

Improving Village Health

A HANDBOOK FOR RURAL WORKERS

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PREVENTIVE MEDICINE
A PRACTICAL GUIDE
FOR THE HOUSEHOLD

ACKNOWLEDGEMENTS

Thanks are due to members of the Preventive Medicine Committee of the C.M.A.I. and other friends for help and encouragement. We are especially indebted to Dr. Hale H. Cook (Vadala), Dr. & Mrs. Edwin Abbott (Rasulia), Dr. & Mrs. Leonard Blickenstaff (Ankleswar), and Dr. A. N. Anwikar of the CIPHERI, Nagpur, without whose help this book could not have been written.



PRINTED IN INDIA

VI BY THE DIOCESAN PRESS, MADRAS—1965. C2584

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there was a water shortage. The latrine was used but not flushed. In a short time it got very dirty. Flies swarmed round it and the smell was terrible. It was far more dangerous to health than if the family had continued to go into the jungle. Some years ago a District Officer in the Punjab persuaded the people in a number of villages to put in latrines. The people did not want latrines, but they wanted to please the District Officer. The latrines were made but never used, and soon filled up with rubbish. The improvement was a good one, but it was a failure because the people did not accept it. The same sort of thing is still happening in many parts of the country.

Projects too may fail through lack of knowledge. In one village the people wanted a well. The well was closed and the water drawn up with a pump. It was a safe well and the water from it was pure. The pump had constant and rather rough use. After a time something went wrong with it. This could probably have been put right easily if someone had been taught how to do it and had been given a few tools. The villagers sent for help to the Government Department responsible for the well. Repeated requests failed to get anyone to come and mend it. This meant that the villagers had to bring their water from a long distance. It was not surprising that they were not willing to accept further 'improvements'.

Fundamental Needs for Good Health

1. Knowledge of how illnesses (communicable diseases), pass from person to person and ways of preventing this.

2. Safe water.

3. Good ways of disposing of human and animal wastes.

4. Food which is sufficient in quantity and variety (a balanced diet).

5. Knowing how to get good medical care in times of illness.

The first part of this book shows why these needs are important; the second suggests ways of meeting them.

COMMUNICABLE DISEASES

This chapter is one of the most important in the book. It explains how a large number of illnesses start. To know this helps us to understand how to prevent them.

Some illnesses pass from one person to another. We call these **communicable diseases**. Here are some of them: A person with a cold or tuberculosis passes it on to other people by coughing, sneezing or spitting; the bites of certain kinds of mosquitoes carry malaria and elephantiasis; the eggs of worms, when passed out of the body can get onto food or into water and so into our bodies and the itch mite, a tiny spider-like creature, crawling from person to person, gives us itch. These are only a few examples, there are many others. Unfortunately we do not know the causes of every illness. To have this knowledge is the first step towards prevention.

All communicable diseases are caused by parasites. A parasite cannot carry on a separate existence. It depends on another living creature for its food and sometimes for its transport. This other living creature is called the host. When conditions are unfavourable a parasite moves from one host to another.

Germs and Viruses

Germs and viruses are parasites. They are responsible for a very large number of communicable diseases. Germs are very small. If you want to see them you have to look at them with a powerful microscope which magnifies a thousand times (Figure 1). Even then they only look about the size of the head of a small pin. We can recognize the germs of different illnesses because they differ in shape, size, arrangement and in the way they stain.

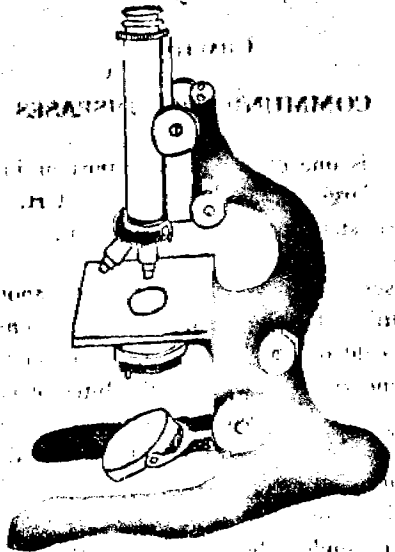


FIGURE 1. Microscope.

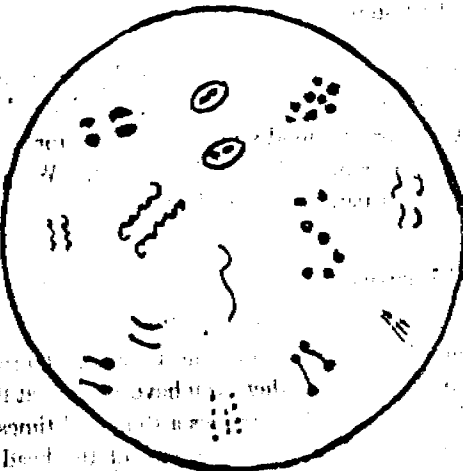


FIGURE 2. Germs of different illnesses (much enlarged)

with different dyes (Figure 2). Others need more complicated tests before we can discover what they are.

Viruses are smaller still and can only be seen with an even more powerful microscope.

Damage done by germs and viruses.—People often find it difficult to understand how such tiny things as germs and viruses can make us ill. At first, when germs enter our bodies, we do not know that they are there. They multiply surprisingly quickly. After a time their presence in the body and the poisons they make are shown by special signs and symptoms. Here are some symptoms caused by germs; fever, cough, a running nose, pus, a rash, or loose and frequent stools. It is by these signs and symptoms that we know the illness from which we are suffering and the special family of germs that causes it.

The body too has its own defences against invading germs. It can destroy them, form **antibodies** to limit their growth and render the poison they make harmless. In this battle between germs and the defences of the body one of two things may happen. Either the defences of the body will overcome the germs and the sick person will get well, or the germs will get the upper hand and the person will die. Many of the new medicines discovered during the last 30 years can destroy or hinder the growth of germs. It is for this reason that many people recover from illnesses from which they would previously have died.

Immunity

After recovering from an illness some antibodies remain in the body. For some time at least they will be strong enough to repel any germs of the same disease. This power to resist germs is called **immunity**. It explains why, when there is a person in a room with a bad cold, only some of the people get it. The people who do not get it have a strong enough resistance to repel the virus.

There are some illnesses against which we can build up immunity. This is done in two ways. We can either put into the body a very weakened living or dead form of the germs or viruses which cause the illness, or blood serum which has already formed antibodies. This is called **immunization**. Immunization does us no harm, but stimulates our bodies to make more antibodies and so increases our resistance to the illness.

In young children immunity is only built up gradually. For this reason we need to protect them and especially during the first few years of life by:

1. **Immunizations** against smallpox, tuberculosis, poliomyelitis, diphtheria, whooping cough and tetanus.

The last three can be given together by an injection called **'Triple vaccine'**. The cost of these injections is just over Re. 1 for the series. Protection

against typhoid fever is given at the end of the first year. See page 17.

2. **Keeping them away from close contact** with people who have communicable diseases like leprosy and tuberculosis.

3. **Worms**

Amongst other troublesome parasites are those worms which live in the intestine (gut). They absorb our food and lay large numbers of eggs. These eggs pass out of the body and can infect new hosts. One way by which this infection passes is by eating raw fruit and uncooked vegetables. The eggs get onto these from contaminated soil, or dirty water used to freshen them on their way to the bazaar. The eggs are so small that you cannot see them.

How diseases pass from person to person

When some people first learn about communicable diseases they are afraid that they will have all the illnesses about which they read. This is unlikely because three things are necessary before an illness can pass from one person to another.

1. **A person with the illness.** Do not worry about the illnesses which no one else has in the neighbourhood.

2. **A way by which the illness can pass from the sick person to someone else.** For instance cold viruses pass through the air, so avoid getting too near anyone who has a cold.

3. **A susceptible person.** This means a person who has not built up immunity to the germs of that disease.

Think of these three things as being like a bridge which passes from one bank of a river to the other.

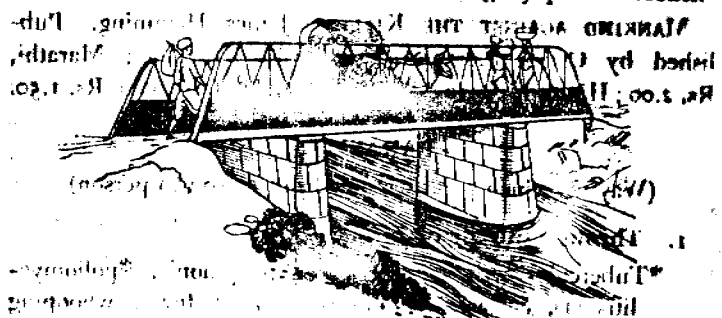


FIGURE 3. An Unbroken Bridge

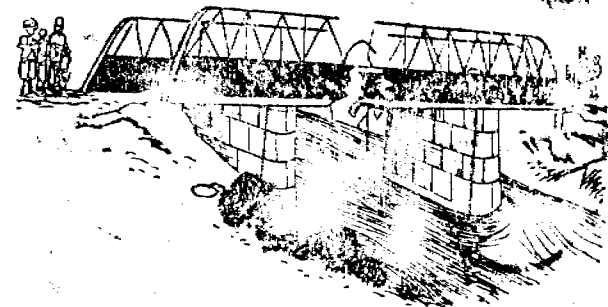


FIGURE 4. A Broken Bridge

down the bridge is useless. People cannot pass from one side to the other. So diseases cannot pass if we block the way

they travel at any point. When you are thinking about communicable diseases notice three things and think how to stop at least one of them.

1. How the parasite leaves the sick person's body.
2. How it is carried to the well person.
3. How it enters the well person's body.

If you know these things you will know what to do to prevent many illnesses.

For further reading!

MANKIND AGAINST THE KILLERS—James Hemming. Published by Orient Longmans. English, Rs. 2.00; Marathi, Rs. 2.00; Hindi, Rs. 1.50; Tamil, Rs. 1.50; Malayalam, Rs. 1.50.

PARASITES

(Ways in which parasites pass from person to person)

1. Through the air or in dust

*Tuberculosis, influenza, colds, pneumonia, *poliomyelitis (I), *measles, *mumps, *scarlet fever, whooping cough (I), *diphtheria (I), *smallpox (I) (also from skin sores)

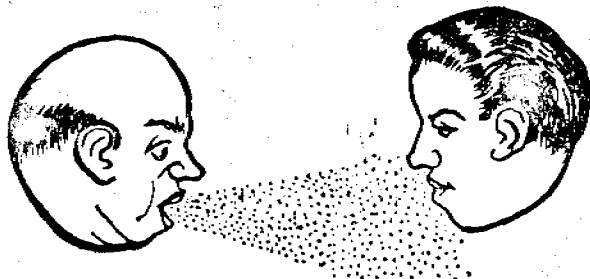


FIGURE 5. Coughing

*=Put clothes in disinfectant before sending to dhobi.

(I)=Immunization.

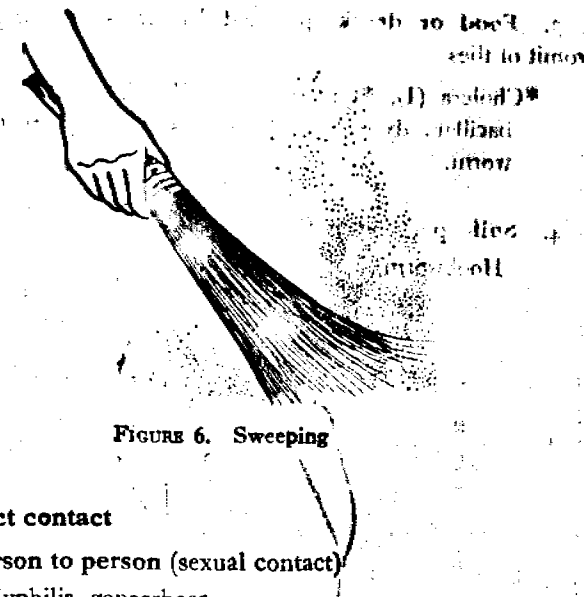


FIGURE 6. Sweeping

2. Direct contact

(a) Person to person (sexual contact)

Syphilis, gonorrhoea

(b) Through open or infected wounds

Leprosy, yaws, tetanus (I)

(c) Discharges Pus—infected wounds, sore eyes, Sputum—tuberculosis.



