather tempting tricks ; but they are base and unworthy in reality ; they are not honourable any more than they are wholesome. The great thing is not to *look* clean, but to *be* clean ; not to hide dirt, but to hate dirt.

And I think this must be the reason why we say "cleanliness is next to godliness ;" because if it is *only* on the outside, it is almost worse than none at all.

LESSON VI.

ON LIGHT.

WE all know how joyful the Light is ; how we brighten up if we have plenty of it : how dull we feel in the dark. It seems as if light and happiness must always

go together, as they do in that pleasant verse, "Light is sown for the righteous, and gladness for the upright in heart."

But has this anything to do with Health?

Yes, a great deal. Everything that makes us innocently happy, helps to make us healthy. The two things seem to go hand in hand. I daresay you have noticed how many times I have said in these lessons, that such a thing, or such another thing, makes people "ill and cross" or "ill and unhappy."

It is a very curious thing, and one that we shall be all the better for taking notice of, that our bodies and minds have such a great effect on one another.

If you come to think of it, you will soon see that our bodies have a great effect on our minds. If our bodies are ill, this puts our minds and spirits and tempers out of order; we feel stupid and depressed and irritable: while, on the other hand, if our bodies are well, our minds and spirits feel well too; we are happier and more good-natured, and we can learn and understand better.

(You are not to suppose it is all right for sick people to be cross and fretful; because they ought to try hard to be contented and patient; but I mean that they will feel more difficulty in being so; and we must make allowances for them if they are peevish and hard to please.)

Besides this, our minds can do a good deal for our bodies. If you are very happy, your body can really do more than if you are dull and low-spirited. You

can walk more ; you can eat more ; you are altogether stronger and brisker if you feel cheerful and bright. If you have a good spirit, you can even conquer and cure many little illnesses, by not thinking about them.

I cannot explain to you how this is ; for no one understands how our bodies and spirits are so wonderfully joined together, but many things are quite true which we cannot understand ; and this is one of them. You may see it for yourselves any day.

If you have a healthy body, it will help very much to make you cheerful, kind, and sensible.

If you have a happy spirit, it will help very much to make you strong, active, and healthy.

Well then, this is one great reason why we ought to live in light, cheerful houses, because they make us feel more bright and happy.

Some of you keep canary birds in cages ; so I daresay you know very well how to quiet them down, when they are too merry. You throw a handkerchief or an apron over the cage when you want them to stop singing, do you not ? The little bird cannot sing in the dark.

And it is just the same with us, if we are in dark rooms. We feel as dull and depressed as the canary bird, not a bit inclined to sing or laugh. And this is very bad for our health.

But besides its having such a great effect on our minds, the light has also a great effect directly on our bodies.

In this we are very much like plants, though we

actually do not seem quite as wise or energetic as they do. You can see if you grow flowers in pots, and set them in the window, how every leaf and every bud turns away from the dark room, and seems to be looking at the light. If trees are planted so close together that they can receive no light at their sides, they grow up very tall and lanky, because they can only get at the light from above, and they try to reach that. The lower branches, which cannot get any light, die off.

I daresay you have heard the story of a potato, which had been left in a dark cellar, where there was only one little window, quite high up in the opposite wall. This potato, when it began to sprout, was so anxious to get at the light, that it sent a long runner all across the floor, and then all up the wall, till it reached the window. It did everything it possibly could to come to the light.

I told you how the plants get the carbon (which is a great part of their food) out of the air. But they cannot get it in the dark. All the carbon they want they must get in the daylight, and when the sun shines.

If plants are grown in the dark, they are never of their proper colour; they look weakly and white. When gardeners want their lettuces and celery to look white, instead of green, so as to make pretty salads, what do they do? They tie them up, or earth them up, so that the light cannot get to the inside leaves and stalks at all; then, when they are cut and opened, they are quite white inside.

