ACTION

PEACE CORPS

HEALTH EDUCATION:

A STUDY UNIT ON

FECAL-BORNE DISEASES AND PARASITES

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HEALTH EDUCATION:

A Study Unit on Fecal-Borne Diseases and Parasites

by

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TO THE TEACHER

The purpose of this unit is to help the student reach a real understanding of how a person's habits determine his health. Through a step-by-step learning procedure, this unit is designed to present the knowledge necessary to gain this understanding in a logical progression.

Subject Matter

Read all the directions, materials, and activities thoroughly before you begin to teach this unit. It is important to have a complete knowledge of the purpose, goals, and subject matter of this unit from the very beginning and to know what will be taught next, in case any questions arise in class which would best be illustrated in a coming lesson.

Read the informational part of each lesson over at least THREE times before presenting it to a class. It is important that you show the children that you know the material and that you think it is important. If you do, then the children will become interested too.

Visual Aids

Have a chart of the digestive system in front of the class at all times while you are teaching this unit. Leave it there after class, during lunch, etc. It will remind the child of the material of the lesson. Use as many visual aids as possible. Many are presented or suggested in this unit. Draw charts, gather pictures, and get specimens, but be sure that these visual aids are large enough for the whole class to see. The cycles illustrated in this unit can be reproduced on large posters or in individual steps put together on a flannel board.

Vocabulary

I have assumed that each teacher has a SCIENCE VOCABULARY BOARD. Everyone has many display boards, some of which are not used and could be made very functional. The science vocabulary board should be changed for each unit, and while the class is studying each unit the words should be left on it and added to every time there is a new word to be learned. Flannel boards are good for science vocabulary boards.

Blackboards are not, because the words are easily erased and the children become tired of looking at them. Make something permanent. At the top of the board put some eye-catching question such as "What Do These Words Mean to You?" or "Do You Know These Words?"

This is a good procedure for studying science vocabulary: As each new word comes up in a unit, explain it in class and tell the children that it will be a science vocabulary word. Don't display the word BEFORE you present it in class, as this will take any suspense out of learning and may set up mental blocks against learning the word. Also, try *not* to give them a definition to memorize. If you do, they will never really *learn* what the word means. If you give them a specific definition to memorize, they may only learn the *word-order* of the definition and not the real meaning.

Just describe the word, frequently changing the words you use to describe it, if possible. Then, after the class in which you introduced the science vocabulary word orally, write the word on a large piece of heavy paper (poster paper is good, because it is thick and stiff). If you use heavy paper, it will last and you can use it every year for the same unit. Write the word in crayola or heavy pencil. The lettering should be about an inch high so that the children in the back of the room can read it. Cut the word out and, the NEXT DAY, pin or tape it on the board. Put up only the word. Do not put a definition with it. The meaning should already be in the children's heads. Thus, when the word appears on the science vocabulary board for the first time, the child will automatically try to define it from what he learned the day before.

I have indicated the science vocabulary words for this unit, but for other units your common sense will tell you what new terms or words should be put on the science vocabulary board.

Boardwork

Try NOT to write on the board in advance the material that is to be taught. If it is written on the board beforehand, the class may read it over all at once, then lose interest and not listen. Or a student may read the material, but its meaning may not enter his mind. First, present the material orally. An oral presentation will keep up suspense and fun in learning,

because listening to an oral presentation is just like listening to any story. It forces the child to absorb the knowledge, to think about it. Of course, yo must try to make the presentation interesting.

Try writing only to illustrate a point while you are talking. Draw pictures (stick figures are fine, and anyone can draw them) or diagrams to emphasize your point. When making a list, discuss the points well with the children first, then make the list. This procedure gives the children two different exposures to the material. And when making a list, try to avoid full sentences. If the children see full sentences, they will attempt to remember the exact words, not the meaning or idea. They will learn the word-order instead of learning the *idea* and learning how to give the idea from their own minds, in their own words. Write only the key word or words — the heart of the idea.

Other Sources

This unit is only an outline, designed primarily for the information of the teacher. When presenting it to the class much more should be added from both the teacher and the students. Every fact should be enlarged upon and made as interesting as possible for the children. Don't simply list fact. Perhaps you can give the children a fact and then tell a story about it. Or you can tell all you know or can think of about the fact. Or you can ask the children what they think of it or have heard about it. For instance, in giving the symptoms of a disease, discuss with the children WHY these symptoms appear (eg. there is a loss of weight when a person has worms, because the worms take much of the food and the person gets no benefit from it).

Do your own research. Do not feel you cannot add to this unit because you think that you do not have the knowledge. You do have the knowledge in most cases, and you can think over and reason out any questions that arise in your mind or in the minds of the children. Make use of your own common sense. Be resourceful in obtaining information, visual aids, and displays from doctors, midwives, Rural Health Units, Puericulture Centers, hospitals, government organizations, encyclopedias, magazines, etc.

Sequence

This unit is designed primarily for use in the intermediate grades of elementary school, specifically, Grade Five. But it can be taught in Grade Six if the students did not study the unit during the previous year, and can easily be simplified by the teacher for all of the other primary grades. The sequence of the parts of the unit and the content have also been taught in a normal school with great success. With adaptions it can also be used to teach in barrio meetings. For the elementary school, note the time devoted to each part of the unit and follow this schedule fairly closely. If the unit is taught much slower, it has been found, the children will lose interest and become bored. It has also been found that the children can learn all the material, but remember not to stress details and facts that are not really important to the aim of the unit.

Application

The child should be educated about these diseases so that in the end he will understand 1) that these diseases are important to know about; 2) that a certain few things are spreading them; 3) that these diseases can be prevented; 4) that each person is responsible for the state of his own health. All these diseases are prevalent in the Philippines, and they are here mainly because most people (including teachers, unfortunately) simply do not know about them and how they are spread and how serious they are. This unit, therefore, is much more than schoolwork. If taught well, it should teach a lesson the children will remember all their lives and will consider important enough to tell others. It has been found that if this unit is well taught in the school, it can generate effects which will result in the improvement of health and sanitation practices in the community.

Merry Lee Corwin
Tolosa, Leyte
October, 1963

PREFACE TO THE SECOND EDITION

In the year since the first printing of this booklet there has been a very encouraging reception of it and, what is more important, certain successes in its use as an aid in health education.

As much as anything, the booklet is meant as an aid to the actual method of education. Of course it is a convenient collection of the more important facts relating to the subject of Health. But the facts and details are of secondary consideration. Many children can recite facts perfectly, but do not really *know* them or believe in them. For example, they have all memorized the long list of things to do which is the answer to the question, "What should we do before coming to school in the morning?" But it has never occurred to these same children to actually *do* these things. Those answers are only words to be remembered up to the time of the test and then forgotten. What we would like to do is to make health education extend beyond the classroom and into the people's actual lives.

This goal can be accomplished by the teacher's caring about the health education of her students and showing them that she cares. If she can show them the importance of healthful habits and show them *how* these habits are responsible for the state of a person's health, then her students (children or adults) will *want* to attain better health for themselves. For example, once they *understand* how the lack of sanitation spreads disease, then they will *want* a water-seal toilet.

You cannot start at the end and that is why this booklet does not even discuss the actual diseases until the middle of the book. In order to reach an *understanding* of diseases of the digestive system, for example, the student must know about the digestive system itself and how it should work. Also, he cannot want to prevent flies from touching his food until he appreciates the part the fly plays in transmitting disease, and this appreciation cannot come until he knows the fly's habits. Thus, I have attempted to make this booklet a *systematic* coverage of the material. The student studies the background to prepare himself for the full understanding of the diseases and infections.

Finally, I would like to say to the teacher that she is the only one in this country who teaches the Filipino children in regular classes over a long period of time. Part of every Science year must be devoted to the study of Health and this is virtually the only exposure a Filipino has to knowledge about health. If the health education of the child is made *meaningful* for him and applicable to his life during his impressionable years in elementary education, this knowledge will stay with him the rest of his life. If the child wastes all his time in Elementary School memorizing words and answers which he does not apply to his life and which he forgets anyway after the test on that unit, then his teacher has failed in her duty to him and he will remain ignorant through his life. The major part of health education of the Filipino people is in the hands of the Elementary School teachers.

M. L. C.
Tacloban, Leyte

November, 1964

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DIGESTION AND THE DIGESTIVE SYSTEM[1]

Teaching time — 3 days

Science Vocabulary

Molecules
Digestion
Enzymes
Feces

Digestion is the process by which food is broken down int very small particles, which are called *molecules.*[1] These mole cules are small enough to be used by the human body for it growth.

This breakdown of food makes it possible for the molecule of digested food to pass through the walls of the intestines an into the blood stream. The molecules of food in the bloo stream are then carried to all the different parts of the body and this is how the body is nourished and how it can stay aliv and grow.

During digestion the food is mixed with substances calle *enzymes.* Enzymes are chemicals in the juices of the bod which are found in the different parts of the digestive system They are a help to digestion. They speed up digestion, the help to change the food into smaller and smaller pieces an eventually into molecules, and they help the food to pass throug the digestive system.

It is very important that all parts of the digestive system work together, because each part is necessary to the whole system for good digestion and health. If one part does not work or if there is a disturbance in one part, then the whole process of digestion is interrupted.

The first thing to know about is what goes into the digestive system — food. Food is what makes the body run. It keeps the body strong and healthy and ready to fight disease. If people do not eat the right foods, their bodies will not be strong enough to fight disease.

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[1] It is logical to begin at the beg nning — with the digestive system. If the children are to learn about the diseases of the body (in particular of the digestive system), they must first know about the body and how it should work. This background knowledge will make the study of diseases much more meaningful to the child, a he will really understand how each disease harms his body.

Nutrition

Nutrition is the process by which human beings take food into their bodies and use it. We may have good nutrition or poor nutrition. This choice depends on the food we eat. When a person has good nutrition, he is eating good foods and many different foods for the many different needs of the body. A person with good nutrition has strong bones, muscles, teeth, and healthy skin and healthy blood. His body can fight against diseases. He feels good, has enough energy for his work and play, and he looks healthy.

A person with poor nutrition does not eat enough food, or he does not eat all of the different kinds of food. He does not look healthy. He easily gets tired. He easily gets diseases. Many Filipinos have poor nutrition because they eat only rice and dried fish. They do not eat enough of *different* foods and the right kinds of foods. So many Filipinos are not healthy, their bodies cannot fight against diseases, and they are sick most of the time.

There are many different kinds of food which people should eat so that they will be healthy.

Proteins. These are found in such things as meat, fish, eggs, peanuts, beans, milk and peas — foods that many Filipinos do not eat enough of. Protein is very valuable to the body's good health. It has many different important uses in the body.

It is used by the body to fight against, and prevent infections and disease. It is also used to build up the body and to repair the insides after they have been damaged from disease. So we know that a person who does not eat a good supply of protein will lose twice. First, he easily gets an infection or disease which weakens his body. And secondly, he cannot repair the harm which these infections have caused in his body and he will therefore remain permanently weakened.

Protein also supplies energy for the body so it is obvious that a person who is not eating very much protein will appear to be lazy and to lack energy.

Protein helps to make the all-important enzymes which are

so necessary for good digestion and the best use of the food a person eats. A person with a poor supply of prot in will also have a poor supply of enzymes. And since enzymes are needed to properly digest the different kinds of foods, he will not be able to get the full benefit of the foods which he does eat.