FIGURE 7. Spitting

3. Food or drink—polluted by faeces, or dirty feet and vomit of flies

*Cholera (I), *typhoid fever (I), diarrhoea, amoebic and bacillary dysentery, *hepatitis, poliomyelitis (I), round-worm.

4. Soil—polluted by faeces.
Hookworm.

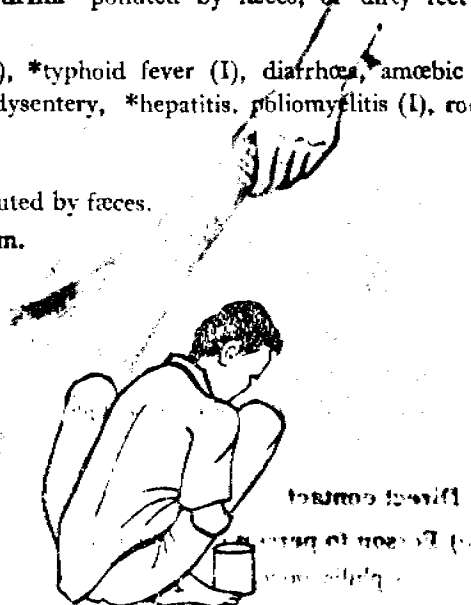


FIGURE 8. Squatting

5. Bites of animals or insects

- Typhus .. flea or louse
- Dengue
- Malaria
- Elephantiasis } .. mosquitoes
- Plague (I) .. rat flea
- Rabies (I) .. dog (I for dog)

*=Put clothes in disinfectant before sending to dhobi.

(I)=Immunization.

Age	Illness	Immunization	Obtainable from
0-4 weeks	Tuberculosis	B.C.G.	Tuberculosis Officer.
3-9 months	Smallpox	Smallpox	Health Officer
3-9 months	Diphtheria	Triple vaccine—Two injections with interval of one month. First can be given at same time as smallpox vaccine	Haffkine Institute, Parel, Bombay-12, Glaxo—Madras, New Delhi, Calcutta and Bombay.
	Whooping cough	Booster dose	Haffkine Institute, Glaxo
	Tetanus	TAB. Two injections with one month interval	Haffkine Institute, Glaxo.
School entry	Diphtheria	Vaccination can be given at same time as second TAB injection	Health Departments
"	Tetanus	BCG vaccination, if necessary	Health Officer
"	Typhoid	Re-vaccination	Tuberculosis Officer
10-14 years	Smallpox	TAB booster	Health Officer
"	Tuberculosis	Above details are extracted from WHO Chronicle for areas where vaccine is available.	As before
15-18 "	Poliomyelitis	Poliomyelitis vaccine (Salk)	Glaxo
3-4 years		Two doses with interval of one month	
		Vaccine 3rd dose	
		Vaccine 4th dose	

CHAPTER 2

SAFE WATER

In most villages the people feel the need of more water. This is especially true where the wells are outside the village or their use restricted to one special section of the community. Water is needed in the home, for watering animals, for growing food, and for flushing latrines. If this water has to be carried for some distance there is usually too little to meet all these needs adequately.

The Importance of Safe Water

Though the villager wants water he rarely knows whether the water he drinks is safe or not. By safe water we mean water which is free from dangerous germs or worm eggs. These cause a number of the communicable diseases like typhoid fever, dysentery, cholera and diarrhoea. Many people die every year from these illnesses. Others lose much time from school or work.

Germs and eggs get into water in many different ways. They leave the body of the sick person in very large numbers in his stools (faeces). When a person passes stools near a river some of these germs and eggs will probably get washed or carried into the water. When he does the same thing near a well the germs can reach the water through the unprotected sides. It is dangerous too to wash the body or clothes near any place from which drinking water is drawn. Remember eggs are too small to see.

In times of pilgrimage large numbers of people travel through the country. Until recently many of them walked, stopping at different places on the way. After every large pilgrimage it was noticed that cases of cholera were reported from many different parts of the country. What had happened was that some of the travellers had come from places where there was

cholera. Although they did not know it they had become infected and were passing the germs out in their stools. In this way they spread infection all along their journey. After the last two Kumbh Melas no serious outbreaks of cholera were reported. The Government had taken precautions. Before anyone could buy a ticket to Allahabad he had to show a certificate of immunization against cholera. Wherever possible latrines were dug and efforts made to see that people used them.

The villager takes little interest in germs or the illnesses they bring unless he hears of some dangerous illness in the neighbourhood. The fact that he is alive means that he has developed at least some immunity to the local germs. This is often only partial. Young children do not have this immunity. Far too many young children die from these illnesses, and when the infection is a severe one other people sicken and die as well.

How to get safe water

If you do not know whether your water supply is safe or not, get it tested. Your local Public Health or Block Development Officer will tell you how to get this done. Find out from him how to take a sample and where to send it.

Water drawn from tanks and rivers is not safe. Well water is only completely safe when the top of the well is entirely closed and the water drawn up with a pump. The sides of the well must be lined down to the first layer of the solid stone. If the soil goes down to a very deep level, 6 metres (20 feet) of brick or stone set in good *chunam* or cement mortar should be enough. If the soil is very sandy and loose the stone or brick lining may have to go down even to thirty feet. Cement rings and pipes are also very satisfactory.

If you have an open well try to get it closed. When a pump is put in, be sure that there is someone who can repair it if it goes wrong.

Disinfection of water

Germs can be killed by boiling water or adding disinfectant to it. It is not satisfactory to try to disinfect the water in a well, though you may have to do it in an emergency. There are several reasons for this. It is very easy to contaminate a well again. People do this in several ways. Germs get into the water when people wash themselves or their clothes on the side of the well and let the dirty water run back into the well. Another way of re-infecting a well is from the bottom of a bucket which has been left standing on the dirty ground. The bucket will be clean when it comes out of the well. It has been washed with the water someone else will drink (See Figure 33 for a safe well.)



FIGURE 9: "Unsafe Well"

Disinfectants too are unreliable.

Potassium permanganate only kills cholera germs. It does no harm to other germs or to worm eggs. Don't be misled by the nice pink colour into thinking that you have made the water safe.

Bleaching powder (calcium hypochlorite, chloride of lime) will kill nearly all germs. Unfortunately the powder loses its strength very quickly when exposed to air. Powder taken from a tin which is constantly opened is quite useless. In some parts of the country it is difficult to buy bleaching powder. It is even more difficult to be sure that it has not lost its strength. If you can get bleaching powder you must find out how much water is in the well. This will vary from time to time. It is no good thinking that the same amount will disinfect the well in the wet season as in the dry. Here is the way to do this.

DISINFECTION OF WELLS WITH BLEACHING POWDER (chloride of lime)

Amount needed:—1 ounce, (30 grams) for every 2,000 gallons of water in the well. Amount needed will vary from time to time.

To see how much water is in the well:

Measure in feet:

The diameter of the well in feet = D

The depth of water in well in feet = W

Calculation:

$D^2 \times W \times 5$ = gallons of water in the well.

e.g. if $D = 4$

and $W = 25$

$\therefore 4 \times 4 \times 25 \times 5 = 2000$ gallons.

\therefore 1 ounce of bleaching powder is needed.

How to disinfect the well

Do this at night when people have drawn the water they need. Put the right amount of powder in a bucket. Half fill the bucket with water and stir well. Let down the bucket gently

into the water. Then draw it out a little way. Do this several times till all the solution has entered the water. The well will be ready for use next morning. When there is an epidemic wells should be disinfected at least weekly.

Liquid bleach can be bought in most bazaars and is more stable. A quarter litre (10 oz) bottle costs about Rs. 1.25. Two bottles will disinfect a well holding 2,000 gallons of water. This can be done in an emergency.

Even after disinfecting a well you cannot tell how soon it will be again contaminated. First try to get a safe supply of water by having a closed well and pump. If you cannot get this boil the water you are going to drink or disinfect it chemically.

DISINFECTION OF WATER IN WATER POTS

Empty the water out of the pots, rinse them with boiling water. Do this weekly. Let them dry in the sun. When in use keep them covered.

(a) *By boiling*—Boil the water so that it foams for at least one minute and pour it into the pot. Always keep the mouth of the pot covered.

(b) *With bleaching powder:*

To make a stock solution, mix 100 grams (4 ounces) of fresh bleaching powder with $4\frac{1}{2}$ litres (1 gallon) of water. Let it stand all night. In the morning pour the clear fluid from the top into bottles with glass stoppers. The bottles should be made of dark coloured glass. You can make a dark bottle by covering a plain glass one with brown paper.

To disinfect the water

(a) *Bleaching powder*.—Find out how much water your pots hold. (A kerosene tin holds about 18 litres.) Add one teaspoonful of the stock solution to every 18 litres (4 gallons) of water.

(b) *Liquid bleach*.—Add 6 drops to the litre 2 pints, 40 ounces. Let it stand for half an hour before using.

(c) *Iodine*.—Add 15 drops (1 cc.) of tincture of iodine to 1 litre of water. (This is just under 2 pints). Let it stand for half an hour before using.

These disinfectants do add a taste to the water, but the taste is much less unpleasant than having typhoid, cholera or dysentery.

CHAPTER 3

THE SAFE DISPOSAL OF WASTE

During the last twenty-five years the health of the people of India has improved greatly. Deaths from widespread epidemics like malaria, plague, and smallpox are much fewer. The better care of mothers and young children has also saved many lives. As a result of this people are living longer.

Improvement in sanitation and the safe disposal of waste has made far less progress. Too many people are still dying from typhoid fever, dysentery and even cholera. These illnesses and parasites like hookworms and roundworms cause much chronic ill health, leading to loss of time at work and school.

A. The disposal of Human Waste

The rapid increase in the population of India makes the proper disposal of waste exceedingly important. The problem is a difficult one. To many it seems satisfactory to follow the age-long custom of passing stools (æces) on the ground. In the old days when there were fewer people in the country this did no particular harm. To follow this custom now, when people are living in much more crowded conditions, greatly increases the danger to health.

Roundworm and hookworm eggs (Figures 10 & 11) and the germs of dysentery, poliomyelitis, typhoid fever and cholera all leave the body in the stools. When a person knows that he has one of these illnesses his stools can be disinfected. Very often he has

no idea that he is ill, yet he is passing infection to other people. Besides being an annoyance, to pass stools on the surface of the ground is a danger to the health of other people. Stools which

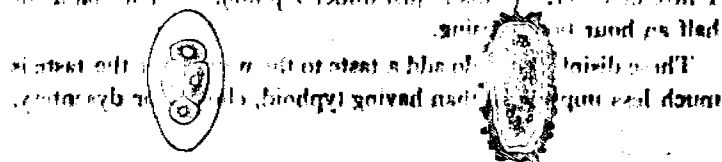


FIGURE 10. Hookworm egg (much enlarged) FIGURE 11. Roundworm egg (much enlarged)

go into a pit or septic tank are harmless and unobjectionable. All human and animal waste finally disintegrates. It is absorbed into the soil and used by plants as food.

Ways in which germs from the stool carry infection.

These germs usually enter our bodies when we eat or drink. They do this in several ways by:

- (1) Water. (see chapter 2)
- (2) Soil.—The ground round houses is often heavily contaminated with hookworm and roundworm eggs. This is especially so where small children are allowed to relieve themselves on the ground. At this age children often have very long nails. When they play in the dirt eggs can get under them. These will be transferred to their mouths and swallowed when they eat. In one town school, when the children's stools were examined, it was found that 40% of those in the lower classes had worms. The parents either did not know or did not think it mattered. Hookworm eggs hatch out in the soil. They burrow through the soft skin of the bare foot. Parents often do not understand that the ill health of their children is due to these parasites. Training children in good toilet habits should start as early in life as possible.
- (3) Flies spread germs very successfully. They spend their time flitting between dirt and our food. They put germs on it,

from their dirty, sticky, hairy feet, they vomit on it and pass out their waste on it. (Figure 13.)