It is just the same with human beings. Those who live in the dark are pale and sickly. Their blood is poor and thin and pale-coloured. They are liable to all sorts of diseases, both of mind and body.

Their bodies seldom grow even to the right size ; they are stunted and puny, and sometimes deformed : and their minds do not grow properly either ; they are apt to be weak and silly, and even idiotic : and they grow old before their time.

There is a saying that "where light cannot come, the doctor must." But the doctor cannot do instead of the light, and medicine is not as good as the sun. I have read of a school where a number of sickly girls were being educated. There were some fine large mulberry-trees growing outside, and their branches shaded and darkened the poor children's schoolroom. Can you fancy the look of that room, dim and dark, the windows shaded with boughs and leaves, the sunshine all waiting outside, and the dull, white children inside ? At last, somebody had the sense to cut away a great many branches of the mulberry-trees, so that the beautiful light and sunshine came streaming into the room ; and as soon as they had done that, the poor sick girls began to get much better. The sun was better than the doctor.

This is why it is so dreadful to see poor people living in dark, underground rooms, as they still do in some large towns, or in high narrow streets, which the sun never shines to the bottom of. I do not think you have ever seen these people ; but if you ever do,

you will not forget their pale, weary, hopeless face. as long as you live.

Without living in cellars or dens, however, people often live in rooms which are much darker than they ought to be. In old houses, the windows are generally very small ; then, as if that were not bad enough, we must needs hang up dark curtains on each side, and stretch a blind across the lower half, so as to keep out as much of the precious light as we can ; or we put a whole stand of plants in the window, which, however pretty they may be, keep the light, which we want, all to themselves. And, sometimes, we forget to wash our windows, and so get a sort of blind of dirt all over them.

We ought to do the very contrary of all this ; to tempt in all the light we can possibly get, even to the very farthest corners. And if we live in rooms with small windows, it is a good plan to have very light-coloured wall-papers and paint, and to keep the ceilings and floors as white as possible, because they help to make our rooms bright. Dark papers and dark furniture and floors seem to swallow up the light, and will make such rooms look very dismal ; though they do very nicely in rooms with large windows, where plenty of light comes in, and we can afford to spare a little of it.

Perhaps you think the light walls and paint will soon "show the dirt." If they do, it is all the better ; because you remember how unwholesome they make our houses when they are dirty, by spoiling the air.

And this is another great good which the light does ; it shows us when things are getting dirty, and reminds us to make them clean.

Another good which a light room does us, is that the daylight lasts longer in it, and we do not have to light our candles or lamps so soon. This is much better for our eyesight, if we are reading or working ; and besides, it keeps our air purer. You remember I told you that lamps and candles spoil the air, just as we do ourselves, by using up the oxygen, and making carbonic acid gas ; so the more we can do without them, the better for us.

I reminded you, once before, of some things you should look out for, if ever you help to choose a house to live in. One of them was that, if in a street at all, it should be a wide street, and not too high. You will not only get more air, but more light, in such a house. And now, I hope, you will also remember to get a house with nice large windows, if you can ; and not to have any great trees growing near it.

LESSON VII.

ON EXERCISE.

SUPPOSE we had a beautiful engine of some sort ; for instance, if I had a very good sewing machine, and I never used it for a year, but kept it dry and safe, and oiled it now and then, and rubbed and cleaned it

now and then, and took care not to let it get rusty, it would be just as good at last as at first.

But when we come to our beautiful bodies (which in some ways are very like a machine), if we do all the things I have been telling you of in these lessons,—if we keep them clean, and warm, and well-fed, and take ever so much care of them,—yet if we do not use them they will not keep in good order; they will soon fall ill, grow weak, and pine away.

It is quite necessary for them to be exercised.

Of course we all know that if we sat quite still all day, and lay quite still all night, it would soon make us ill. We all of us do get some movement and change. But some of us do not get enough, and some of us get too much, and some of us do not get the right sort.