From all of this information, it is clear that protein is very valuable, useful, and necessary in the body. However, you can see by the chart on page 5 that Filipinos do not eat enough foods that are rich in protein.

Carbohydrates. These are found in starches and in sugars. They are a very important source of energy for man. The carbohydrates which a person eats can be used by him as a source of energy if he is also eating enough protein to provide good enzymes within his body because it is these enzymes which aid the digestive system in changing carbohydrates into energy.

Filipinos eat a lot of carbohydrates. The basis of their diet is rice, which is a cereal. And you can see on the chart on page 5 that Filipinos eat more cereal than is necessary, while at the same time they are neglecting to eat the other foods which their bodies really need.

Fats. These give about twice as much energy as carbohydrates and proteins, but the energy from these fats cannot be released and used by this body unless the enzymes aid in their digestion. And the body needs protein in order to produce these enzymes.

Fats also contain some vitamins which the body needs for its good health and functions.

Vitamins. These are not changed in the digestive system. They can be used just as they are found in food. Vitamins regulate the different processes in the body, including the digestive process.

There are several different vitamins that are definitely needed by the body. Each vitamin has a certain job. If you are missing one certain vitamin, you will get one certain corresponding disease caused by the lack of that vitamin. For example, if you do not get enough Thiamine, also called Vitamin B1, you will get beri-beri. Many Filipinos get beri-beri, but

they could avoid it by eating unpolished rice, because the outside shell of rice contains Thiamine.

We know that if you do not get all the different vitamins found in vegetables, fruit, milk, eggs, meat, etc. that your body cannot work well.[2] Look on the chart to see if Filipinos eat enough food rich in Vitamin C.

Minerals. These are not changed either by the body but are used just as they are found in food. The most important work of minerals is to help us grow strong bones and teeth. Small amounts are used also for good muscles, blood, and nerves. Like vitamins, they also help the body to function well.

Calcium is one mineral which is necessary to the body. The body needs calcium to build good strong bones and teeth. Calcium is found in milk and milk products, and is also found in green leafy vegetables, but you must eat plenty of them to get enough. Most Filipinos do not eat enough calcium. You can see this on the chart by observing how much milk they drink, and how much green, leafy vegetables they eat.

Water. This is not changed either in the digestive system. It is essential to the body, however. You could live longer without food than without water. It helps digestion, helps carry food throughout the body, and helps good passage of waste from the body. Also, the evaporation of water from the skin helps to keep the body cool, and this is very important in a hot country like the Philippines.

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[2] The children should be the ones to give examples of these types of food. They know them from Home Economics. Also see if they can give you the uses of each food group. Try to give the children the chance to use their knowledge if they already know something. Then, if you find that they already know this, just discuss it briefly with them again instead of really teaching it. This section on nutrition is not meant to substitute for the regular study of nutrition in Home Economics, but it is meant simply to recall facts (or teach them, if necessary) which are a necessary background for the material in this unit.

FOOD GROUP	Actual Intake (in grams)	Recommended Intake	Percentage of Recom. Intake
1. Cereals	349	273	127.8
2. Starch roots and tubers	33	134	24.6
3. Sugars and syrups	23	42	54.8
4. Dried beans, nuts and seeds (expt. coconuts)	10	36	27.8
5. Leafy and green vegetables	18	68	26.5
6. Vitamin C-Rich foods	37	86	43.0
7. Other fruits and veg.	119	93	128.0
8. Meat, poultry and fish	84	107	78.5
9. Eggs	7	12	58.3
10. Milk and milk products	38	143	26.6
11. Fats and oils (Incl. coconuts)	11	36	30.6
12. Miscellaneous	23	none	

This chart is taken from a report entitled "Nutrition Problems in the Philippines," (1963) by Conrado R. Pascual, M.D., Research Director of the Food and Nutrition Research Center of the NSDB.

The Digestive System[3]

The Mouth[4]

A. Digestion begins in the mouth.
   1. The mouth chews the food into smaller pieces which are more able to pass through the digestive system.
   2. The food is mixed with its first enzyme. It is found in saliva and is produced by the salivary glands. The enzyme changes starch into sugar and then sugar into a simple sugar so that it can be digested.

B. The food passes from the mouth to the esophagus. The esophagus does not change the food because it is only a passageway. The esophagus takes the food to the stomach.

The Stomach

A. Food is churned or ground in the stomach.
   1. The stomach has very strong muscles inside its walls. These muscles press together and then go apart and repeat this action until the food is ground into very small pieces.
   2. While the food is being churned, it is mixed with another enzyme in the gastric juice. Gastric juice is given off by the stomach, and it contains the enzyme that begins the digestion of protein.

B. After leaving the stomach the food goes to the intestines.

The Small Intestine

A. In the small intestine are other enzymes that help digestion.
   1. Intestinal juice contains one enzyme and comes from

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[3] Be sure that you have a large chart of the Digestive System in front of the class during the whole unit. Most Central Schools have them and will lend them to the barrio schools. You might get one from a hospital, doctor, or Puericulture Center. Or you can make a large drawing from an encyclopedia or health book on large Manila paper or poster paper.

[4] Go through the whole digestive system once, just as if you were telling a story to the children. Then go through it again, making use of the chart and making the chart do the work. This way you go over it twice, but in two different contexts, so that the children won't lose interest.

the small intestine. The enzyme works with another enzyme to finish the digestion of protein which was begun in the stomach by gastric juice. It also helps to change the fats into molecules which can be used by the body.

2. Pancreatic juice comes from the pancreas and passes into the small intestine. The enzyme in this juice works with the enzyme in intestinal juice to finish the digestion of protein and to digest fats.
3. Bile is produced in the liver and passes into the small intestine where it meets the partially digested food. Bile also helps to digest fats. It helps to keep the food from spoiling for the day or two that it is in the body.

B. When the food is finally digested completely, it has changed into molecules and can pass through the walls of the small intestine into the blood stream and can be used by the body for its growth and its health. These molecules are so small that they cannot be seen. They are the smallest pieces of food possible. If they were broken, they would become elements, like nitrogen, oxygen, carbon, etc.

The Large Intestine

A. No actual digestion takes place in the large intestine, but it is here that water is absorbed for use in the body.
B. The large intestine is used only for storage of food which cannot be used by the body. The body cannot digest this food. Everything that does not pass through the walls of the small intestine for use in keeping the body healthy passes into the large intestine.
C. These waste materials are called *feces* and are what is passed out of the body at the end of the large intestine, the rectum. This waste passes out when a person moves his bowels.

Time of Digestion[5]

The First Day

A. Dinner is eaten at 6:00 p.m.
B. 6:01 p.m. The first food enters the stomach.

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[5] Make a large chart from the one on page 9 to illustrate the time

C. 10:30 p.m. The stomach is empty again.
D. 1:00 a.m. The food has passed through the small intestine.

The Second Day

A. 6:00 p.m. The first waste food from the meal of one day ago will be ready to leave the large intestine about this time.
B. The rest of the food is slowly moving through the large intestine.

The Third Day

A. 6:00 p.m. The last waste from the meal eaten 48 hours ago has left the body[6]

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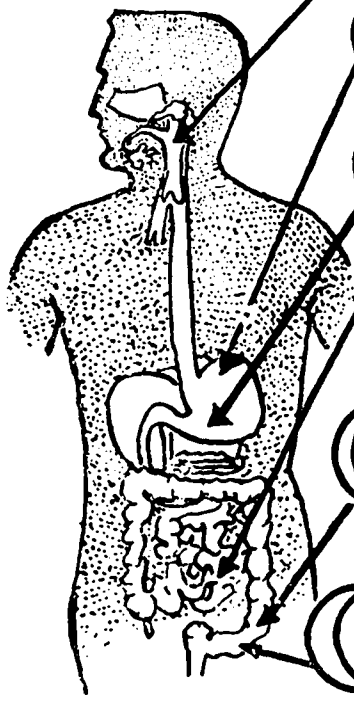
of digestion. Go over the information just like a story, then show the chart and go over it a second time, using the chart to make it clearer.

[6] Spend one day going over the digestive process information and then showing it on the chart. The second day can be used for going over it again, this time by asking the children to retell the process for you. You give ONLY the facts which they have forgotten. On the third day have the children draw the digestive system themselves — one each — on a fairly large piece of paper. They may use your chart as a model if it is necessary, but they will benefit much more if they do it from memory, using what is in their heads only, instead of copying. They should label each part and tell on the paper what each part does. This should be in their own words. No two charts should be exactly alike.

TIME OF DIGESTION



6:00 PM FIRST DAY
DINNER IS EATEN

6:01 PM
FIRST FOOD ENTERS STOMACH

10:30 PM
STOMACH IS EMPTY

1:00 AM
FOOD HAS PASSED THROUGH SMALL INTESTINE

6:00 PM SECOND DAY
FIRST WASTE READY TO LEAVE LARGE INTESTINE

6:00 PM THIRD DAY
48 HOURS AFTER MEAL, LAST WASTE READY TO LEAVE LARGE INTESTINE

II

FECAL-BORNE DISEASES[1]

Teaching time — 1 day

Science Vocabulary
Fecal-borne
Stool
Contaminated

How are Fecal-borne Diseases Acquired?[2]

A. Fecal-borne diseases are always found in the intestinal tract. Therefore, when a person moves his bowels, the disease in the intestines will pass out of the body with the feces or *stool.* Someone else gets the disease (or many people get it) from contact, either direct or indirect, with the feces containing the infection.

B. A person may get one of these fecal-borne diseases by coming in direct contact with the feces or the area where the infected person moved his bowels. The disease is all around the area if the feces is left out in the open or left uncovered. When another person comes into the *contaminated* area, he comes into contact with the disease or he may step on the feces and carry the infection with him to other places. Or he may touch the feces with his hand even without knowing it, then put his hand into his mouth or put it into someone else's food or dishes.

C. A person may get a fecal-borne disease by touching or using the belongings of others. The chances are that a person with a disease gets the infection on his hands. Then, everything he touches will become contaminated.

D. A person most frequently gets a fecal-borne disease

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[1] Cut out or draw pictures that show visually some of the ways that a person can get a fecal-borne disease.