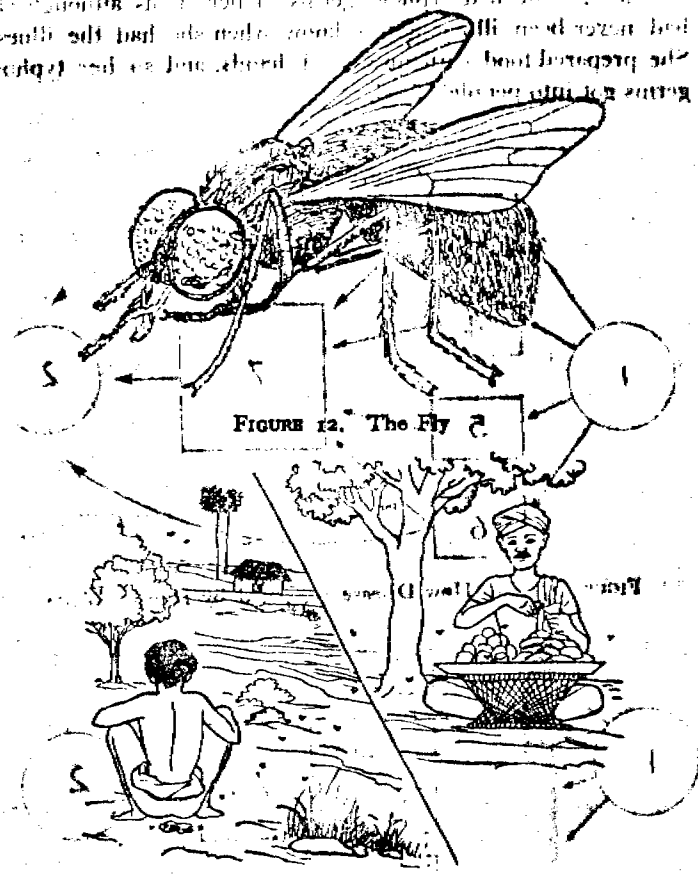


FIGURE 12. The Fly

FIGURE 13. Flies flit between dirt and food

- (4) Fingers.—This happens when people do not wash their hands carefully after passing a stool and before handling food. Some years ago there was a cook living in America, who earned the name of 'Typhoid Mary'. She constantly changed jobs.

At last it was noticed that wherever Mary worked someone became ill with typhoid fever. She was what is called a 'carrier'. She had typhoid germs in her stools although she had never been ill enough to know when she had the illness. She prepared food with unwashed hands, and so her typhoid germs got into people's food.

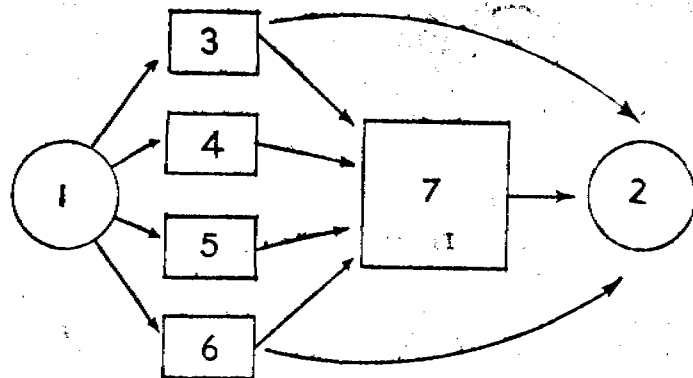


FIGURE 14. (a) How Disease is carried by Human Waste

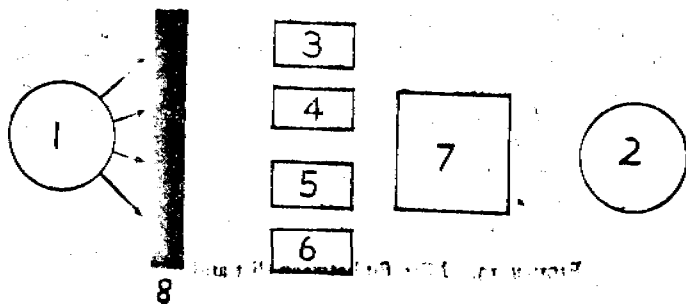


FIGURE 14. (b) When Disease does not spread
 1. Faeces (stools); 2. A healthy person; 3. Water; 4. Flies;
 5. Fingers; 6. Soil; 7. Food; 8. Safe disposal of feces.

The first of these two diagrams shows how easy it is for infection to pass from person to person, unless proper care is taken to dispose of human waste safely. The second shows how effective good sanitation can be, in preventing infection.

Waste can only be safely got rid of when:

1. It is out of the reach of flies.
2. It is in a place where worms, eggs and germs cannot pass from person to person.

Only certain types of latrines do this effectively.

Different Types of Latrine

1. **Water seal latrines.**—These may be flushed from a cistern or by pouring water into the pan. The flushing water drives the stool from the pan into a septic tank or pit. (Figure 15.) The pipe leading from the pan is curved, in such a way that

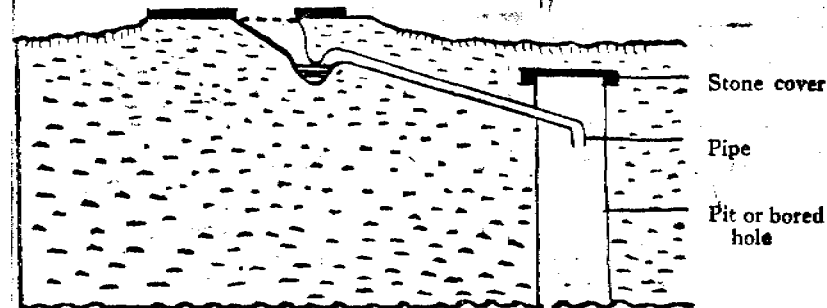


FIGURE 15. Water seal latrine inside the house leading to pit or bored hole outside

there is always water at the bottom of the pan, sealing it off from the pit. When sufficient water is used for flushing there is no smell. This kind of latrine can be made inside the house, and be connected with a pit, bored hole or septic tank outside.

2. **Bored hole latrines.**—These are always made outside the house and only where the soil is not rocky. A hole 16-20 feet deep is dug with a special tool—the earth borer (auger). Here the stools are not covered, but flies rarely breed in the dark and so far below the ground. A squatting plate is put over the hole. It is usually not a water seal one as shown in Figure 16.

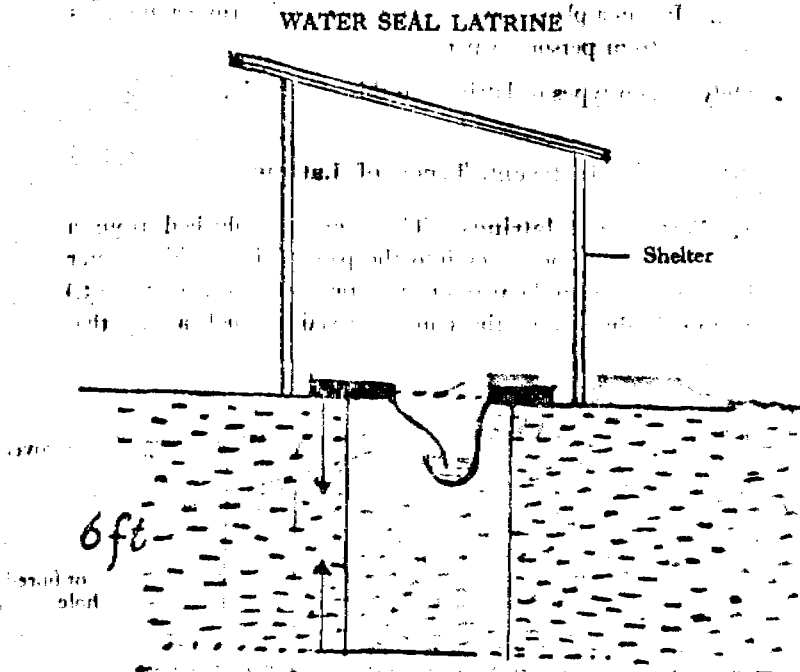


FIGURE 16. Water seal latrine over bored hole outside the house

3. **Trench latrines** are unsatisfactory as it is very difficult to keep the contents completely covered with earth. A badly looked-after trench latrine is a good breeding place for flies. A narrow, shallow trench, is adequate for temporary use, as for instance during camps or conferences. A useful size is a metre

(3 feet) long, 60 cms. (two feet) deep and 30 cms. (1 foot) wide. If children are to use it, the width should be decreased. It should be narrow enough for the user to squat comfortably with one foot on each side of the trench. The earth which has been dug up is piled up conveniently near the trench. A piece of board or a tin scoop can be used as a shovel for putting the earth into the trench. Users must be taught the importance of covering the stools completely. When the trench is no longer needed, it is filled up with carefully rammed down earth.

4. **Pots, buckets or tins** are an abomination unless they have well fitting lids. They collect dirt in a very convenient place for flies to get to.

5. **Communal latrines** in stations and bus stands are often smelly and dirty. People have never been taught to use them properly, and the staff are often not sufficiently interested to see that they are properly looked after. This may account for the unpopularity of latrines in many places.

6. **School latrines.**—In places where there is plenty of water available water-seal latrines or the automatic flushing system recommended in Chapter 9 should be used. If there is not enough water and the soil is suitable, bored holes will be quite satisfactory. One latrine or latrine compartment will be needed for every 20 students. In many country places the girls' schools have good latrines, but the boys' schools have none. This is a pity. It may lead to difficulties when a couple start a new home. The wife is used to a latrine and wants one; the husband, never having used one, thinks it unnecessary.

7. **Family latrines** are much easier to keep clean than communal ones. They are of the greatest convenience to the elderly and the women of the household. Sometimes they smell, because not enough water is used for flushing. This may be due to the distance from which it has to be brought. Any

improvement in the water supply will make people more willing to have latrines and to flush them adequately.

Every family should think out whether its present way of waste disposal is satisfactory or not. If it is not, they should try to improve it. Useful advice can be got from the Block Development officer of the District. Chapter 9 gives some practical details on the making of latrines.

B. The Disposal of Animal Waste

The best way of disposing of animal waste is to make it into fertiliser. This is called compost.

Dangers from animal waste.—The soil of the fields and roads is heavily contaminated with animal waste (dung). Our greatest danger from this dung comes from the germs of tetanus. These live in the guts of horses and other grass eating animals, and are even found in human faeces. These germs are able to protect themselves from unfavourable conditions. They go into a resting stage, and a thick protective skin grows round them. They are then called *spores*. Spores are very resistant to disinfectants, and are not killed by any heat below 100°C. (boiling point). When conditions become favourable again the spores lose their skin and once more start to multiply.

A very slight wound, such as those made by a nail or a thorn, lets the germs get into our bodies. The injury may be so slight that we do not remember it. Tetanus germs thrive best in the dark and multiply rapidly. They make a poison which attacks the nerves. This leads to fits and often death. Newborn babies too can be infected. The germs get in by the cut end of the cord. It is usually carried there by the uncleanly habits of the untrained *dhai* who has done the delivery. Tetanus is not only a dangerous illness, but the treatment is very costly.

There are two ways of protecting ourselves against tetanus. The first is by immunization with *tetanus toxoid*. This builds up our resistance to tetanus germs which may get into the body later on. It protects us for some years. The second is by an injection of *tetanus antitoxin*. This is given after an injury to repel any germs which may have got in. This injection only gives us protection for a short time, but is effective immediately.

Everyone working on the land should have a series of tetanus toxoid injections. Children should be given them early in life at the same time as they are immunized against diphtheria and whooping cough. This injection is called *triple vaccine*. (See page 11.)