There are a good many different kinds of exercise, because there are a good many different parts of our bodies, and every one of them ought to be used, if we want it to be vigorous and healthy. You know what stout, strong arms a blacksmith has; that is because he uses his arms so much. Instead of wearing them out, as it would if they were tools, it does them good to be used. Just the same with other parts. A person who uses his eyes as he ought, gets good eyesight, and sees many things another person cannot see. A person who uses his ears as he ought, gets to hear many things another person does not hear. I have heard that savages, who are obliged to be always looking and listening with all their might, either for enemies

or prey, have the wonderful apparatus belonging to their ears and eyes actually larger than ours, as the blacksmith's arms are larger than ours. Without being savages, I know that those who have learnt music and drawing properly, do really hear many beautiful sounds and see many beautiful sights which other people know nothing of.

And any part that we do not use gets weak and helpless, and perhaps, at last, we could not use it if we tried.

But not only this. All the parts of the body are so joined together, and have so much to do with each other, that one has a great effect on all the others. Now what we commonly call taking exercise, that is, walking, running, dancing, jumping, &c., not only strengthens our arms and legs and backs, but also does us good by helping the other work of our bodies. It makes our blood flow faster and brisker; it makes us breathe in a great deal more fresh air; it helps us to get rid of more of the waste and refuse; it makes us warm and comfortable; and it keeps our digesting apparatus in good order. So it makes us stronger and better all over.

You see, then, what a good thing it is for boys and girls that they are so fond of play. Cricketing, running races, skipping with a rope, tossing balls, all help them to grow up active, healthy men and women.

And when people are too old to care for play of that sort, nice pleasant walks in the fields or on the common are capital exercise too, and do us good in

many ways; beside the actual exercise, we get fresh air and sunshine, and something pleasant to look at: all these help on in refreshing and strengthening us.

I was talking to you in our last lesson about the wonderful way in which mind and body are joined together. So, as I have told you part of the good effect exercise has on the body, I will now speak a little of what it does for the mind. We read in Genesis iii. how it was said to man, "In the sweat of thy brow thou shalt eat bread."

Man does really have to work very hard to keep himself in comfort and well-being. Does it not seem very odd that, of all animals, man is worst off for a covering?—no wool, no fur, no feathers?

But that very thing turns to his good: can you think how? Because he can suit his clothes to any place he goes to. If he is in a hot place, he can wear cool clothes; if he is in a cold place, he can wear warm ones. So he can make himself comfortable in any part of the world. Scarcely any animal spreads so widely over the world as man can. Besides, having to make clothes teaches him to be observant and ingenious.

Then, again, does it not seem very odd how weak man is, compared with other animals?—no claws, no horns, no strong teeth, no sting?

But that obliges him to make tools, both to catch and kill his food, to defend himself against his enemies, to plough and to build with. And it makes him

inclined to seek and to give help to his neighbours, and so to be sociable and friendly.

All these drawbacks, all these difficulties, oblige him to use his brain and his hands. And the more he uses them, the more clever and skilful he gets. If he does not use them, instead of improving and getting on, he goes back and gets worse.

You have all heard of the Romans. They used to be a very great, brave, and clever nation, and did wonderful works wherever they went. They travelled about everywhere, conquering and civilizing savage nations. You know how they came to England, and taught the barbarous people whom they conquered many useful things, and how they made great buildings and good roads. The people who live in Rome and Naples and those parts now, are quite different; they do not go anywhere or do anything in particular; they are very good-natured, but they love to loll about in the sunshine, eating macaroni, wasting their time and begging.