[2] Try to have the children give as much of the material above as they can, being guided only by your questions (for instance, "How can a person come in direct contact with feces?" or "How can he carry the disease?")

from taking the following foods:[3]

1. Contaminated water.
2. Uncooked vegetables or fruits that were grown or washed in contaminated places.
3. Uncooked meat and fish, or partially cooked meat and fish, if the animals and fish have eaten in contaminated places or have drunk contaminated water.
4. Cooked food which has been handled by a contaminated person, or upon which contaminated flies have rested.[4, 5]

E. The diagram on page 12 shows how diseases are spread through the contaminated feces.

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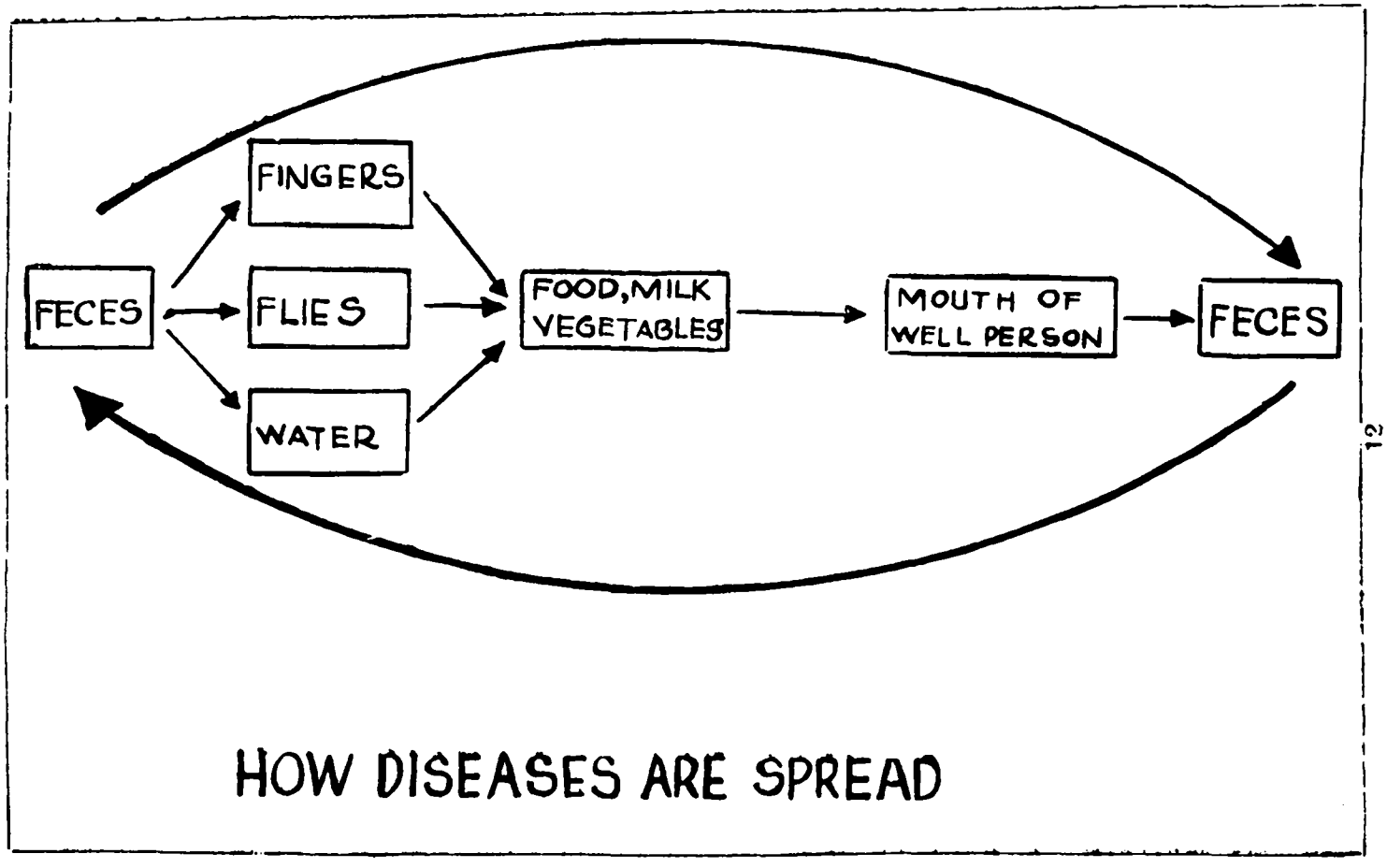
[3] Be sure to have the children think of the answers in Section D (How they can get the disease through eating). Have them think through each answer. For instance, if they say we can get the disease by drinking contaminated water, ask them how water gets contaminated, where contaminated water is found, etc.

[4] Have the children think of ways to stop the spread of germs. There is at least one thing that can be done for each of the ways listed above in which the diseases can be acquired. Answers should include using a toilet and pouring water in afterward, covering food, cooking food to kill germs, boiling water, washing before preparing food or eating it, etc.

[5] Tell the children to catch a fly (each one should catch one fly) and bring it to class the next day. Tell them also to remember where they found their flies.



HOW DISEASES ARE SPREAD

HOW ARE FECAL-BORNE DISEASES STOPPED?

A. The diseases found inside a person's intestine will be carried out of his body along with the feces. If the feces is deposited on the ground, or exposed to the air, flies can easily come to the feces, pick up the disease germs, and carry them to other people. Or people may come in personal contact with the feces and the disease germs.

B. The way to prevent flies or people from coming in contact with the feces is to deposit it in a water-seal toilet. Within a water-seal toilet the feces and germs are sealed off from contact with the air and the outside world.

After the person moves his bowels into a water-seal toilet, he pours fresh water into the toilet. This water pushes the feces and the old water along the pipe and into the pit below the toilet. And the fresh, new water remains in the bowl acting as a seal. The odor cannot escape from the pit because the only opening, through the toilet, is sealed by the water. Also flies cannot enter the toilet and come in contact with the feces and the diseases. The water left in the bowl prevents the flies from coming in contact with the feces, so the germs are not transferred to anyone else.

Also, human beings will not come in contact with the feces and the diseases will die within the pit.

The important thing to remember is to *always* pour water into the toilet after using it so that it will seal the fecal-borne diseases off from the agents of transfer. If water is not poured into the toilet, it will be just as if the person moved his bowels on the ground because the flies and other agents will be able to reach the feces and carry the diseases to other persons.

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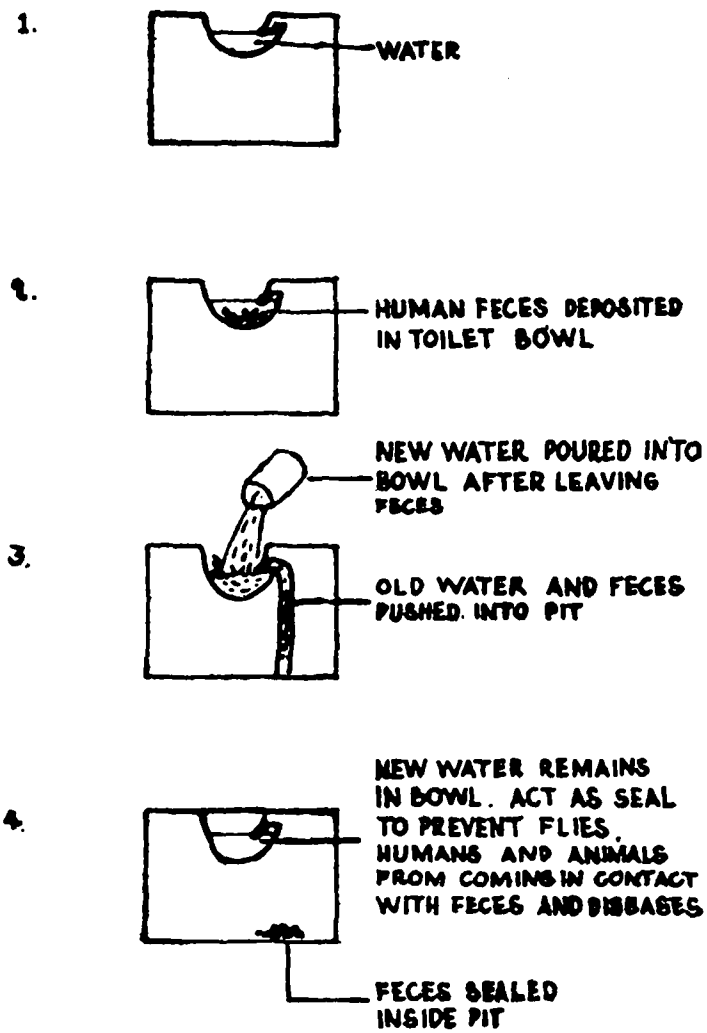
HOW A WATER-SEAL TOILET WORKS



III
THE FLY

Teaching Time — 1 day

The fly does not seem to be dangerous.[1] But the tiny hairs on the legs of the fly carry germs that may cause serious diseases and even death.

The fly has dirty, filthy habits. It loves to live in manure and in garbage. Then the fly goes to man's home. Because the fly has a sticky body and thousands of tiny hairs all over its body, germs and worm eggs found in the feces of man are carried in these sticky hairs. The germs and worm eggs then drop from the body of the fly when it goes to man's house. They are found on food, dishes, and the human body. The fly may bring these germs from as far away as 20 kms.

The female fly lays her eggs in fresh manure and garbage.[2] About 130 eggs are laid in one batch. The female fly may lay as many as 21 batches of eggs in her lifetime.[3]

One or two days after the eggs are laid, the eggs hatch into maggots. The maggots eat the manure and garbage around them for about ten days. They grow fat on this dirty food. Then they begin to become adults. They pass into the middle stage. They crawl underneath the manure and garbage until their skin hardens and they become fully-grown flies. This middle stage usually takes from three to six days more. Then the fly comes out to the top of the manure and begins to fly around. It carries with it the dirty germs and worm eggs found in the manure and garbage.

The fly lives for about 30 days.[4]

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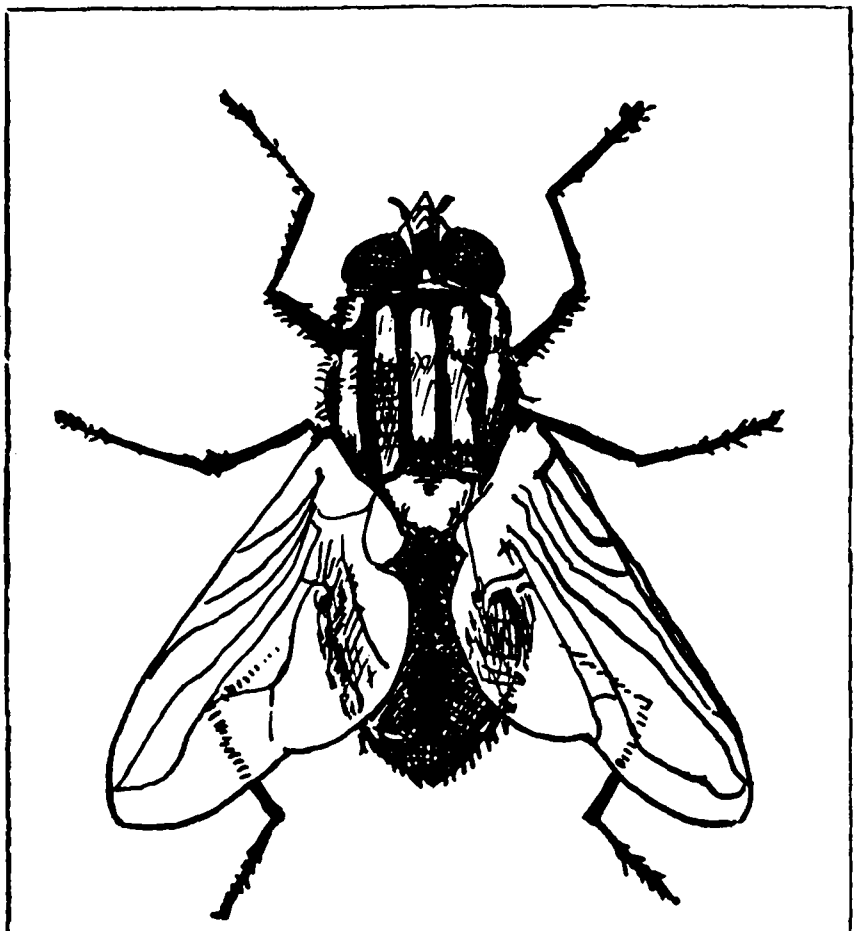
[1] Show the children a magnified picture of a fly. These pictures are easily obtained from the sanitary inspector, municipal agriculturist, Puericulture Center, or rural health unit. If you cannot find one, then copy a picture from a book or from this pamphlet, making it very large (poster size). Be sure to point out the hairs on the body and legs of the fly, because these are what carry the germs and worm eggs found in the feces.