Ways of disposing of animal waste.—Some people dry the dung and make it into cakes to use as fuel. This is wasteful of good fertilizer and drying will not kill the tetanus spores. Others make pits at the outskirts of the village. In the wet weather these pits fill up with water and make a good breeding place for flies and mosquitoes. The most satisfactory thing we can do with it, is to make it into compost.

Compost is made from vegetable and household waste, animal droppings and soil. This is allowed to rot. After from three to six months it can be used as fertiliser. Directions for making compost are given in Chapter 11.

For further reading

COMPOST IS EASY TO PREPARE.—A pamphlet published by The Farm Information Unit, Directorate of Extension, Ministry of Food and Agriculture, New Delhi, price 10 P.

OUR FOOD

To keep well we need not only enough food but also foods of different kinds. Food gives us energy for living and working; it builds up our bodies and keeps them in repair and helps us to resist the germs of illness. Some foods are particularly valuable in one way and some help us in several ways. It is important to know the foods which are specially necessary at different times in our lives.

Foods and their work

SUGARS AND STARCHES (carbohydrates) gives us energy. Carbohydrates are found in large amounts in all grains (cereals) *gur*, *jaggery* and tapioca. Grains form the basis of most Indian diets. If we eat too much of them and not enough of other kinds of food our diet is said to be **unbalanced**. One way of improving the balance is to eat at least two different kinds of grain every day instead of just one.

PROTEIN builds up our bodies and keeps them in repair. It is particularly important in the diets of

1. Women who are expecting or feeding a baby.
2. Children, especially during the first four years after weaning.
3. Children in times of rapid growth as when they are starting to grow up.
4. Anyone recovering from a long illness.

Many foods contain some protein but in varying amounts. In vegetarian foods the best sources are peas, beans, *dhal*, *grams* and nuts. It is also found in grains. (There is less in rice than in any of the other grains). Non-vegetarian protein foods are milk, cheese, eggs, fish and meat. Protein is made up of a number of different parts all of which are not present in every food. Here too what we should eat varies at different ages. A grown up man who is working hard usually eats large quanti-

ties of rice or other grains. From this he gets most of the protein he needs. It is very different for the child who has just been weaned. His stomach is small and he needs protein in forms which he can easily digest and absorb. He needs milk, eggs, *dhal* soup and porridge (*khanji*) made from the flour of wheat, *jowar* or other grains obtained locally. *Chana* flour is especially good. If milk is difficult to get groundnut (peanut) milk will make a good substitute. (See note at the end of the chapter).

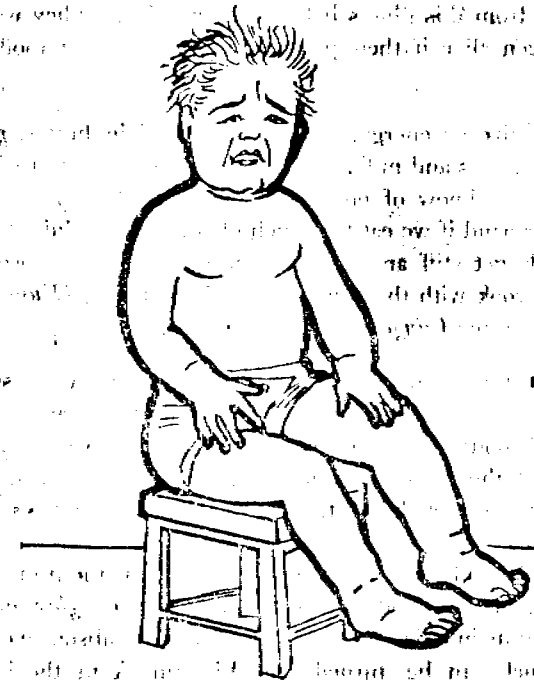


FIGURE 17. This boy has kwashiorkor. When a child is weaned, and only given starchy foods, he is likely to become ill before he is two or three. *Kwashiorkor* or protein-calorie malnutrition are names given to this illness.

It is a serious one. You can recognize it by some of these signs. The child has thin soft hair which stands on end. Even if his parents have black hair his may be yellow, brown, bronze or even red. Later on his hands, arms, feet, legs and stomach start to swell. His face is large, and round like a full moon, and his cheeks hang down. He is cross and does not want to play. When you see this you know that he is a very sick child and needs hospital treatment urgently. If he does not get it, his liver will be damaged and he will probably die. Many children die from this illness before they are five. They would still have been alive if their parents had known what foods to give them.

FATS also give us energy. They are found in butter, *ghee*, vegetable oils, nuts and milk. Fat forms a necessary part of our food though we know of no special illness caused by its lack. On the other hand if we eat too much of heavy and solid fats the blood vessels get stiff and 'rusty' earlier. For this reason it is better to cook with the thinner oils like safflower (*Kusumbh*) groundnut, sesame (*gingelly*) or coconut oils.

Vitamins are necessary substances found in very small amounts in some foods. Foods containing them are called 'protective' foods and are in one way or another necessary for the health of the body. Vitamins are called by the names of different letters of the alphabet. Some have special names as well.

VITAMIN A.—The chief work of this vitamin is the protection of the sight. It is found in fish oils, eggs, butter, *ghee* and in smaller amounts in milk. There is also a yellow substance called *carotene* which can be turned into Vitamin A in the body. This is found in green leafy vegetables and all those fruits or vegetables which are red or yellow inside.

In India the lack of this vitamin is one of the chief causes of blindness. Children under the age of five need it especially.

So also do people who are recovering from long illnesses like typhoid fever, dysentery or cholera. We see signs of the lack of this vitamin by looking at the skin and the eye. The skin is dry. The outer layers of the eyeball, instead of being moist and shiny, are dry and wrinkled. There may also be white triangular patches on the inner side of the white part of each eye. Later the central part of the eye (cornea) looks dull and opaque. Infection enters the eye. It softens and the sight of the eye is lost never to return. Older children often cannot see at night. They are nightblind, but rarely lose their sight.

VITAMIN B₁ (thiamine) gives us a good appetite and helps us to digest our food. Infants and young children should get it from milk. Older people can get what they need from whole grains, *dhal*, *grams*, nuts and oil-seeds. This vitamin is in the outer layers of the grains. It is lost when the grain is milled or polished. Parboiling the rice before it is milled helps to preserve the vitamins and some of the protein. In parboiling, the rice is soaked and steamed before being milled. This drives the health giving parts into the seed, so not much is lost when it is milled. This vitamin is also found in the *dhal* and *grams* and in nuts. In the West people buy medicine made from rice polishings to give them this vitamin. In this country we have it taken away to make the rice look whiter.

People who do not have enough of this vitamin lose their appetite, and their hands and feet feel numb and tingle. If they continue to eat too little they get an illness called *beri-beri*. They become paralysed and often have heart trouble. In a prisoner of war camp in the last war the men were fed on polished rice. After a time they started to show signs of *beri-beri*. From time to time most of the prisoners received gift parcels containing luxuries. In one part of the camp the men exchanged these for the beans which were part of food eaten by the men who guarded them. People in other parts of the camp

laughed. They stopped laughing when they found that the prisoners who ate beans instead of luxuries had lost all signs of beri-beri.

RIBOFLAVIN is another member of the group of B vitamins. It helps the body to digest its food. Sometimes in boarding schools the children have an unbalanced diet. They eat a good deal of rice, and not much of other foods. After a time they show signs of the lack of riboflavin. Sudden white patches appear at the corners of the mouth, the tongue is sore and the eyes burn. When you see this, try to improve their diet and make it better balanced. The best sources of riboflavin are milk, eggs and liver. Peas, beans, *grams*, *dhal* and green leafy vegetables will also help.

NICOTINIC ACID (niacin) belongs to this group. It also helps in the digestion of food. People whose main foods are maize or *jowar* (cholam) do not get enough of this vitamin. The illness caused by its lack is called *pellagra*. People with pellagra have dark patches on their skin on those places which are exposed to light, and sore mouths and tongues. Later in the illness they get diarrhoea (loose stools) and mental trouble. The cure for the deficiency is to eat different grains, groundnuts and liver.

VITAMIN C (ascorbic acid) was one of the vitamins which was discovered when people were deprived of the foods containing it. Up to the end of the last century people travelled by sailing ships. Journeys often took many months. As there was no way of keeping fruit and vegetables fresh, after the first few days, people had to do without them. Towards the end of a long voyage people often got very ill. Their gums were swollen, their teeth dropped out, they bled from different parts of the body. Finally they grew very thin and often died. They had what we now call *scurvy*. On one ship some very sick sailors asked to be put ashore on an uninhabited island. The captain agreed because he expected them to die. The ship

visited the island a year later, and to everybody's surprise these men were alive and well. They had been cured with the fruits and vegetables they found on the island.

After that every sailor in British ships was given limes regularly. This led to them getting the nickname of 'limey'. It also abolished scurvy from the ships in which they sailed.

Nowadays people rarely have scurvy, but some have a slight deficiency of this vitamin. This is recognized by swollen and unhealthy gums which bleed easily. This vitamin also hastens

FOR VITAMIN C



FIGURE 18. The Amla, Indian gooseberry, Nellikai

Botanical name: *Phyllanthus emblica*.

Hindi	} (Amla)	Oriya (Anla)	Telugu (Usiri kaya)
Gujarati		Bengali (Amlaki)	Malayalam (Nellikai)
Marathi	(Anvli)	Tamil (Nellikai)	Kannada (Nellikayi)

the healing of wounds and recovery from illness. Nearly all fresh fruits and vegetables contain Vitamin C. Specially good sources are the Indian gooseberry (*nellikai, amla*) (Figure 18), oranges, other citrus fruits and tomatoes.

Infants, and especially those who are bottle fed, need Vitamin C. The best way to give it to them is in fruit and tomato juice, or mashed *papayya*.

VITAMIN D.—Young growing children need this vitamin together with calcium and phosphorus to make their teeth and bones strong. If they do not get enough, the bones of their legs bend and those of their chests are soft and crooked. They have an illness we call *rickets*.

The cheapest way to get this vitamin is to expose the body to sunlight. It is also present in milk, eggs, butter, *ghee* and liver.

There are a number of other vitamins. They are not yet known to be of great importance in ordinary life. Eating a varied diet will make sure you have enough of any of them.

For further reading

1. NUTRITION FOR MOTHER AND CHILD, by Venkatachalam & L. M. Rebello (pp. 58; free); Published by Indian Council of Medical Research, P.B. 494, New Delhi.

2. MENUS FOR LOW COST BALANCED DIETS AND SCHOOL LUNCH PROGRAMMES, (North India), by Swaran Pasricha, (pp. 29; 15 P.); Published by Indian Council of Medical Research.

3. MENU FOR LOW COST BALANCED DIETS AND SCHOOL LUNCH PROGRAMMES, (South India), by Nutrition Research Laboratories, Coonoor (pp. 37; 15 P.). Available from: Central Health Education Bureau, Temple Lane, Kotala Lane, New Delhi.

4. OUR FOOD, by M. Swaminathan & K. R. Raghavan. Published by Ganesh & Co. (Private) Ltd., Madras-17. (Rs. 3)

HOW TO USE GROUNDNUTS (PEANUTS)

Groundnut milk 30 grams (1 oz) of nuts will make 165 ml. (6 ozs) of milk.

1. Buy fresh groundnuts and shell them.
2. Roast gently for 5 minutes.
3. Take off the pink skin.
4. Soak the nuts in water for two hours.
5. Drain off the water.
6. Grind or pound the nuts into a fine paste, adding water if necessary.
7. Add the correct amount of slightly warmed water and stir for 5 minutes.
8. Filter through a clean thin piece of cloth into a clean vessel.
9. Boil the milk and put it into a clean vessel with a lid. It will keep for 8-10 hours.
10. For children the thin skin which forms on the cooling milk can be taken off. This reduces the amount of fat in the milk.

Note.—Use the left-over solids to thicken soup, put in chutneys or mix with flour to make *chapaties*. Use quickly as it spoils rapidly when moist; but you can dry it and then store it safely.

Groundnut balls

Pound the groundnuts well to remove some of the fat. Add salt and roll in balls.