I have often wondered how they came to change so dreadfully; and I will tell you what, I believe, was one reason. After a time, instead of having to work and grow corn for themselves, as their bravest men used to do, the rulers took to *giving* them corn. They would fetch corn from all parts, and distribute it to the people for nothing. So the people got idle; they left off working, and expected to have the corn brought without their taking any trouble to get it, and they grew weak and beggarly. After those rulers

and emperors had passed away, a great many priests and monks came, who built rich monasteries, and out of false kindness they would give to the beggars instead of setting them to work ; and so the people got more and more used to idleness, less and less brave and industrious, till they became what they are at this time. I hope they will now have wiser governors, and will learn to work, and will grow strong and courageous again ; but I am often afraid that if English people should get to like receiving charity better than working for their bread, they also will grow poor weak cowards, instead of being strong and manly like their forefathers.

Even if people have not to work for their bread, woe betides them if they do not work for their duty.

A doctor who attends a number of rich ladies in London, told a friend of mine that a great many of their illnesses come simply from having nothing to do. They are eaten up with dulness ; they don't know how to get through the long weary days, and so they mope and fall ill. I would much rather be an honest, industrious cook or housemaid than be one of them.

Well, then, work is very good for us, both body and mind ; but, you know, one may have too much of a good thing ; and too much work will do us harm. Working too hard and too long wears out our bodies, and makes our minds dull and stupid.

But, as I was saying just now, there is another very good sort of exercise, besides work ; that is, play.

When I say play, I do not mean only skipping and running, I mean any sort of harmless amusement.

When I was a child, I very well remember that the people who arranged my lessons and occupations, used to be fond of repeating the proverb "Change of work is as good as play," and would try and make me believe that it was as good as play to go from arithmetic to history, and from history to French grammar. You may suppose I did not like that proverb at all.

But there is a sense in which it is quite true. If I have been sitting reading a long time, it rests me to get up and take a walk. If I have taken a long walk, it rests me to sit down and read. A man who has been writing or studying all day, finds it rest him to dig his garden, or work at a bench like a carpenter. A man who has been hammering or digging all day, unless he is quite over-tired, finds it rest him to sit still and read or write. In these ways "change of work" *is* as good as play; because it is a real change, and exercises quite a different part of us. Reading uses our eyes and brains; walking or digging uses our legs and arms; and while one works, the other rests.

Now people who can work very well, and are sensible at that, are often quite stupid about play. They don't the least know how to amuse themselves. This is because there are so few things they care about, or take an interest in. It often makes me quite unhappy to see such people taking holiday; they seem to have no idea of pleasure but shouting, rude joking, racing poor unfortunate donkeys and ponies

about, and perhaps ending up with drinking too much, and getting bad headaches next day.

And how many pleasant things there are to do ; how many wonderful and beautiful things to look at and to listen to, which would do them so much more good, if they could only care for them.

The more things we take an interest in, the more pleasure we shall have in our lives. I cannot stop to speak of many of these things now ; but I must say a few words to you about reading.

I hardly know how to make them a few ; for I so long to make you feel what a treasure of happiness you will have all your lives, if you are fond of reading. Nothing ever rests a tired spirit so well as a book. When you don't seem to care for any other pleasure, even if you are ill or unhappy, and could not bear the thought of any actual amusement, your books will be your companions and comforters. What beautiful, happy thoughts, what merry laughs, what wise teachers, what dear friends, we find in books.

If I were a fairy godmother, thinking what choice gifts I would give my godchild, I think that after a good conscience and a kind heart, a love of reading would be the best, and would make her the happiest.

You all enjoy being read to. I have often noticed how happy you look, when you are listening to an interesting book. Now, I wish you all to learn to read, well enough to enjoy reading to yourselves quite as much, or more, than being read to.

And then, I hope you will keep it up. When you

leave school, pray do not leave off reading, because it is very easy to get out of the habit, and not so very easy to pick it up again. And I am sure I need not say, that I hope you will only read good books, because a person who loves good books cannot bear bad and wicked ones.