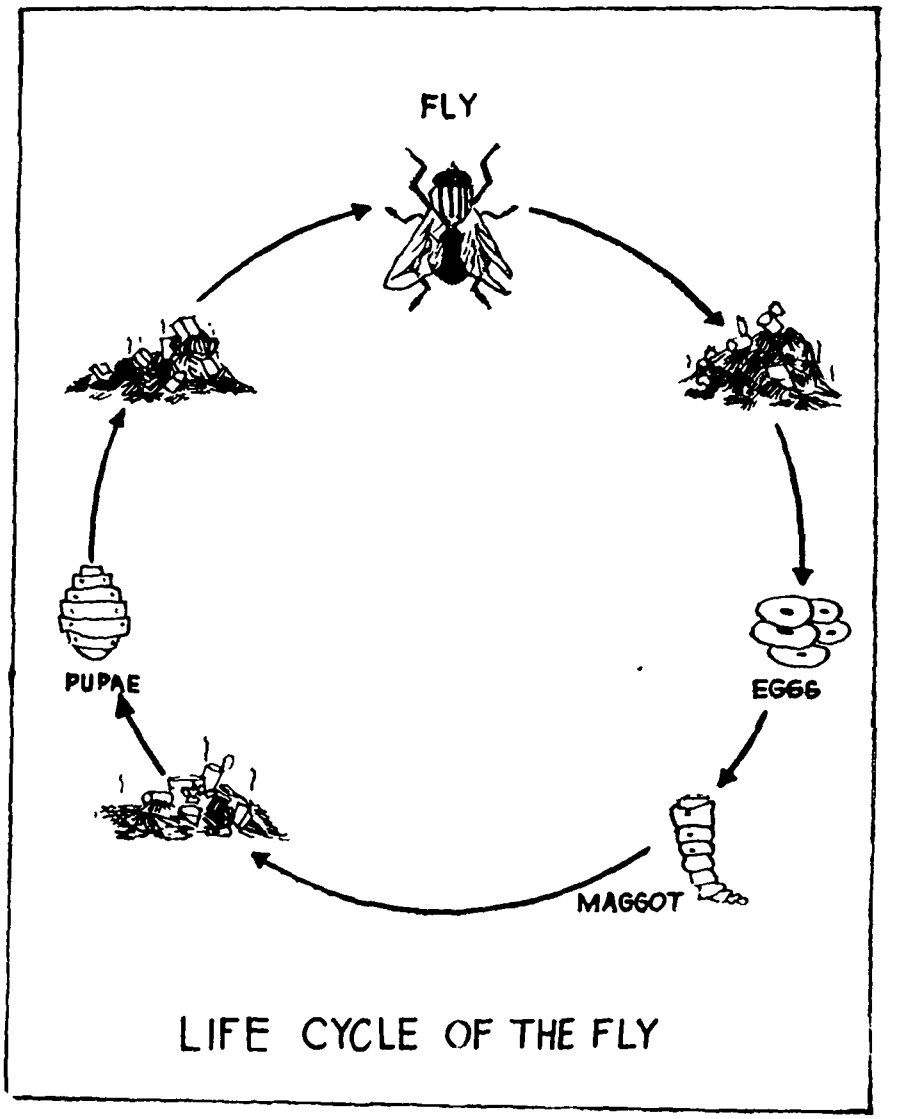
[2] After you finish telling the story of the life cycle of the fly, retell it. This time draw the cycle on the board as you are telling it. Make the drawing in the form of a time chart, showing the number of days for each part of the life of the fly. Make thirty divisions for the number of days that the fly lives, and put into each division what the fly is doing during that day.

[3] Have the children compute the number of eggs which a female fly can lay during her lifetime. They should know how to do this from your information. The large number of eggs should surprise them and help them to remember how fast the fly multiplies.

[4] Have the children examine the flies that they brought to class under magnifying glasses. Be sure that they notice the hairs.



HOUSEFLY



LIFE CYCLE OF THE FLY

DISEASES TRANSMITTED THROUGH HUMAN FECES

Dysentery

Teaching time — 1 day

Science Vocabulary
Mucous
Cyst
Diarrhea

Bacillary Dysentery

A. This disease is caused by germs called "dysentery bacilli." The disease gets its name from these germs.

B. This disease is found all over the world, but it is found mostly in the tropics. The Philippines is one of the countries in the tropics.

C. The germs that cause this disease are found inside the body in the large intestine.

D. The germs are passed out of the body when the person moves his bowels, and other people get the germs from them by:
   1. Direct contact with the area where the person moved his bowels (children are easily infected because they are likely to play in these areas).
   2. Taking food or water which has the germs in it, either from someone's hands or from flies.
   3. Eating from contaminated plates, glasses, or utensils.

E. The disease usually lasts from one to two weeks.

F. The symptoms of the disease are:
   1. The disease comes suddenly, usually within two or three days after the germs enter the body.
   2. Fever rises to 38 or 39 degrees Centigrade.
   3. The person will move his bowels often.

4. The stool may contain blood from sores which the bacilli cause in the intestine or mucous from the bacilli — disturbed lining of the intestine.
5. There is pain in the abdomen, and it is painful to move the bowels.

C. When a person is suspected of having bacillary dysentery, he should see a doctor to get medicines. He should also:
1. Get plenty of rest in bed.
2. Drink liquids to replace the liquid lost through fever and *diarrhea.*
3. Take special care that his feces is disposed of properly in a toilet and covered with water to prevent the flies from carrying the germs to others.
4. Although he does not seem so sick, he must not be allowed to cook or handle food.[1]

Amebic Dysentery

A. This disease is found mostly in the tropics.

B. It is caused by a tiny animal called an ameba, from which "amebic dysentery" gets its name.

C. The ameba can divide itself within the body and in this way produces more ameba, which in turn divide and produce more ameba and so on.

D. An ameba can divide itself according to two methods.

E. In one method, an ameba produces more ameba, but these new ameba are encased inside of a covering. These new ameba are called amebic *cysts.* Since they are completely sealed inside of the cyst covering, the ameba cannot harm the intestine. But they are carried with the feces out of the body.
These cysts remain in their covering outside of the body and do not need food to live. They are then carried by flies or other insects to a water supply or to food. And

[1] Have the children think of all the ways to prevent this disease.

when a person eats or drinks, he takes these cysts into his digestive system.
When the cysts reach the small intestine, the covering breaks and the live ameba come out. They then begin to reproduce themselves either by the same method, or by the second method.

F. According to the second method, an ameba divides itself into two new ameba, but this time these new ameba are not sealed inside of a cyst. They are two young ameba and are free and exposed inside of the intestine.

The young ameba live on the mucous which lines the intestine. They grow and divide into four ameba. Then these four grow, destroy the lining of the intestine for their food, and in turn divide into eight ameba — and then sixteen, and so on. There may be millions of these ameba after some time and of course they cause serious damage to the intestines by destroying the mucous lining and producing sores and eventually bleeding through these sores into the intestine. When there are holes in the walls of the intestine caused by the ameba's damage, then the ameba can pass from the intestines back to the liver and other organs. If this happens, the disease becomes very serious, and often fatal.

When these ameba, not inside of cysts, pass outside of the body in the feces, they cannot survive, and die shortly. So this form of ameba cannot infect other persons.

G. Amebic dysentery may be discovered by examining the stool of the person suspected under a microscope. If only the cysts are discovered, there may be no damage to the person's intestines. But if the non-cyst ameba are seen, there must be others in the intestine causing harm.

H. Like bacillary dysentery, amebic dysentery is spread through taking food or water which contains the cysts. These cysts are especially found in water near where people have moved their bowels, or in open water sup-

plies into which flies and other carriers can drop the cysts.

I. When a person has amebic dysentery:
   1. He moves his bowels very frequently.
   2. His stool is liquid.
   3. His stool contains mucous and/or blood.
   5. There may be a slight fever.

J. The symptoms of amebic dysentery may appear within two weeks after the ameba has entered the body of the person, or it may take months for the symptoms to appear.

TYPHOID FEVER

Teaching time — 1 day

Science Vocabulary
Carriers

Typhoid fever is caused by a small germ called a "typhoid bacillus." This germ is so small that it can be seen only under a microscope.

How Typhoid Fever Is Spread

A. The typhoid bacillus lives and grows in the feces of infected human beings.
B. People who take food or water contaminated by feces containing the typhoid bacillus can get typhoid fever.
C. Some people can get the typhoid fever germs in their body, but they do not show signs and symptoms of the disease.
    1. These people can transmit the disease through their feces.
    2. These people are called *carriers*. Although they have the disease germs in their bodies, they do not suffer from the disease. They only carry the germs.
D. Typhoid fever is spread in rural areas where waste from outdoor toilets or from people who move their bowels on the ground can contaminate water supplies in wells or pumps, or can contaminate food.
E. Flies can carry the germs from human feces to food and water which will be taken by other people.
F. People who touch contaminated clothes, bedding, towels, or handkerchiefs may also get the disease.

Symptoms of the Disease

A. Illness develops from one to two weeks after the germs have entered a person's body.
B. There is a fever for three or four weeks.
C. The person has a headache.
D. The person has pain in the back, arms, and legs.
E. The person vomits.
F. The person loses his appetite.
G. The typhoid germs multiply very rapidly.
    1. They make sores in the intestines.

2. They can cause bleeding inside the body.
3. Stools are black due to the blood which has been digested inside the intestine.
4. If the sores become deep, they can used holes or ulcers in the intestines. The germs can spread through these holes in the abdomen. If this happens, the disease becomes very serious, and the person may die.

H. Typhoid fever is at its worst in the third week.

Treatment of the Disease

A. See a doctor.
B. Give cold sponge baths to help control the fever.
C. Drink lots of water and liquids to replace body liquids lost in perspiration during fever and vomiting.
D. If a person has lost blood from sores or holes in the intestines, the doctor will give him more blood.
E. The doctor will prescribe drugs which are needed to cure the disease.
F. Isolation of the patient should be done immediately.
G. Feces should be disinfected and completely disposed of in a water-sealed toilet.
H. Articles used by the patient should be disinfected.[3] [4]

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[3] Let the children think of ways to prevent the spread of typhoid fever, such as using waterseal toilets, keeping flies away from food and water, cooking food, making sure the water supply is away from toilets, getting injections against typhoid fever.

[4] Get statistics from local hospitals, rural health units, provincial health offices, etc. about the incidence and severity of typhoid fever and the other diseases.

EL TOR CHOLERA

Teaching time — 1 day

Science Vocabulary
Dehydrated
Acute

El Tor Cholera is an acute disease affecting the digestive system. It is caused by an organism called *El Tor vibrio*, which is an organism shaped like a comma. The disease is characterized by frequent large amounts of watery stools and vomiting. The fluid output in the stool is so great that the person soon becomes markedly dehydrated due to excessive loss of fluids in the body. It takes only a few days for this disease to prove fatal, if it not treated immediately.