Groundnut porridge

Mix the groundnut paste with equal parts of Bengal gram (*chana*) flour. Add water and cook for a few minutes. In those parts of the country where tapioca is grown a good porridge can be made by mixing 1 part of groundnut flour with 3 parts of tapioca flour. This can also be mixed with wheat flour to make *chapaties* and *purees*.

Groundnut curds

Add a teaspoonful of cow's milk to a cupful of cold groundnut milk. If you like you can add $\frac{1}{2}$ a teaspoon of honey. Use within 12-24 hours after the curds have set.

SPROUTING GRAM FOR VITAMIN C

1. Soak the grain in water for 24 hours.
2. Spread out the grain on damp earth or a damp blanket. Cover with a damp cloth.
3. Keep the cloth damp.
4. In 1-2 days the grain will have germinated with a $\frac{1}{2}$ " to $\frac{3}{4}$ " sprout.
5. Eat raw or after cooking for a short time.

Grains to choose

Green gram.—Botanical name *Phaseolus aureus*; Hindi & Marathi *Mung*; Gujarati *Mag*; Tamil *Pachai payaru*; Telugu *Pesalu*; Kannada *Hesaru Kalu*.

Bengal gram.—Botanical name *Cicer arietinum*; Hindi *chana*; Tamil *Muzhu kadalai*; Telugu *Sanagalu*; Kannada *Kadale*; Oriya *Buta*; Marathi *Hurbura*; Bengali *Chola chana*; Malayalam *Kadala*.

Note.—You can sprout any whole grain. Green gram contains three times more Vitamin C than Bengal gram. 85% of vitamin C is contained in the grain and 15% in the sprout.

FOOD GROUPS

Eat something from each group each day

The five

Food Stuff

Food-Groups

I. MILK

Milk, curds, butter milk, cheese (*paneer*), milk powder.

PULSES

Dhals, *grams*, dried peas and beans, groundnut and other nuts.

MEAT etc.

Mutton, beef, poultry, game, fish, egg.

II. FRUIT

Papaya, orange, tomato, melon, lime, mango, custard apple, *amla*, (*nellikai*), guava, *sapota*, grapes, ripe banana, apple, etc.

GREEN LEAFY VEGETABLE

Sag or *keerai*, tops of radish, onion, carrot, drumstick leaves, mint, lettuce, cabbage, etc.

III. OTHER VEGETABLES

Beans, *brinjal*, cucumber, carrot, drumstick, *kovai*, radish, onion, chillies, ladies finger, pumpkin, bitter gourd etc.

IV. CEREALS

Rice, wheat, maize, *jowar (cholan)*, *bajra (cambu)*, *ragi* and other millets.

STARCHY VEGETABLES

Yams, *colocasia*, tapioca, potato, sweet potato, tender jack fruit, raw banana, etc.

V. FATS AND OILS

Vegetable oils, butter, *ghee* and other fats.

SUGAR

Jaggery, cane sugar etc.

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Lack of hæmoglobin leads to *anaemia*. People who have this illness feel tired, weak and often breathless. To see if a person is anæmic look at his tongue or the inside of the lower eyelid. In an anæmic person these look pale. We get anæmia in one or both of two ways from

- (1) Too little iron in the blood.
- (2) Loss of blood from one cause or another.

Foods which give us good quantities of iron are grains, peas, beans, grams and *dhals* and *gingelly* (sesame) seeds, green leafy vegetables and *gur* (jaggery).

Iodine is usually found in small amounts in common foods, unless there is less than usual of this mineral in the soil. There is a shortage of iodine in some hilly districts, and especially in the Himalayan foothills. Lack of this mineral in the diet leads to an overgrowth of the thyroid gland. This is called *goitre*. The only way of getting additional iodine in our food is by eating salt made from sea water, and sea fish. Dried fish is cheap and can be bought in most bazaars.

Salt (sodium chloride). In hot weather a great deal of salt is lost from the body in the sweat. People vary in the amount of salt they need, but in hot weather and where there is much physical activity, additional salt should be taken. Heat cramps are caused by a lack of salt in the diet.

MALNUTRITION

Malnutrition comes from the wrong use of food. It has several causes.

1. **We may eat too much.** Then we grow fat. Having to carry a heavy body about puts a strain on the heart. Fat people usually live a shorter time than thin ones.

2. **We may eat too little.** Then we shall become weak and tired, and liable to get infectious diseases.
3. **Our diet may be unbalanced.** We have already seen the dangers of an unbalanced diet.

What can we do ?

- (1) **Grow foods.** See note at the end of Chapter 6

- (2) **Buy carefully.**

- (a) Choose foods for their value.

Note—*Ragi* is the only grain containing calcium. Use more.

Jaggery (*gur*) from sugar cane contains iron, from coconut or date palm sap contains calcium. Use these instead of white sugar.

- (b) Wilted vegetables lose most of their vitamin content. Use vegetables quickly.

- (c) White rice loses most of its vitamins and proteins unless it was parboiled.

- (3) **Prepare food carefully**

- (a) Scrape as little skin as possible from root vegetables. The most valuable part is just under the skin.

- (b) Do not leave vegetables to soak in water.

- (4) **Cook carefully**

- (a) Cook vegetables in a covered pot.

- (b) Cook in just enough boiling water.

CHAPTER 5

OUR FOOD (Contd.)

There are nineteen different useful minerals in our food. Most of them we need only in small amounts. Here are the most important :—

Calcium and phosphorus together with Vitamin D, are needed to build strong bones and teeth. We saw how useful these were in preventing rickets in young children. Pregnant women also need them. During pregnancy the baby's body is growing in the mother's womb. Calcium is needed to make his bones. If the mother is not eating food with sufficient calcium in it, this will be absorbed from her own bones. When this happens the hip bone (the pelvic bone) will soften. Then it will be impossible for the child to be born the normal way. This illness is called *osteomalacia*.

There is plenty of sunshine in Kashmir but there is too little calcium in the soil. This leads to shortage in the grass, in cows' milk and in green leafy vegetables. The mother does not get enough calcium for her own and for the baby's needs. Calcium is drawn from her bones to make the baby's bones. For this reason there is more osteomalacia among pregnant women in Kashmir than in other parts of India. Most foods have phosphorus so there is not much danger of people eating too little.

We get calcium in milk products, green leafy vegetables, *ragi*, and small dried or fresh fish eaten whole (Figures 19, 20). All the grains with the exception of *ragi* are very poor in calcium. Rice has less than any of the others.

Ragi, the botanical name *Eleusine coracana*; Tamil and Kannada *ragi*; Hind *Mundal okra*, Telugu *Ragulu chollu*; Oriya *mandia*, Marathi *nachni*; Gujerati *ragi bhav*; Malayalam *moothari*. It is also called *makra*, *Korakan* and *marua* and finger millet.



FIGURE 19. *Ragi*



FIGURE 20. These give us Calcium

Iron.—Hæmoglobin is the name of the colouring matter in the red cells of the blood. It is largely made up of iron. Its work is to carry the oxygen from the lungs to all parts of the body, and to return the waste products to the lungs.

- (c) Cook for a short time only.
- (d) Use the water in which you have cooked the vegetables in 'dhals', gravies or soups. It is very nourishing.
- (5) Remember the special needs of the people you are feeding. *The young child* needs milk, or groundnut milk every day. *The pregnant mother* needs food containing protein, calcium and iron.
- (6) Learn and teach people all you can about foods.

For further reading

THE ROAD TO GOOD NUTRITION, by M. V. Radhakrishna Rao (pp. 61, illustrated, price 0.50 P.). Published by the Department of Nutrition, Government of Maharashtra, Haffkine Institute, Parel, Bombay-12. Also available in Marathi, Hindi and Gujarati.

CHAPTER 6

OUR HOME

The House and Garden

Proper housing is one of the important things necessary for the improvement of village health. This is very clearly stated in a booklet called '*Rural Health Services in India*'. This was published in 1962 by the Directorate-General of Health Services. It reports a survey on housing carried out in 1943 villages in different parts of the country.

Here are some of the facts given :—

- 81% houses had 3 rooms or less.
- 32% had two rooms.
- 34% had one room.
- 95% had no latrine.

The House

In the same book the minimum standard for satisfactory housing is said to be :

1. Two rooms.
2. A kitchen with a paved sink or platform for washing utensils.
3. A sanitary latrine.
4. Facilities for the disposal of waste.
5. A protected water supply within easy distance of the house.
6. Separate accommodation for animals.
7. Proper ventilation and lighting for all rooms.

Many houses do not yet meet these requirements.

Here are a few minor things which help to improve the comfort of the home.

The stove (chula) smoky or smokeless ?

In many houses there is no chimney to let the smoke out of the house. The mother spends hours crouching over a smoky stove. Her throat is sore and her eyes water. There are several ways of making a smokeless stove. Choose a pattern which meets your needs. Some people like a good supply of hot water; others want a place on which to cook *chapaties* (*roti*).

Whatever kind of stove you choose, follow the directions you are given for making it very carefully. The slope of the floor, and the way the pots fit closely into the holes are both important. They make all the difference between the stove being a success or a failure. When you use the stove for cooking, remember

that the smoke will come from any hole which is left uncovered. When people say that their 'stove burns too much wood' or 'still smokes' it is nearly always due to some mistake in following the directions for making it.

Some people say that they like a smoky stove because the smoke keeps the mosquitoes away. Nowadays people are finding a better way of doing this. They let more air and light into their houses; they do not have piles of clothes in dark corners under which mosquitoes hide in day time, and they sleep under mosquito nets. To burn *neem* leaves will also keep mosquitoes away.

Pests

COCKROACHES, ANTS AND OTHER CRAWLING INSECTS often give a good deal of trouble in the home. We must keep them from getting on to our food. To protect it we need a cupboard (*doolie*). (Figure 21.) It is made with a door and sides of fine

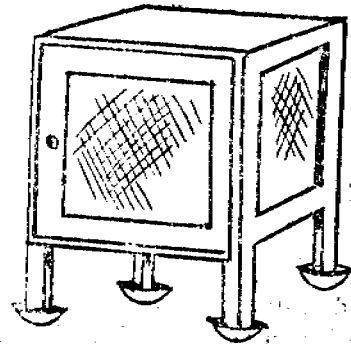


FIGURE 21. A *Doolie*

Keep your food safe from ants and flies

mesh wire. It can stand on the floor or be hung up. If it is on the floor it is a good thing to put the legs in tins. In the tins put water, DDT powder or '*Gammexane*'. These powders and sprays kill these pests and are all poisons. We must be careful to prevent them from getting on to the food. In other places they can be sprinkled freely.

RATS do a great deal of damage in our houses. In trying to get rid of them there are several things to remember. You can buy rat poisons in all bazaars. They are all dangerous both for people and animals. Follow carefully the directions given for use of the poison you buy. Put the poison food (bait) down at night and remove and destroy what is left early in the morning. If you are afraid that children or animals will eat the bait you can put it in lengths of bamboo or tile. Rats usually follow the same path. You can recognize this by greasy marks and their droppings. Put the bamboo across the path with its open end about 5 cms. (2 inches) from the wall. Keep the bamboo in place with heavy stones. You can also make an arrangement (Figure 22.) from bricks and tiles.

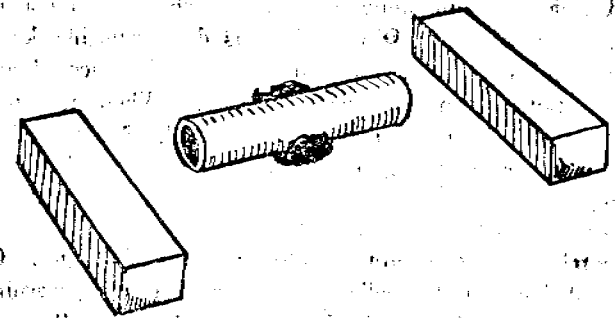


FIGURE 22. A rat trap

Put the bait in the central tile. Protect the open ends with bricks.