Now that I have said so much about work and play, and how good they both are for us, you will understand, that if you are taking care of children, you must not call them naughty or troublesome when they are restless and busy. It is in their nature to be always doing something; and playing and crawling and running about help to make their limbs strong and useful, and to keep them well and healthy. And very often, what looks like mere play is really good useful work. Look at a baby's solemn earnest eyes, when it is examining something fresh, and you will judge how hard it is at work. You know how it tries to get everything into its own little hands and mouth. Well, that is not mischief; the child is learning a great deal about the thing, whether it is hard or soft, rough or smooth, heavy or light, and how it tastes. We could not *teach* the child anything of this sort in words; it must learn it for itself by experience.

What we have to do is, not to let it buy its experience too dearly. I mean, we should not let it find out by experience that fire burns, or boiling water scalds, or knives cut, as some poor little neglected children do; nor should we let it have things to handle which it can destroy; but if we take pains to let it always have

something to play with, which it cannot hurt, and which cannot hurt it, it will be happy and good, instead of mischievous and troublesome.

One way of managing a child, which you and I see sometimes, is to leave it to itself till it gets hold of something it ought not to have; then to snatch that away, give it nothing else instead, and to slap and scold it when it begins to cry. That is the exact way to make a child grow stupid, sly, and ill-tempered.

Both for little children and grown-up people, nothing will go farther towards making them "healthy, and wealthy, and wise," than having plenty to do and liking to do it. As Solomon said long ago, "In all labour there is profit."

LESSON VIII.

ON REST.

I SAID so much in our last lesson about the kind of rest which is only another sort of exercise, I mean play and amusement, that I have not left a great deal for to-day. I showed you how it rests us to go from one sort of occupation to another, and how good it is, both for body and mind, to have plenty of different things we care about and enjoy doing.

But then, we know, that at last we get tired all over, and neither body nor mind is fit for any more work or any more play; and then we want something that will rest them both.

And we do not have much trouble in seeking it ; it will come to us of itself, and, without our having to do anything, it will take us in hand, quiet us and comfort us, repair us and refresh us, and turn us out quite like new people in the morning.

Of all the wonderful things about us, which we only do not wonder at because they are so common, I think sleep is one of the strangest. How it comes, why it comes, how it does its kind and helpful work upon us, not the wisest people seem able to understand ; so you may suppose I cannot even try to explain it to you.

But there are one or two things which *hinder* sleep, and one or two things which *spoil* sleep, which I will say a little about.

I hope, not one of you knows what it is to have any difficulty in going to sleep, but that the minute you lie down upon your beds, or a very few minutes after, your eyes shut up of themselves, and never open again till it is time to get up. But as you grow older this will not always be, and sometimes when grown-up people are most tired, they find they cannot sleep. So what I am going to say will perhaps be useful to you some day, though I hope it will not now.

One great thing, which hinders people from sleep, is thinking. Even if you are thinking of a pleasant thing, if you are very much delighted about it, it will keep you awake. Perhaps you do know this yourselves. When you are going for your summer treat, or to do anything very nice indeed, you can hardly

get to sleep the night before for thinking of it ; or you wake very early in the morning, long before the right time.

Now, for once in a way, and for such a pleasant reason, it does not much matter losing a little sleep ; but it would be a very bad thing to get into a habit of it. Older people, who are fond of reading, often find, if they have been very much interested in their book till bed-time, that they go on thinking and thinking about it after they are in bed, and that, do what they will, they cannot get to sleep. When that happens, it is a sign they must leave off reading rather earlier, and give themselves time to forget it a little, before they want to go to sleep.

I do not know if you are ever likely to care about your books so much as for them to keep you awake ; but, at any rate, there is another thing which I am afraid there is no hope of your escaping, which may also hinder your sleep,—that is, trouble and anxiety. I am not speaking now of very great cares and sorrows, but of little ones, such as we are all subject to at times, and which we must learn to manage so that they shall not get the better of us.

With matters of this sort, there is no better rule that I know of, than the old nursery one :—

“ If there is a remedy, find it ;
If not, never mind it.”