A. The El Tor germ gains entrance into the body through the mouth *only* and after passing through the digestive system, remains in the large intestine where it multiplies.
B. The El Tor germs are passed out with the stools in large numbers. Flies and other insects may carry these germs to the food and drink. If a person takes food or drink which is contaminated or he eats from dishes or forks and spoons which are contaminated or eats with unclean hands, he will get El Tor Cholera. The most common way to get the El Tor infection is by taking uncooked foods or foods that have been exposed to flies which carry the germ.
C. After a person swallows food and drinks contaminated with El Tor germs, the germs remain in his large intestine.
D. While the germs are multiplying in the intestine they also produce a poison which causes a change in the intestine, but does not produce inflammation. Because of this change in the intestine, the water which is usually absorbed from the large intestine into the body, is instead reversed and taken from the body into the large intestine. This change brings about the watery diarrhea (in which the stool resembles the water rice is cleaned in) and vomiting.
E. The poison does not affect the other organs or tissues of the body.

F. As a result of the marked loss of fluid from the body through vomiting and diarrhea, the person becomes dehydrated — so much so that he may not even have enough fluid for his urine.

G. When too much fluid from the body is lost, the person goes into shock. The fluid content of his blood also becomes low, so that the blood becomes thick and therefore cannot circulate very well. Then the person dies.

H. When a person has El Tor Cholera, the germs in his intestine multiply and pass out of the body when he moves his bowels. Then the germs are carried to food and water that other people take, and they become sick with El Tor Cholera.

I. To find out if a person has El Tor Cholera, doctors examine the person's stool to look for the El Tor germs.

J. Nobody will get sick with El Tor if the food and drink which he takes are not contaminated, and if he eats always with clean hands, spoons, forks, and dishes..[5]

K. The diagram on page 26 is the El Tor Cholera cycle.[6]

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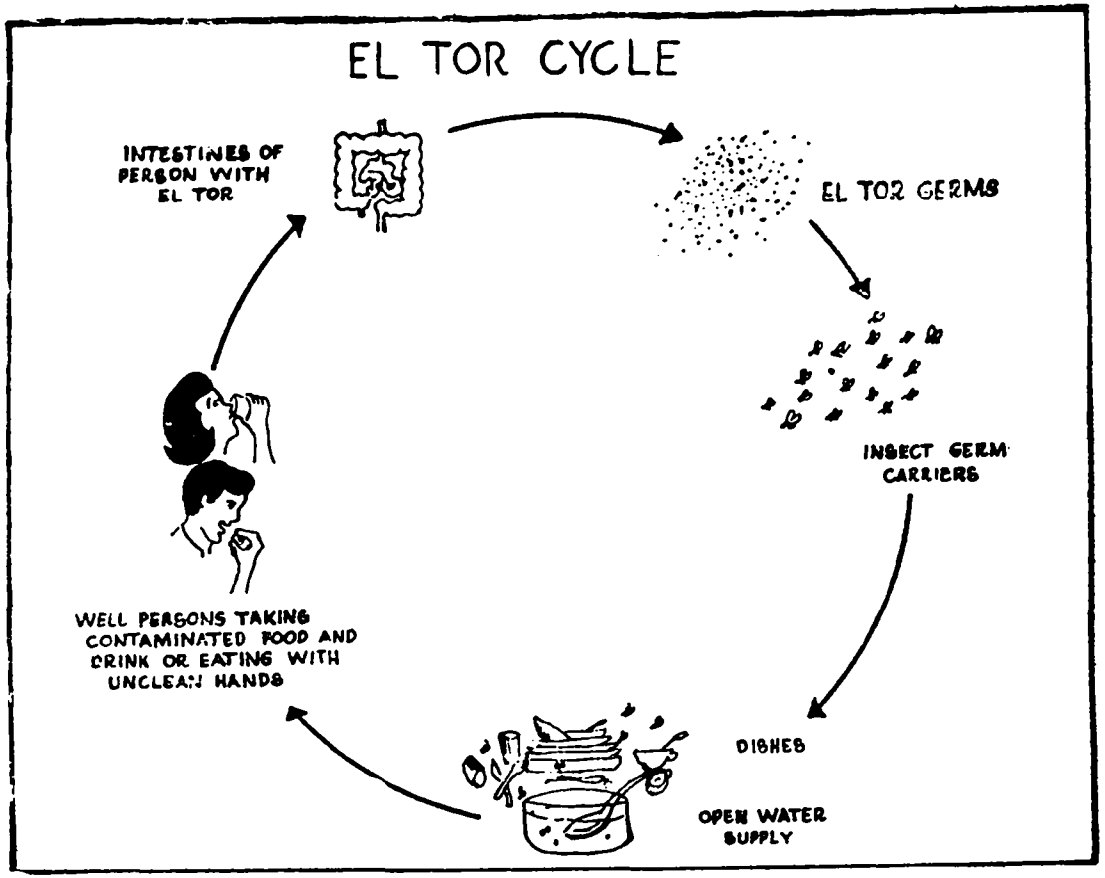
[5] Have the children think of ways to prevent El Tor, such as using a clean and safe water supply, protecting food and dishes from flies, using waterseal toilets, getting innoculations once a year, not eating uncooked foods or not eating fruits that cannot be peeled.

[6] After telling the cycle once, illustrate it on the board you retell it. Then have the children draw **from memory** (erase the information on the board) the cycle, **using their own words and representation.** The more different their drawings are from your own, the more they will be using their own minds.


EL TOR CYCLE
INTESTINES OF PERSON WITH EL TOR
EL TOR GERMS
INSECT GERM CARRIERS
DISHES
OPEN WATER SUPPLY
WELL PERSONS TAKING CONTAMINATED FOOD AND DRINK OR EATING WITH UNCLEAN HANDS

V

PARASITES
Teaching time — 7 days

Science Vocabulary
Parasites

Parasites are organisms that feed and live on other animals. This section covers two types of parasites. One type is intestinal worms, which are intestinal parasites and are very common in the Philippines. The other type is a blood parasite called Schistosoma Japonicum. This Schistosoma Japonicum parasite causes the disease schistomosasis which is common in certain parts of the Philippines.

There are five kinds of intestinal worms that are especially important in the Philippines. They are 1) Ascaris, 2) Hookworm, 3) Tapeworm, 4) Trichuris, or whipworm, and 5) Pinworm.

* * * *

ASCARIS WORMS
Teaching time — 1 day

Science Vocabulary
Larvae
Duodenum

General Information

A. Ascaris worms are round worms which are found all over the world, but they are especially found in areas with poor sanitation.
B. Ascaris worms are the most common worm in the Philippines. Between 85% and 90% of the Filipino children have this infection.

Life of the Worm

A. The immature eggs of the ascaris worm are found in the feces of a person who has the infection.
B. If these immature eggs are deposited on the ground they develop a tiny worm within their shells. This process takes between two and three weeks. And at the end of this period, when the small worm has

developed inside the egg, the egg is considered to be mature.

There are many hazards to the egg during its maturation process. If the environment is too dry or too cold, the egg will not develop. However, in the Philippines, the soil is warm and usually damp, so the ascaris egg develops easily.

If the egg is taken into the body before it has fully matured, it will never grow to an adult ascaris. Also, good sanitation and depositing of feces in a water-seal toilet will prevent the eggs from developing.

C. If the fully mature egg, with the tiny worm inside, is swallowed, it will pass through the digestive system to the duodenum. Here the eggs hatch into tiny larvae.

D. These larvae dig through the intestinal wall and are then in the veins and the blood system. In the blood they circulate to the heart and lungs.

E. In the lungs, the larvae develop into mature larvae which are then able to break through to the air passages. They can cause serious harm because they create an inflammation in the lungs. And if there are many ascaris, or if the patient is a small child or baby[1] the larvae in the lungs cause difficulty in breathing, especially at night.

From the lungs, the mature larvae move up the trachea. At the top of the trachea they cross to the esophagus, and go down again through the digestive system.

F. These mature larvae stay in the intestine where they grow to adult ascaris worms between 8 and 10 inches long. Usually, the adult ascaris live in the intestines, but when they are very numerous they spread to other part of the body such as the appendix, liver, gall bladder, nose and sinuses. Also, in large numbers, they cause obstruction in the intes-

[1] In infants with ascaris there are frequently convulsions and suffocations caused by the worms blocking passage of air to the lungs. Most people have heard of or witnessed such cases.

tine so that food cannot pass.

G. These adult ascaris lay the immature egg which pass out of the body in the feces. The female ascaris worm lays a quarter of a million (250,000) eggs every day during her life time which is usually about one year.

Symptoms of Ascaris Worms

A. Abdominal pain.
B. Abdominal swelling.
C. Vomiting.
D. Thinness.
E. Paleness.[2]
G. Restlessness or inability to sleep.
F. Heavy rings under the eyes.
H. Live worms may appear in the stool or vomit if the infection is very great. Or the worms may just pass out of the body through the rectum.

Treatment of Ascaris Worms

A. Ascaris worms may be discovered by examining the stool for eggs.
B. Medicine to remove the worms can be easily obtained. Any doctor, hospital, or Puericulture Center can prescribe it. The medicine is taken through the mouth to reach the worms in the intestines.[3, 4]

See the Life Cycle of the Ascaris on page 30

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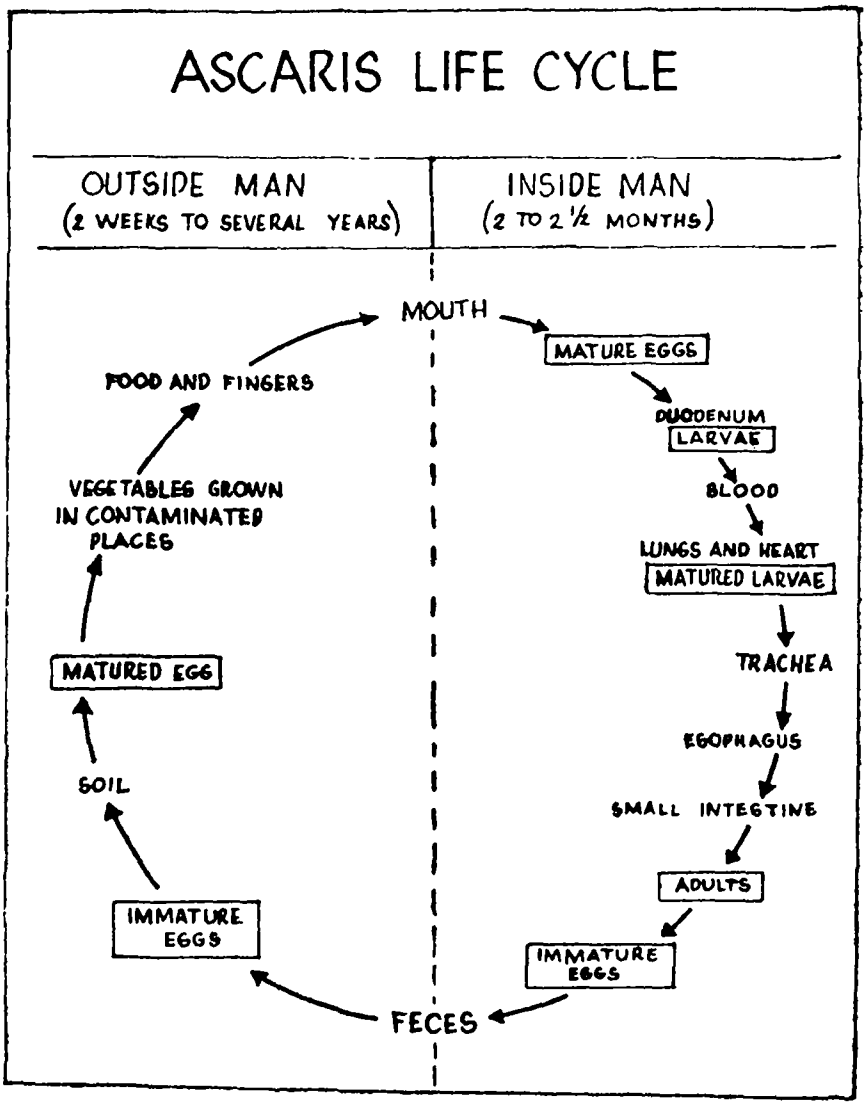
[2] You should be able to guide the children through a logical process to discover why paleness develops, because they already know that the worm lives on the blood of a person. (The blood will become unhealthy, or anemia will develop, causing paleness. But let the children think of this themselves, with you only guiding them by asking questions.)