The best way of keeping rats away is to keep a cat. A female is more likely to stay at home than a male. Be sure to give the cat enough food to keep it strong and healthy. If you do not, it will not have strength to catch rats. A home with a happy cat is a home without rats or mice.

ACCIDENTS

Here are some ways of avoiding accidents.

Burns.—Try to have your stove built up so that you can stand to do your cooking. This has the advantage that it puts the pots and *dehchies* out of the reach of small hands. Many children get badly burned when they pull a pan of water or rice over themselves. For slight burns a very good first aid treatment is to soak the part which is burned in cold water for at least 15 minutes. If you cannot do this, cover it with clean cloths soaked in cold water. Severe burns need medical treatment at once, if possible at a hospital.

Poison.—Another important thing is to have a shelf or cupboard which is quite impossible for the children to reach or open. In this keep anything which is dangerous like knives, scissors and medicines. Medicines when taken according to the directions given are perfectly safe. When too much is taken the person may be poisoned. Many children have died from eating large tablets thinking they were sweets.

Electricity is being brought into a number of villages. One very real danger is to foolhardy boys, who ignoring warnings, climb up the pole, touch the wires and then fall to the ground dead or badly injured. They have had an electric shock.

PESTICIDES FOR KILLING HOUSEHOLD PESTS

Name of Pesticide	Chemical	Used as	To kill	Price in bazaar
1. Neocid powder	DDT Technical 9.5%	Dust	Crawling insects, pests, head and body lice	Rs. 0.75 per 50 gm. tin
2. Gammexane D.025	Lindane 0.5%	"	"	about Rs. 0.50 per 500 grms.
3. Ratox	Benzene hexachloride Zinc phosphide 80-85%	To mix with bait	Rats and mice	Rs. 4.40 per 500 gm. tin
4. Rochex	Diazinon Technical 2%	Dust	Cockroaches and crawling insects	Rs. 1.75 per 200 gm. tin
5. Spray	Lindane 0.5% Pyrethrins etc.	Spray	Mosquitoes, flies and other flying insects	Rs. 3.50 per 1 lit. tin
6. Gammexane water dispersible powder	Benzene hexachloride	"	"	Rs. 10.50 " 5 " "
7. Termex	Chlordane technical 20%	"	"	‡ kg. per lb. Re. 1.20
8. Tik-20	Diazinon Technical 20%	"	White ants Bed bugs	Rs. 2.75 per 250 ml. tin Rs. 0.90 per 15 cc. bottle

NOTE: These are all poisons. Some simple precautions are necessary.

1. Read the direction on the tin carefully.
2. Store out of the way of children and animals.
3. Do not let it come into contact with food.
4. Throw away the empty container and do not use for any other purpose.
5. Wash your hands carefully after using.
6. Tik-20—Whilst spraying, keep doors and windows open.

NOTE: Other dusts and sprays are marketed and made of the same chemicals. Many are meant for agricultural use and are too strong for household use.

TF = Tata-Fison and Geigy. These pesticides are now being distributed in India by Rallis India Ltd., Ralli House, 21 Ravelin Street, Bombay-1. Registered Office: 16 Hare Street, Calcutta.
ICI = Imperial Chemical Industries (India) Private Ltd., Crescent House, Ballard Estate, Bombay-1 and at Calcutta and Delhi.

THINGS TO GROW IN YOUR GARDEN

Many village homes have a small plot of ground round the house. This is often sufficient to grow the fruit and vegetables necessary to keep the family in good health. The garden can be watered with waste water from the house.

TREES

Papayya.—Botanical name *carica papaya*; Hindi *papita*; Tamil *pappali pazham*; Telugu *boypay pandu*; Kannada *pharangi*; Oriya *pachila amrut bhanda*; Marathi *popai*; Bengali *paka pepe*; Gujarati *popaya papaiya*; Malayalam *pappaya pazham, kappanga*; other names *arind kharbuza*.

There are many different kinds of papayya, so choose the seeds of a good variety.

Soak the seeds in cowdung for twenty-four hours. Then plant them in pots, leaving a distance of 3 inches between each seed. When the seedlings are about 6 inches high, transplant them. Prepare pits 2 x 2 x 2 feet. Fill the pits with compost or finely divided earth. Plant the seedlings a foot apart in the middle of each pit.

Care of the papayya trees. Keep the soil round the trees weeded. Papayyas need water, but not to stand in water. This makes them rot. Heap soil up against the stem. Water every four or five days and more often in summer.

Flowers come out after six months and fruit a year after planting. Male trees do not bear fruit, but one at least is necessary for fertilizing the flowers of the female tree. The flowers on the female trees are near the stem and on the male tree are more spread out. Sometimes male and female flowers are on the same tree. These can bear fruit.

Drumstick.—Botanical name *moringa oleifera*; Hindi *sajjan*; Tamil *murungai kai*; Telugu *mulaga ahu*; Kannada *murige*; Oriya *sajana saga*; Marathi *shevuga pan*; Bengali *sajana*; Gujarati *saragroni dheng*; Malayalam *muringa ela*.

Drumstick Trees—grow quickly and pods and leaves can be eaten. They are easy to grow and need little attention or watering.

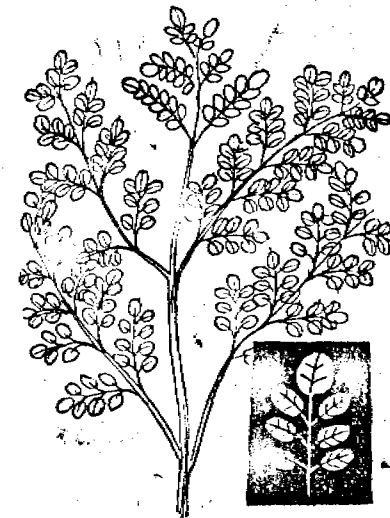


FIGURE 23. Drumstick

How to grow a drumstick tree.—Choose a tree if possible with long, fleshy, sweet fruit. Just before the rains, cut off a branch the thickness of a walking stick and about three feet long. Plant one end about a foot deep in the earth. Seal the other end with cowdung to prevent drying.

Sometimes old trees become exhausted. Cut them down to three feet above the ground level. *Gammexane* dust or spray will keep away the pests.

GREEN LEAFY VEGETABLES

Amaranth.—Botanical name *amaranthus tricolor*; Hindi *chaulai*, *lal sag*; Bengali *banoputa nate*; Gujerati *tandaljo*; Kannada *dautina soppu*; Malayalam *elan chemecheera*; Marathi *math*; Tamil *keerai zhandu*; Oriya *khada sag*.



FIGURE 24. Amaranth

Amaranth is one of the most useful of the green leafy vegetables, as after being cut the leaves will grow again. It is easily grown from seed. There are several different kinds, so choose the one which grows best in your part of the country.

Indian Red Spinach.—Botanical name *bassella rubra*; Telugu *batsalla*; other names *mayalee*; *poi*.

This is a quick growing creeper with large, fleshy leaves. It is grown from seed.

Mint.—Botanical name *menthas picata mint*; English, Malayalam and Hindi *paudina*; Tamil and Telugu *pothina*; Marathi, Kannada and Bengali *puđina*; Gujerati *fudina*.

Mint needs plenty of water and is an excellent vegetable to grow under a waste water pipe.

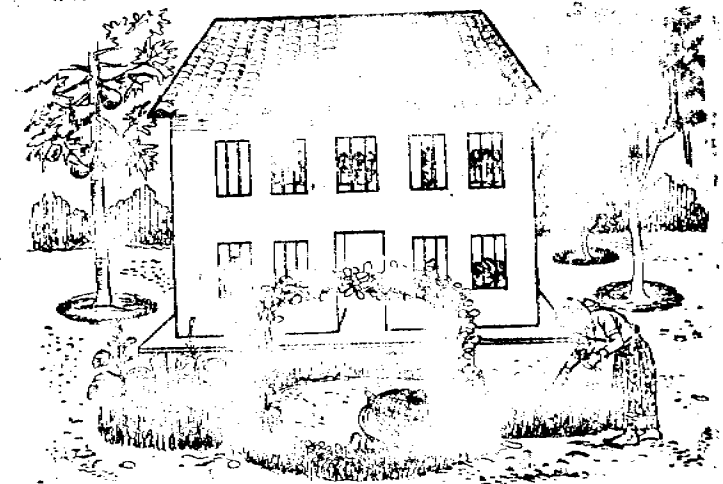


FIGURE 25. A School Garden. See what they are growing

For further reading

OUR GREEN LEAFY VEGETABLES—English and Hindi price 50 P.

PAPAYYA IS EASY TO GROW—price 10 P.

DRUMSTICK THE YEAR ROUND VEGETABLE—price 10 P.

All from !
 Farm Information Unit, Directorate of Extension,
 Ministry of Food and Agriculture,
 New Delhi.

RURAL HEALTH SERVICES IN INDIA, by Dr. P. R. Dutt. Published by the Directorate-General of Health Services and obtainable free from the Central Health Education Bureau, Ministry of Health, Government of India, New Delhi.

SMOKELESS KITCHENS FOR THE MILLIONS, by Dr. S. P. Raju ; price—English, Rs. 1.50 ; Telugu (abridged), 50 P. ; C.L.S., Post Box 501, Park Town, Madras-3, Marathi, 62 P. ; Poona Christian Bookshop, 267a, Mahatma Gandhi Road, Poona-1.

CHAPTER 7

THE HOME

Some needs of the family

Sound sleep is one of the chief needs of every member of the family. Some people want it more than others. In village homes there are often things which make sleep difficult. Here are some of them.

The Head Louse is a parasite which lives by sucking our blood. Her bite is very irritating and so we scratch. (Figures 26, 27.) The skin is broken, germs get in and pus forms. The glands of the neck enlarge into large painful lumps. The mother louse lays from eight to twelve eggs (nits) a day. She fastens them tightly to the bottom of the hair with a kind of

cement. Newly laid eggs look white and pearly. Empty nits, out of which the louse has hatched, look dull and yellow and are nearer the free end of the hair.

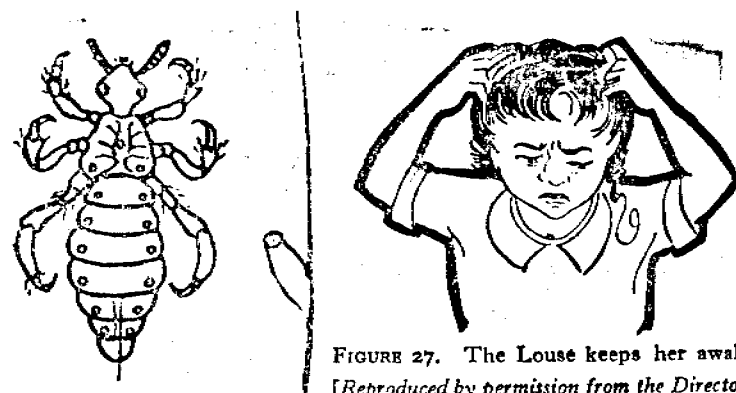


FIGURE 26. The Head Louse
 FIGURE 27. The Louse keeps her awake
 [Reproduced by permission from the Director-General of Health Services, New Delhi.]

'Neocid' or 'gammexane' powder D.025 (page 45) should be put on the scalp at a number of different places. Put the powder on at night and wash the hair next morning. See that the powder does not get into the eyes, nose or mouth as it is irritating. After nine days repeat the treatment to kill any lice which may have hatched out since.

'Lorexane' lotion (101) is easy to use but is more expensive.

Bed Bugs live in the cracks in walls or beds and come out to bite at night. 'Tik-20' 'Neocid' or 'Gammexane' D.025 will kill them. If you have a metal bed, put a lighted torch under it. Then you will see how fast bed bugs can run.