Look the thing in the face ; think it over as sensibly as you can, and see if you can do anything to set it to rights : if you can, then do it ; if not, then try not to think

any more about it. If you worry and worry about it, over and over again, as we are all apt to do, you will get depressed and stupefied, and no good will come of it. And, especially, do not allow yourself to think of it after you have gone to bed; for it will frighten your sleep away, and seem worse and worse the more tired you get.

You may say that thoughts will come into your head, whether you like it or not, and how are you to help it? But, if you try, you can help going on with the thoughts; and we should all learn to turn our minds from one thing to another, if we choose: for this is one way of ruling our spirits, which the Bible says is a greater thing than taking a city.

Delicate, weakly, and old people often awake very early in the morning, or even in the middle of the night, and cannot fall asleep again. I daresay you have felt sorry for them, when you have heard them speak of the long tedious hours they have to lie awake "wishing for the day." Now, very often, this is because, being old or weak, they have become chilly or exhausted; and if they got a little food or a little warmth, they might fall asleep again. It is very easy overnight to put a sandwich, or a biscuit, and a little wine (all lightly covered up), by their side, where they can readily get at it, if they are not too weak to help themselves; but if they are, then somebody should get up to give it to them, so that they may, if possible, get another sleep, and be spared all that restlessness and weariness.

And a third thing which hinders sleep, is when our bodies are too much tired. We may have worked them so hard that they really cannot settle to sleep, and this is one of the ways in which overwork is so bad for us. If we ever find we have done this, we must remember another time, and stop short before we are thoroughly worn out. There is hardly ever any good reason or excuse for such over-toil.

And now I will tell you of one or two things which may spoil our sleep, and prevent it from doing us all the good it ought. One is, eating a great meal just before going to bed, and especially if it is a meal of any of those heavy and unwholesome things we talked of before. A great supper, if you have not had time to digest it, or partly digest it, is nearly sure to disagree with you, and will make you sleep heavily, and have bad dreams.

Another thing which sometimes spoils your sleep is your bed ! That sounds very odd, but I will tell you how it is. You remember all I said about clean clothes, and how the waste from our skin gets into our linen. Well, when we are in bed, of course it gets into our sheets and blankets and mattresses ; and if we are not very careful to keep them all nice and clean and well-aired, it makes them very unwholesome and very unpleasant. If we want to have pure and refreshing sleep, we must keep our beds pure and sweet. And we must not be in a great hurry to have the beds made in the morning, because, though that makes the rooms look neat, we ought to open our

windows wide, and let the fresh air blow on all our bedding every day for some time after we get up.

I spoke in one of our first lessons of another thing which spoils our sleep—that is, bad air, which is sure to make us feel sick and stupid. Do not forget that every one of us is constantly spoiling the air, every time we breathe, and then you will see what a bad thing it is for many people to sleep in one small room. If there is only enough air in it for one or two people, how dreadful it seems for four or five to be forced to breathe it. I know it is very inconvenient and very expensive to get houses with bed-rooms enough in them for a good-sized family; but it is worth trying for: and if you cannot get them as large or as many as you want, you must be doubly careful to air them as well as you can, both when you are in and when you are out of them.

Remember what a large part of our whole lives we have to spend in our bed-rooms, and how much of our health and strength depends on our getting proper and wholesome sleep; sleep which will refresh and renew us, not stupefy and depress us, or, in the dear old-fashioned words of the Evening Hymn:—

“ Sleep that may me more active make
To serve my God when I awake.”

Yes, that is the end of it all; and of all the other things I have been trying to teach you in these lessons. I want us all to be healthy and active that we may serve our God better; that He may see us diligent and

vigorous in obeying His laws ; fighting against disease and darkness and misery ; living happy and useful lives in His beautiful world ; and that "the voice of joy and health" may be heard in our dwellings, according to His loving will.

THE END.