[3] There are cases in which a patient has died from ascaris worms, and the doctor has then removed a half bucketful of the worms from the patient. There is also a record of 1488 worms that were removed from one patient.

[4] After going through the information once, tell it again, this time drawing the chart as you talk. You might like to have the children draw the chart for a homework assignment.


ASCARIS LIFE CYCLE
OUTSIDE MAN
(2 WEEKS TO SEVERAL YEARS)
INSIDE MAN
(2 TO 2 ½ MONTHS)
MOUTH
MATURE EGGS
DUODENUM
LARVAE
BLOOD
LUNGS AND HEART
MATURED LARVAE
TRACHEA
EGOPHAGUS
SMALL INTESTINE
ADULTS
IMMATURE EGGS
FECES
IMMATURE EGGS
SOIL
MATURED EGG
VEGETABLES GROWN IN CONTAMINATED PLACES
FOOD AND FINGERS

HOOKWORM
Teaching time — 1 day

General Information

A. The hookworm is the only intestinal parasite that does not enter the body through the mouth. A person is infected with hookworm through his skin.
B. Some people think the hookworm received its name because the shape of the adult worm resembles a hook. But most likely the worm is called "hookworm" because the adult worm hooks itself into the intestine of man.
C. Children are easily infected with hookworm because they have thin skin, and are likely to be playing in contaminated places, and going without shoes.

Life of the Worm

A. Hookworm eggs are passed in the stool of an infected person.
B. If the eggs reach the ground, they hatch into larvae after a day in the warm, moist soil. Because the eggs live well in warmth, there is a rise in hookworm infection in the late summer months. And because the eggs like dampness, the infection rate rises at the beginning of the rainy season.
C. These young larvae then dig a few inches into the soil where they mature.
D. The mature larvae then come to the surface and lie on the soil or on grass. If they have no opportunity to enter man, they may live in warm, moist soil for 4 to 8 weeks. And when a person passes, they attach themselves to his skin. In warm countries, such as the Philippines, the bare foot is the most common point of entry. But it is also possible to become infected through the hands by handling contaminated soil.
E. When the mature larvae touch the skin, they then dig through into the bloodstream. They, like ascaris, are carried in the bloodstream to the lungs where they may cause damage to the respiratory system similar to that of the ascaris worm. They pass from the lungs, up the trachea, and are swallowed down the esophagus.
F. In the digestive system, they travel to the small intestine where they grow to adults. The adult hookworm is

about ½ inch long, and about the thickness of wire. It may live several years inside man, and during this time the female hookworm lays about 30,000 eggs every day.

The adult hookworm has something similar to teeth in its mouth. By means of these teeth they hook themselves into the mucosa of the intestine, cutting holes in the intestinal lining. From these holes they suck the blood and fluids in the walls of the human intestine. This is how they live. Thus, infection with from only 25 to 50 hookworm may cause serious anemia, although there are cases in which infection with 1,500 worms is known.

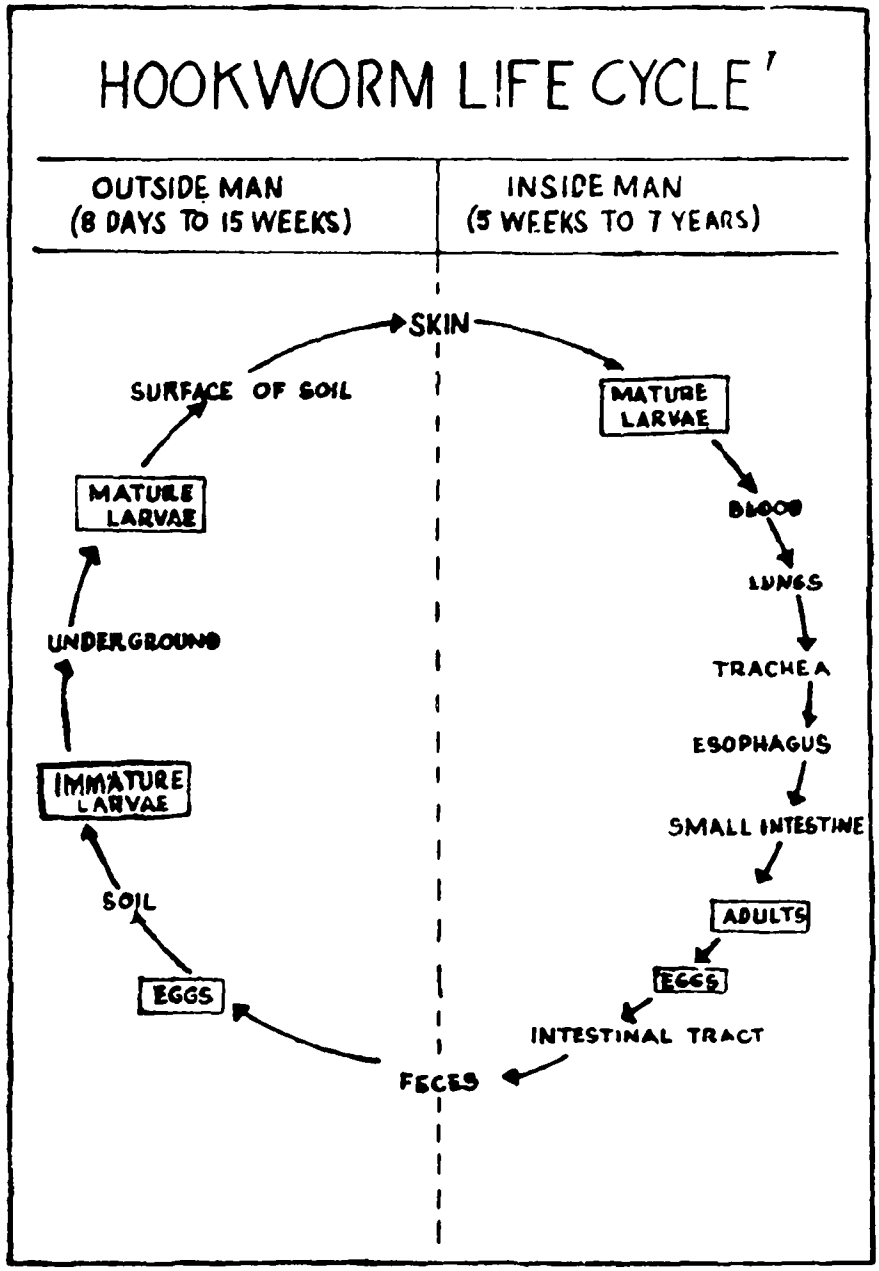
G. The hookworm eggs then pass out in the feces, ready to begin the cycle all over again.

Symptoms of Hookworm

A. Sores on the feet where the larvae have entered.
B. Diarrhea.
C. Paleness from anemia.[5]
D. Lack of energy.
E. Physical and mental retardation.
F. Some difficulty in seeing, especially at night.[6]

See the Life Cycle of Hookworm page 33

[5] Ask the children to explain why paleness and anemia develop.
[6] Have the children give the preventions, such as wearing shoes, etc.



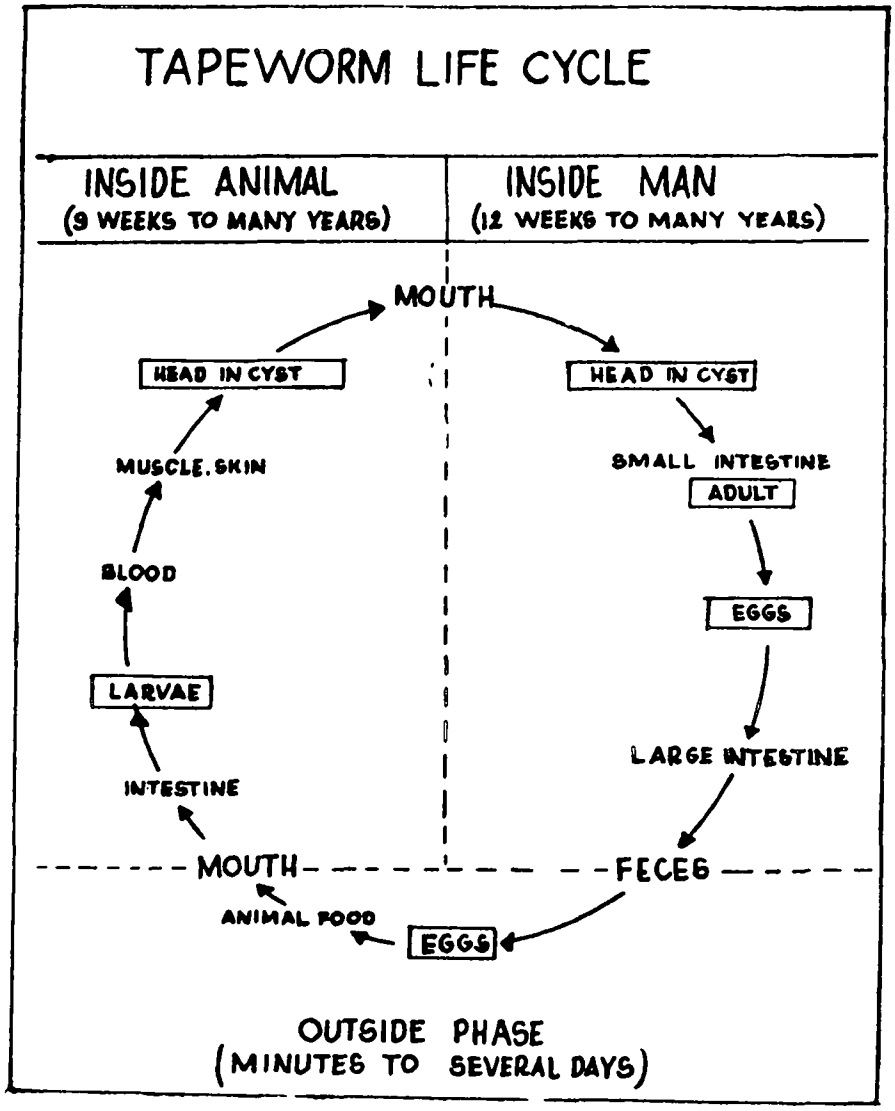
[7] After telling the life story of the hookworm, retell it drawing the chart as you talk. Have the children draw it either in class or for homework.