The Itch Mite of scabies (*kugli*) is another creature which causes a great deal of irritation and scratching. She lays her eggs in a burrow under the soft skin between the fingers or

round the wrists. The tiny mites hatch out and go back down the burrow. (Figure 28.) When they reach the skin again they wander off to seek a new host. In this way people sleeping in

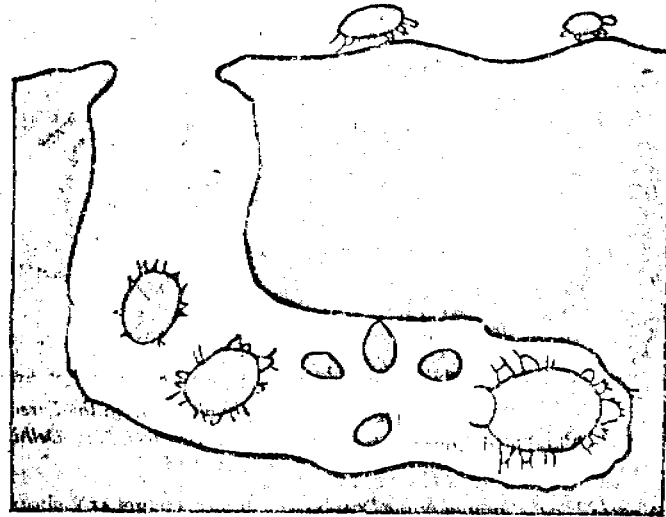


FIGURE 28: The itch mite burrows under the skin to lay her eggs and (much enlarged)

the same bed often get itch from each other. It is important to treat all the people in the house who have itch on the same day.

'Benzol Benzoate' or 'Tetmosol' are good lotions but are rather expensive. Many people use and like Tetmosol soap (ICI). Each piece costs about 90 P.

You can make some anti-itch mite lotion yourself. Buy 15 grams ($\frac{1}{2}$ oz.) of sulphur powder. Dissolve this in half a cupful of sweet oil. This is enough to treat a mother and a child. Rub the oil in carefully all over the body except the face. Do this every day for three days.

It is a good thing to know how to get rid of these pests, but it is better never to have them. They can all be banished by cleanliness in the home, daily baths, washing and combing the hair, and careful washing of clothes. If they are in your home, why not try to get rid of them for good?

Mosquitoes not only keep us awake but can carry the parasites which give us malaria and elephantiasis (*filariasis*).

At dusk they come out of the places in which they have been lurking during the day, and start to bite. Get rid of all piles of clothes and other dark corners in which they rest. Destroy their breeding places by seeing that there is no stagnant water

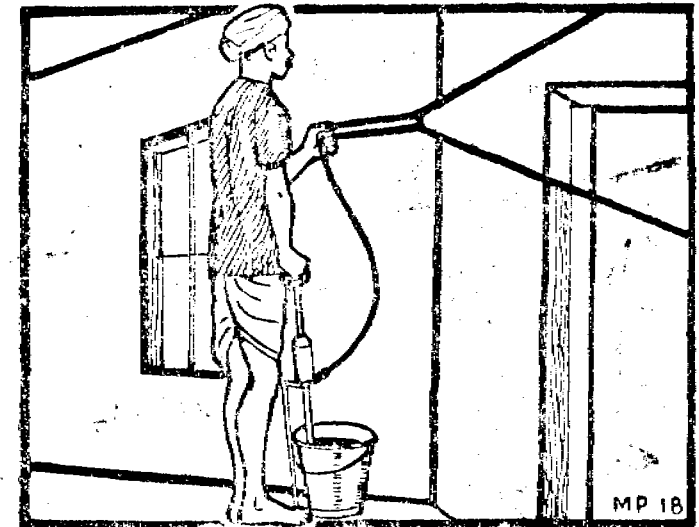


FIGURE 29. Spraying the walls

or pots containing water near the house. See that the walls of your house are sprayed regularly. (Figure 29.) This will kill the mosquitoes as they alight on them. If the spraying is not being done see your Public Health or Block Development Officer.

Sleep under a mosquito net. A net is expensive, but it makes a much appreciated wedding present. If you sleep on a bed fasten

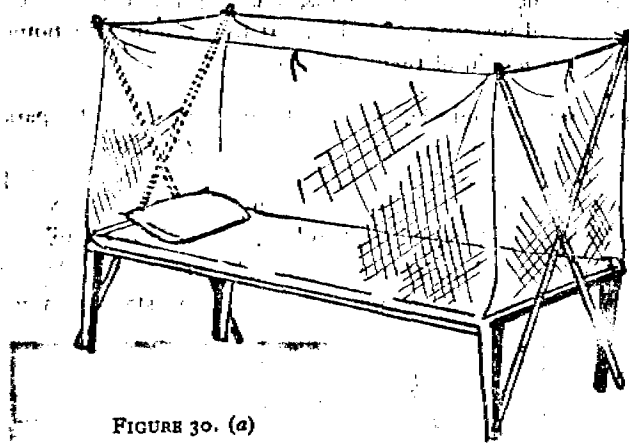


FIGURE 30. (a)

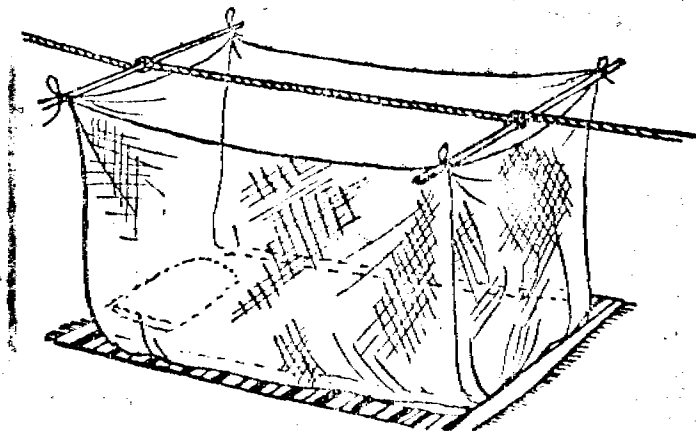


FIGURE 30. (b) Why let mosquitoes bite you?

sticks to the top and bottom of the bed. (Figure 30a) If you sleep on the floor or out of doors you can fix the nets on to any tightly stretched rope. (Figure 30b)

TEETH

Many people do not take enough care of their teeth. They seem to forget that when once a second tooth is lost it cannot grow again.

It is a help to understand how to look after our teeth, and to know something of the way the teeth are made.

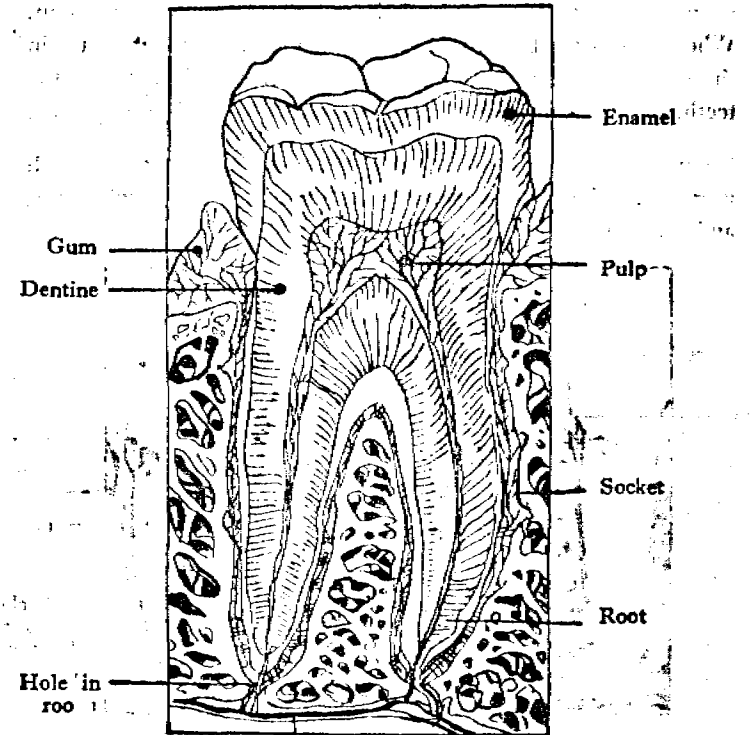


FIGURE 31. A tooth cut in half. Nerves and blood vessels

The tooth is attached to the jaw bone by one, two or three roots. (Figure 31.) These are cemented into the tooth sockets.

The jaw is covered by a soft fleshy mass called the gum which embraces the necks of the teeth. The part of the teeth which we see is the hard outer covering—the enamel. Under this is the dentine, made of a softer material which encloses the pulp. In the pulp are the nerves and blood vessels which keep the tooth alive. These get into the tooth by a small hole at the bottom of each root. For the tooth to remain healthy the enamel must be intact. If there is a hole in it germs get in. When they reach the pulp they kill the tooth. Holes are made in the enamel by tiny particles of food which remain between the teeth. These decay and in decaying make a hole in the enamel.

Cleaning the teeth. Most people do not clean their teeth properly. They do not rinse out the mouth with enough water, and they brush across the teeth. This does not remove the

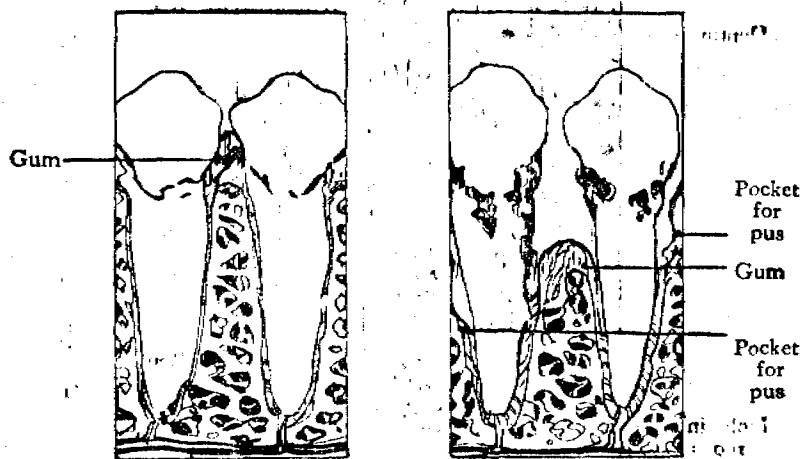


FIGURE 32.

(a) Healthy teeth

(b) Teeth with pyorrhoea

tiny pieces of food, which have stuck between the teeth and which make the teeth decay. Brush the teeth up and down from the gum to the end of the tooth. Brush the backs of the

teeth as well as the fronts. Use a soft brush or a well chewed tooth stick. A hard brush injures the gums. To clean the teeth, you can use salt, finely powdered charcoal or soap. You can buy expensive tooth powders or pastes in the bazaar. These have no particular value except a nice taste.

Pyorrhœa.—When the gums are injured germs get in. Pus forms in folds between the teeth and the gums. The teeth become loose and the breath smells. (Figure 32a, b.) It is very bad for our health to have pus in the mouth. The loose teeth will also have to be taken out. Another way pus forms under the gum is by the growth of tartar between the teeth and the gum. This is a hard stony substance, laid down by the minerals in our food. We cannot remove it by brushing. A dentist, using special instruments, can do this.

How to take care of the teeth :

1. Brush them properly.
2. Visit a dentist if possible every 6 months. He can stop any decay and remove the tartar.

PEOPLE WITH SPECIAL NEEDS

People need special care at different ages.

The Baby needs

Food suitable for his age—Until he is six months old his mother's milk is the best food for him. After that, other foods must be introduced, one by one. At first they should be liquid then gradually more solid. The nurse at your Primary Health Centre or Hospital will give you advice about this.

Immunization.—The baby has very little immunity against the germs of different diseases. See that his immunity is built up against those illnesses for which there are vaccinations or immunizations (see page 11). In illnesses like diarrhœa he builds up his own immunity gradually. Diarrhœa is very

chew of betel and tobacco against the cheek may lead to cancer of the mouth. Both these are dangerous habits.

The Older Man or Woman needs to know

The early signs which may mean cancer.—These are

1. A lump anywhere on the body.
2. A sore which will not heal.
3. Bleeding.

Anyone with one of these signs should check up with a doctor to find the cause. Early treatment gives a good chance of cure.

The warning signs of eye trouble for which they should get the advice of a doctor.