TAPEWORM

Teaching time — 1 day

Life of the Worm

A. A tapeworm must spend part of its life both in an animal and in man.
B. When a person has a tapeworm in his intestine, the eggs of the tapeworm are found in the feces. Or the segments of the tapeworm containing eggs, pass out of the body in the feces.
C. These segments containing eggs, or the eggs alone are swallowed by animals such as pigs and cows. This easily happens in areas where the "pig system", or practice of feeding human feces to animals, is followed. Or flies and other agents may carry the eggs or the segments to the food of the animal.
D. The tapeworm eggs go to the intestine of the animal where the egg shell dissolves. The egg then hatches, and the larvae develop.
E. The larvae then burrow through the walls of the animal's intestine into its bloodstream. In the bloodstream the larvae circulate until they eventually reach the muscle and tissue of the animal.
F. Once in the muscle of the animal, the tapeworm larvae forms a protective wall, called a cyst, around itself. Inside the cyst, the larvae develop into the head of the tapeworm. The cyst does not change until it enters the body of man.
G. When man eats the meat of an animal, but does not cook the meat well enough to kill these cysts, he eats the live cyst along with the meat.
H. The cyst wall is dissolved by the digestive juices of man, and the tapeworm head is then able to come out. This head attaches itself to the lining of the human intestine by means of its suckers and hooks. And then it begins to form the segments which compose the tapeworm.
I. The first segments are formed at the head of the worm and then are pushed back as more and more new segments are formed. As the segments age, they also grow. So the youngest and the smallest segments are those nearest the head.


TAPEWORM LIFE CYCLE
INSIDE ANIMAL
(9 WEEKS TO MANY YEARS)
INSIDE MAN
(12 WEEKS TO MANY YEARS)
MOUTH
HEAD IN CYST
HEAD IN CYST
MUSCLE, SKIN
SMALL INTESTINE
ADULT
BLOOD
EGGS
LARVAE
LARGE INTESTINE
INTESTINE
MOUTH
FECES
ANIMAL FOOD
EGGS
OUTSIDE PHASE
(MINUTES TO SEVERAL DAYS)

J. A fully developed tapeworm may have as many as 1,000 segments and may be as long as nine meters. These segments are flat, so the tapeworm is called a flatworm.

The tapeworm does not have one mouth, but each segment absorbs food found within the person's intestine. And each segment also produces eggs which are discharged into the feces.

The oldest of the segments frequently drop off of the tapeworm and, with the eggs inside them, are carried by the feces out of the body.

K. Then the segments carrying tapeworm eggs, and the eggs in the human feces are eaten by animals and the cycle begins all over again.

Symptoms of Tapeworm

A. Loss of weight.
B. Indigestion.
C. Pain in the abdomen.
D. Segments of the worm passing out of the rectum and appearing on clothes.[8, 9]

See the Life Cycle of Tapeworm on page 35[10]

☆ ☆ ☆ ☆

Trichuris, or Whipworm

Teaching time — 1 day

General Information

A. These worms are found world-wide, but they are most common in the tropics especially in humid places. Whipworms are found both in children and adults.
B. These worms are called whipworms because of their shape. They look like whips, because the first part of their body is straight and the last part is longer and curling like a whip.
C. Animals cannot carry whipworms.

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[8] Have the children think of preventions for tapeworm, including cooking all meat well, using waterseal toilets, etc.

[9] Be sure to compare each new worm to the others which you have already studied as you are learning about the new one. This will keep the information fresh in the childrens' minds.

[10] Illustrate your second telling of the life cycle with the chart.

Life of the Whipworm

A. Like ascaris and tapeworms, the whipworm eggs are taken into a person's body through his mouth.
B. The eggs go into the small intestines, where the shells of the eggs dissolve.
C. The larvae hatch from the eggs and pass to the large intestines, where they grow into adult worms.
D. The adult worms are about an inch or an inch and a half long. They are a dull white color.
E. The female whipworm produces immature eggs which pass out in the feces to suitable damp soil. This damp soil is necessary for the eggs to mature and form a hard shell around them. The eggs stay mature for as long as a vear . . . until they enter a person and then begin to grow again.

Symptoms of Whipworm

A. Inability to sleep well.
B. Loss of appetite.
C. Nervousness.
D. Abdominal pain.
E. Paleness if the person is heavily infected.
F. Diarrhea if the person is heavily infected.
G. Loss of weight in a heavily infected person.

Treatment of Whipworm

A. Doctors can tell if a person has whipworm by finding the eggs of the whipworm in a person's stool.
B. Doctors can prescribe medicine that can cure a person with whipworm.[11]

See the Life Cycle of the Whipworm on page 38[12]

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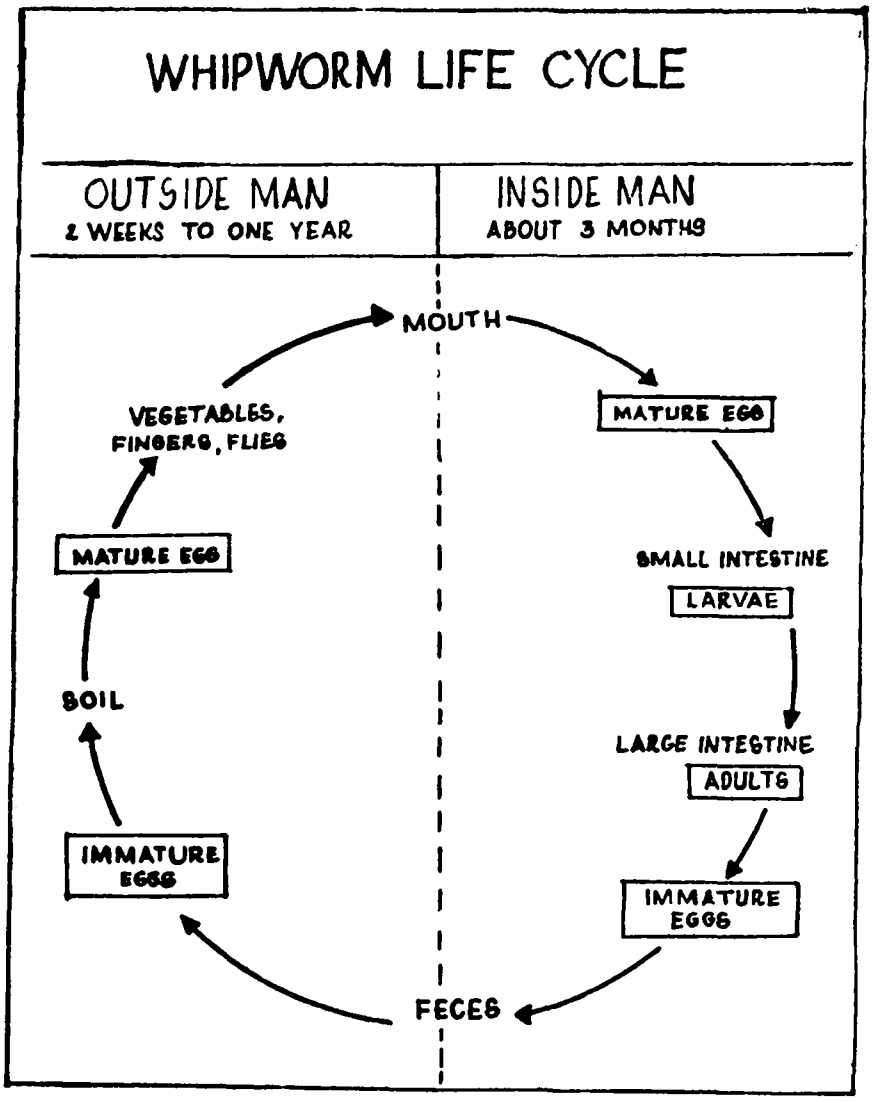
[11] Let the children think of ways to prevent whipworm from spreading, including washing hands after moving one's bowels and before eating, using a watersea toilet, etc.

[12] Trichuris has a very simple life cycle. By the time you study this worm, the students should each be able to draw the life cycle of the are given all the information orally.


WHIPWORM LIFE CYCLE
OUTSIDE MAN
2 WEEKS TO ONE YEAR
INSIDE MAN
ABOUT 3 MONTHS
MOUTH
VEGETABLES, FINGERS, FLIES
MATURE EGG
SMALL INTESTINE
LARVAE
LARGE INTESTINE
ADULTS
IMMATURE EGGS
FECES
IMMATURE EGGS
SOIL
MATURE EGG

PINWORM

Teaching Time — 1 day

General Information

A. These worms are very common all over the world, but are especially prevalent in warm countries.

B. This is the only intestinal parasite in the Philippines which is not usually transferred in the feces.

Life of the Pinworm

A. The pinworm eggs are taken into the mouth and swallowed to the duodenum where they hatch.

B. The young larvae then leave the duodenum and continue to the small intestine where they mature to the second stage larvae.

C. The mature larvae then move to the upper part of the large intestine where they grow to adults. These adult worms live in the large intestine with their heads attached to the mucous lining of the intestine. In this way they cause injury to the intestinal wall at the site of attachment. Then this site is open and susceptible to bacteria.

D. The female adult pinworms migrate through the rectum and lay their eggs on the area around the outside of the rectum. Thus the eggs are not usually found in the feces, but instead on the skin around the rectum.

The worms sually move outside the rectum at night when the person's muscles are relaxed, and then after depositing the eggs, the adult worm goes back into the intestine through the rectum. Since the worm and the eggs cause some irritation around the rectum, the person scratches that area. He then gets the pinworm eggs on his fingers and under his fingernails and when he puts his contaminated fingers into his mouth he becomes reinfected. Or he may prepare food for his family, touch the plates, glasses or utensils or leave the pinworm eggs deposited on whatever he touches, and thus spread the infection to others.

Or pinworm eggs might be left on a toilet seat upon which a person infected with pinworm has sat. The eggs around his rectum may stay on the toilet seat and be transferred to others using the toilet or to anyone

who touches it.

E. An examination of the stool is unreliable in a case of pinworm because most eggs are not in the feces, but around the rectum. To identify a case of pinworm, cellophane tape is pressed against the rectum, and then examined under a microscope for the pinworm eggs sticking to it.

F. Each generation of pinworm only lasts from three to four weeks. Therefore, if there were no re-infection, the current infection would simply die out.

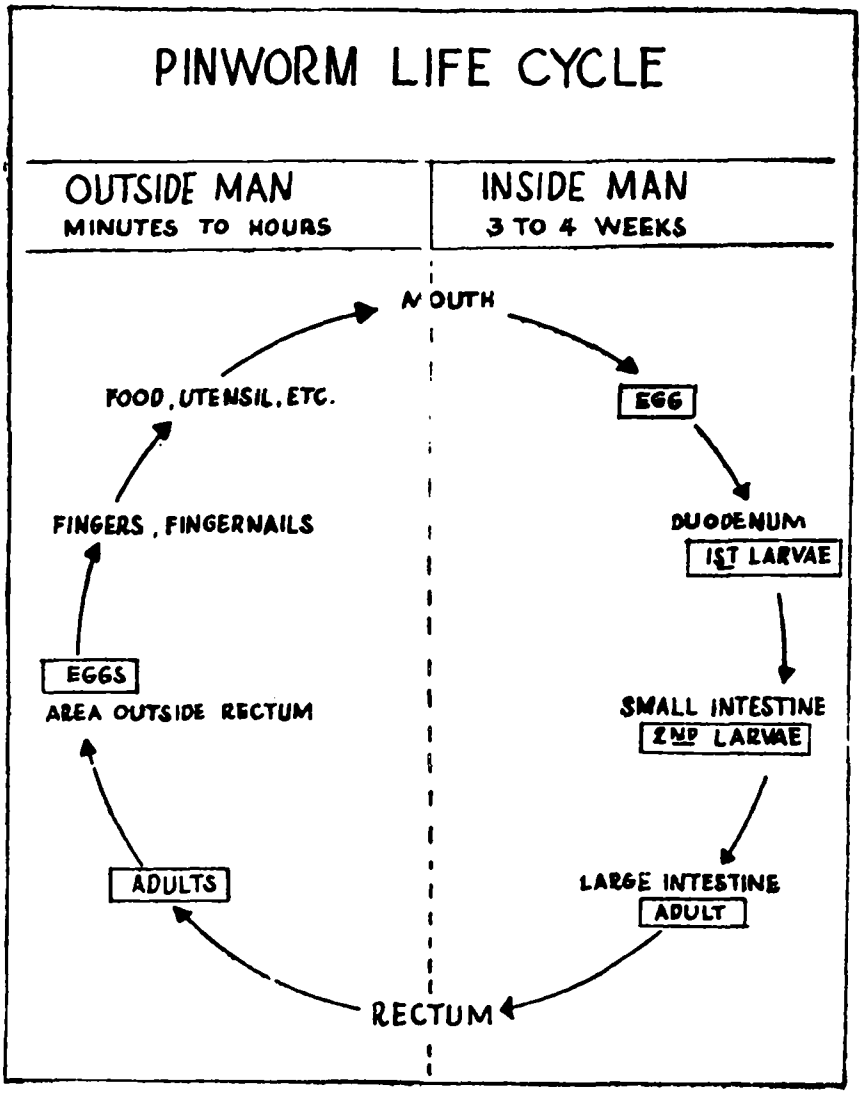
Symptoms of Pinworm

A. There are few symptoms except in cases of heavy infection.

B. Nervousness is common in heavy infection.

C. Irritability is noticeable in heavy infections.

See the Life Cycle of Pinworm on page 41


PINWORM LIFE CYCLE
OUTSIDE MAN
MINUTES TO HOURS
INSIDE MAN
3 TO 4 WEEKS
MOUTH
EGG
DUODENUM
1ST LARVAE
SMALL INTESTINE
2ND LARVAE
LARGE INTESTINE
ADULT
RECTUM
ADULTS
EGGS
AREA OUTSIDE RECTUM
FINGERS, FINGERNAILS
FOOD, UTENSIL, ETC.

SCHISTOSOMIASIS

Teaching time — 3 days

Science Vocabulary
Amphibious

People in rural areas, farmers, and their families in certain parts of the Philippines are the people who get schistosomias.[13] But this disease is also carried by animals such as pigs, cows, carabaos, and dogs, and these animals can transmit the disease to man. Schistosomiasis is a public health problem, but it also affects the economy of the Philippines, because the disease makes the farmers and their families sick and reduces the amount of work they can do and the amount of rice and other crops that they can produce for the Philippines.

The first case of schistosomiasis was discovered in the Philippines in 1906. (Some people wrongly believe that the disease came during the war.) Since 1906, the disease has gotten worse every year, and there are now more than half a million (500,000) people who have this disease.

Schistosomiasis is caused by a blood parasite called the "schistosoma japonicum." By breaking the life cycle of this parasite at any point, prevention and control of the disease can be achieved. It is important for everyone to learn about the worm's life cycle, because his will enable everyone to work against the disease.

The Schistosomiasis Cycle

A. Eggs — the first stage[14, 15]
   1. The eggs of the schistosoma japonicum parasite are found in the feces of men, women, and children who have the disease.
   2. If people do not move their bowels in a toilet and

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[13] Show a map of the areas in the Philippines which are infected with schistosomiasis. These maps are easily obtainable from rural health units, provincial health offices, hospitals, doctors, etc.

[14] If you think the class is not ready for the scientific names of the stages of growth of the schistosoma japonicum, just use "first stage," "second stage," etc. It is not important to learn the names.

[15] Make large drawings of the illustration of the different stages on page 47 and label them. Show the drawings to the children one by one as you are relating the schistosomiasis cycle.

pour water down afterward to seal off and cover the manure, but instead move their bowels just anywhere, then the eggs can reach fresh water by being carried by floods during the rainy season or by being carried by insects.

3. When the eggs reach fresh water, they hatch into larvae called miracidia.

B. Miracidia — the second stage

1. When the schistosoma japonicum parasite reaches the second stage in its life, it looks for a certain snail which is very small.

   a. The name of the only snail in the Philippines which carries the schistosoma japonicum is *oncomelania quadrasi*.
   b. The maximum size of the snail is three to five millimeters.
   c. The snails are found in road ditches, brooks, slow moving streams, swamps, small rivers, creeks, canals, water lily ponds, irrigation ditches, and rice fields.
   d. The snails are found clinging to grasses and water hyacinths, pieces of wood, leaves, moist banks of small streams, canals, and ditches.
   e. The snails are *amphibious*, which means that they can live either in water or on land. They are usually found on the land near the surface of the water and go into the water frequently and come out again.
   f. The snails cannot live in salt water but only fresh water.
   g. The snails are found especially in places where there is no definite dry season, in low flat areas that are always moist or wet, and in places where there are many plants and growing things.

2. If the miracidia cannot find a snail, they will die within about two days.
3. When it does find a host snail, it enters the snail and begins to grow, develop, and multiply.
   a. It stays inside the snail from six to eight weeks, growing all the time.

1. Swelling or enlargement of the abdomen
2. Definite paleness.
3. Retarded or slow growth.
4. Rapid fatigue.
5. Vomiting of blood.
6. Much blood in the stool.
7. Marked loss of weight.
8. Becomes very emaciated.

C. Schistosomiasis can affect:
1. The intestines.
2. The liver.
3. The spleen.
4. The brain.

D. There is no satisfactory medical cure yet for schistosomiasis. The disease must be prevented *before* a person is infected.[16]

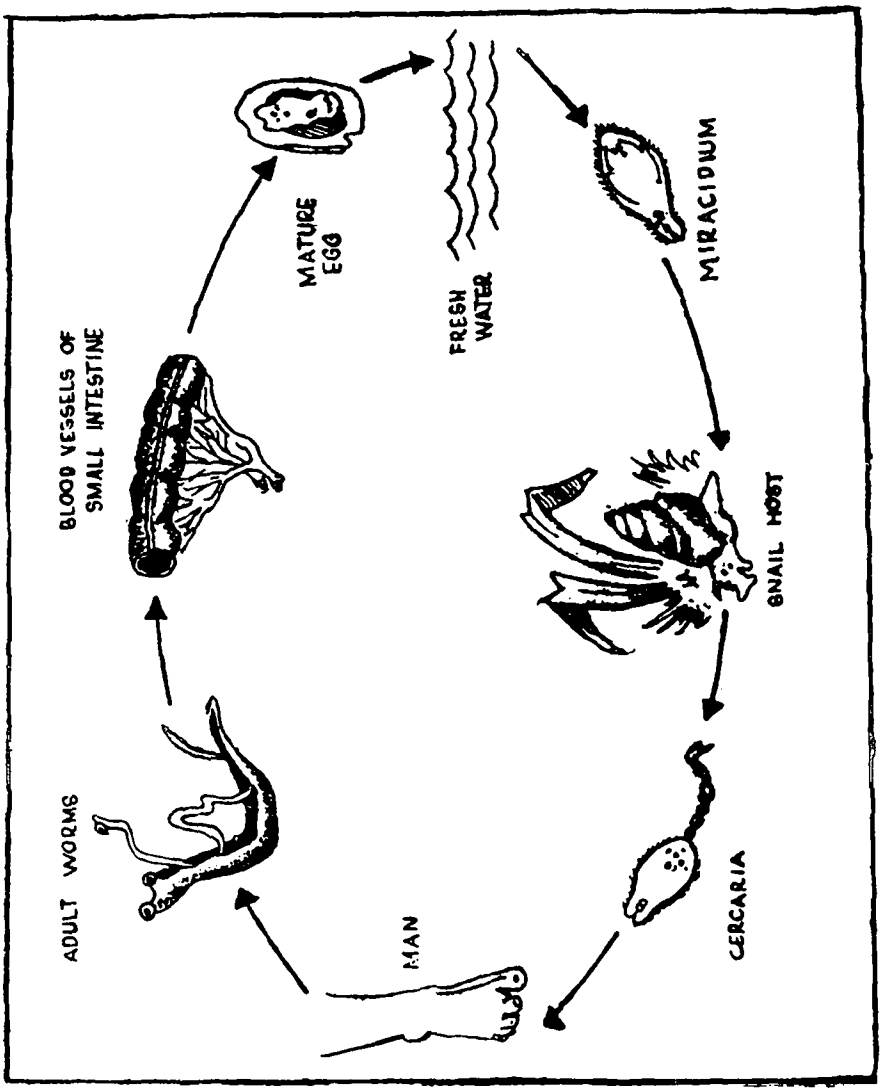
See the Life Cycle of the Schistoma japonicum on page 47 [17, 18, 19]

[16] Have the children tell the different ways to prevent this disease, such as using waterseal toilets and making certain to pour water in afterwards so the eggs cannot be carried further, fencing stray animals to prevent them from getting infected in water or moving their bowels near water, having periodic stool exams, supporting snail control projects in the community by clearing, channeling, filling, ponding etc. Also, adopting modern farming methods such as Masagana 1 is good, because such methods kill the snail by exposing it to sunlight, and the frequent cultivation disturbs it.

[17] When you have finished explaining the cycle, then present a drawing of the cycle which you have prepared on large poster paper. You will spend some time on schistosomiasis, so it's good to make a permanent illustration which can be left upon the board. Or, you may want to let the class draw the cycle, one child drawing each step. Then they, not you, can put them together on a bulletin board and label them so that it makes a clear display. This could also be assigned as homework, but be sure it is on a whole sheet of all white paper so that it will be easy to see. The children will take some pride in this project, and it will help them learn all the more.

[18] If possible, take the children to a hospital, a Schistosomiasis Control Center (if one is near), or invite a doctor or health worker to talk to the class after you have discussed worms and schistosomiasis. Some of these resources will have pictures, displays, actual snails, and microscope slides of the worm and Schistosoma Japonicum eggs. You should also find out the percentage of people in your area who have schistosomiasis

[19] Teaching time: 1st day — it is good to listen to stories from the children about what they know about schistosomiasis; then during your study of the unit you can verify or disprove them; go over the cycle, 2nd day — present prepared drawings of the cycle (or have the children do it); discuss the section "The Disease", 3rd day — review the cycle and the disease; have the children discuss ways of preventing the disease; have each child bring a stool sample to school (they should want to do it by this time) and take them to a hospital for examination.


ADULT WORMS
BLOOD VESSELS OF SMALL INTESTINE
MATURE EGG
FRESH WATER
MIRACIDIUM
MAN
CERCARIA
SNAIL HOST

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