1. Not being able to see clearly.
2. Having to read with a book a long way away from the eyes.
3. Headaches and seeing coloured rings round lights, and difficulty in seeing things approaching from the side.

Finally one more need for the whole family. When you are ill go to a doctor who has been properly trained and not to grandmother or an untrained person. Do not think that injections will cure every illness. They won't. They may cure some, but it must be the right injection for the illness which you have.

People do not let their lorry, car or camera be looked after by people who have never learned how they work. Why trust your life and health to anyone except the best trained and most experienced person you can find?

For further reading :

BETTER HEALTH—C. P. Thomson, 3rd edition. English, Price Re. 1.75; Hindi, Re. 1.00; Santal, Re. 1.00; ISPCK, P.B. 1585, St. James' Church, Kashmere Gate, Delhi-6.

Tamil, 75 P.; Telugu, Re. 1.00; C.L.S., P.B. 501, Madras-3. In preparation: Marathi, Bengali and Oriya.

MOTHER AND CHILD—Mary Cherian, Book I Re. 1.00; Book II Re. 1.00; In single book Rs. 2.50; C.L.S., P.B. 501, Madras-3.

2nd edition, Malayalam Rs. 2.50; National Bookstall, Kottayam, Kerala.

Hindi version, in the Press, Lucknow Publishing House, 37, Cantonment Rd., Lucknow.

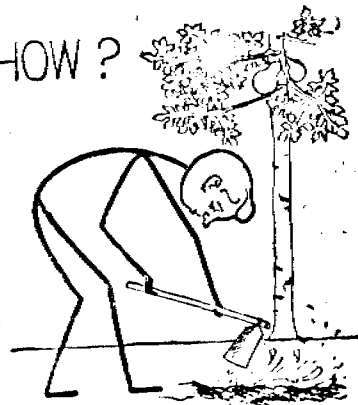
वैद्यकीय क्षेत्र में शिक्षण के लिए एक अच्छा पाठ्यपुस्तक है। यह पुस्तक डॉ. मरी चेरियन द्वारा लिखी गई है। यह पुस्तक माता और बच्चे के स्वास्थ्य के लिए एक अच्छा मार्गदर्शक है। यह पुस्तक कोलकाता के एन.ए.पी.पी. द्वारा प्रकाशित है।

यह पुस्तक माता और बच्चे के स्वास्थ्य के लिए एक अच्छा मार्गदर्शक है। यह पुस्तक कोलकाता के एन.ए.पी.पी. द्वारा प्रकाशित है।

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PART II

HOW ?



CHAPTER 8

NOTES ON WELLS AND PUMPS

In seventy per cent of the villages of India the water supply is from wells. Most of these are uncovered so that their water is unsafe for drinking. Even more dangerous is water drawn from tanks or rivers. Look at any river and watch all the activities along its banks. Then ask yourself if you really want to drink the water.

A Safe Well must have

1. A watertight cover.
2. A watertight wall or casing going down the well for at least 6 metres (20 ft.).
3. A pump to draw up the water.
4. The ground for at least 1.5 metres (5 ft.) round the well must be covered with a sloping cement surface. This allows waste water to run away. (See Figure 33).

When a well is not protected in this way dangerous germs get into the water by:

1. Dirty buckets being let down into the well.
2. Dirty water running back into the well, or soaking through the upper layers of soil.

If possible dig a well on well drained soil. It should be above and at least from 8-16 metres (25-50 ft.) away from any latrine pit.

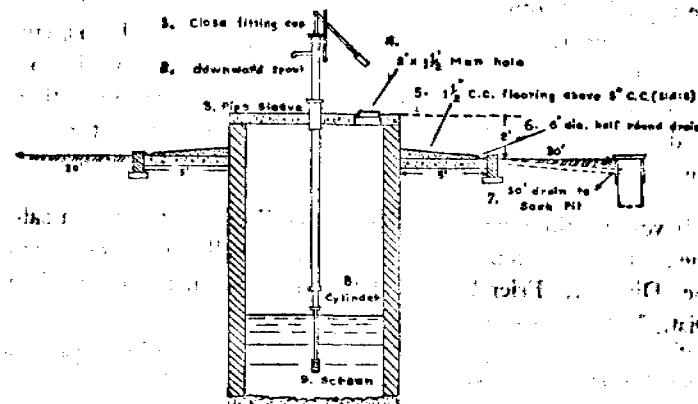


FIGURE 33. A Safe Well

Types of Wells

TUBE WELLS are being made in different parts of the country. They are needed where water is far below the surface of the ground, or where the soil is so rocky or stony that digging is impossible. A narrow pipe is driven through the ground to water level. This may have to go down several hundred feet. Then the water is drawn up with a motor pump. These wells are expensive to make and maintain but otherwise satisfactory.

DUG WELLS are the kind of well most commonly found in villages. They are holes, varying in diameter, dug to water level. Usually they are not covered, and the water is drawn up in buckets. The problem here is how to turn such an unsafe well into a safe one.

THE BARPALI TYPE WELL is a safe one. The work is done in the driest part of the year. After the well has been dug in the usual way, a tank is made beneath the water level. This tank is made of three or four concrete rings fitting one on the top of each other. The tank is closed with a water tight concrete cover. From the cover to the ground level a 15 cm. (6 inch) concrete pipe is fitted. The hole over the tank is now filled up with earth to ground level. The hand pump is then fixed. The pump pipe passes down into the water through the concrete pipe.

If you are thinking of putting in a well why not put in a safe one? Full instructions for making this well can be got from the Director, Friends' Rural Service, Rasulia, Hosangabad Dist., M.P.

PUMPS

A hand pump which is used by many people often has very rough usage. From time to time it may get out of order. Then, unless someone knows how to mend it, there is confusion. It is not difficult to fit and maintain a pump. It can be done by a villager using very simple tools.

Parts of the Pump

Look at the picture which shows the parts of the pump. (Figure 34.)

(a) *The handle* is the lever which works the pump. It is one of the most important parts. The cast iron parts supplied by dealers usually wear out quickly. A sub-

stitute made from wood can be made and kept in order by the local carpenter. (Details for making this can

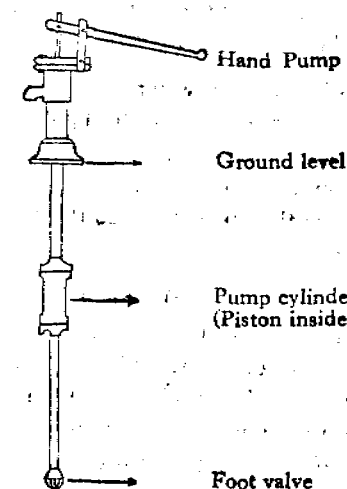


FIGURE 34. The Hand Pump

be obtained from Dr. Edwin Abbott, at Rasulia, at the address already given). (Figure 35) This substitute will last far longer than the cast iron parts originally supplied.

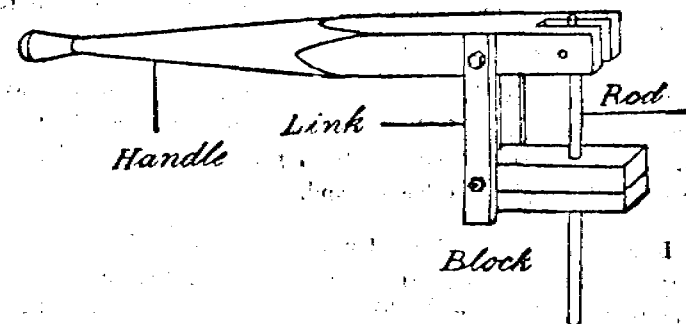


FIGURE 35. Handle for Hand Pump

- (b) *The pump pipe* should be long enough to reach down to the level of the water. If the well is more than 7 metres (25 ft.) deep a cylinder is needed. This should be fixed on the pipe not more than 20 ft. from the water.
- (c) *The Plunger.*—Where the water level is not lower than 7 metres (25 ft.) a plunger (piston) put inside the barrel of the pump is satisfactory. Where the water is lower it is fitted into the cylinder. The cylinder must be fixed not more than 6 metres (20 ft.) from the surface of the water.
- (d) *The leather washer* (bucket). In a simple pump this will be in the barrel of the pump. In a deep well it will be in the cylinder. This washer costs about 75 P. and will need replacing from time to time. To change the washer in a simple pump unscrew the bolt at the head of the pump and lift out the plunger. Replace the old washer by the new one. In a deep well pull out the pump as far as the cylinder. Open the cylinder and replace the washer.
- (e) *The foot valve.*—The purpose of this valve is to prevent water from running back again into the well. These valves can be made of brass or leather. The brass ones are more satisfactory, as leather ones need more frequent attention. They cost about 50 P. each.

People ask how long will a pump last. It is not an easy question to answer as it depends on the number of people using it. On an average it will last from 1-3 years. Always have a spare washer and foot valve on hand.

Buying a pump. A good pump should cost about Rs. 30. Try to buy one locally. If you have any difficulty, pumps from the Maya Engineering Works, Russa Road, Calcutta, have been tested and found satisfactory.

Priming the pump—When a pump is first put in, it must be 'primed' by pouring clean water down the pipe from the top. This may have to be done several times till the water has softened the leather bucket.

If the pump is out of use for some time priming may be necessary before it can be used again. If a pump seems to require frequent priming it shows that the foot valve is leaking and needs to be changed.

The base of the pump.—A sloping cement platform should surround the pump and be at least 3 metres (10 ft.) in diameter. The waste water flows into a gutter from which it is carried off to water trees or plants.

CHAPTER 9

LATRINES FOR YOUR FAMILY

Before putting a latrine into your house there are several things to think about.

1. Do you want it inside or outside the house?
2. How much ground can you use?
3. How much will it cost?
4. Is there enough water to flush it properly?
5. Will it meet the needs of those who use it both now and in the future?

PARTS OF THE LATRINE above ground

- (a) *A room in the house.*—This is connected with a pit outside the house. If the room is also used as a bathing place the washing water can be made to pass through the latrine pan.
- (b) *A building of mud or brick* outside the house. A roof is needed, but simple thatch will do.

- (c) Screens of bamboo or matting in a wooden frame. (Figure 36.) The legs can be set in cement or painted with tar to discourage white ants. Vines can also be planted to make a good screen.

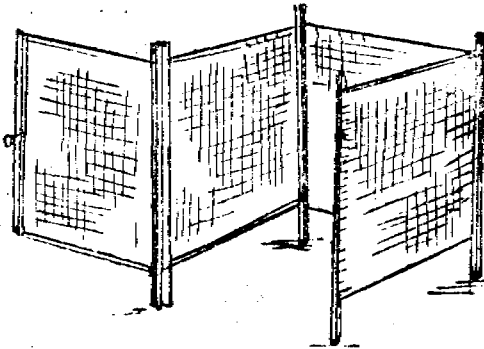


FIGURE 36. Bamboo Screen

- (d) A squatting plate.—This is a concrete slab with a hole in it. It may or may not have foot rests. It

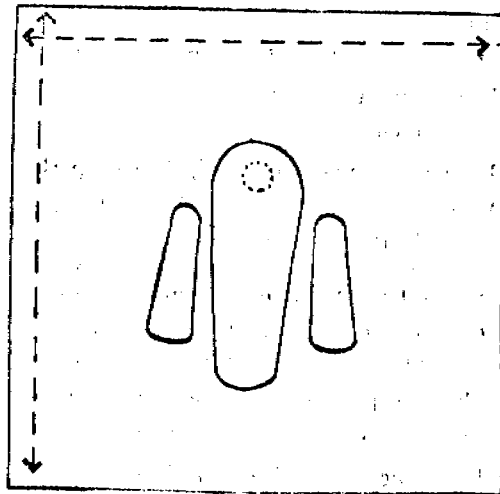


FIGURE 37. Squatting Plate

is only suitable for outdoor latrines and use over a bored hole. (Figure 37).

- (e) Squatting plate with water seal.—This can be used inside the house. The water seal cuts off the contents of the pit from the outside, and prevents fly breeding and smell. Cost Rs. 8-10 varying with the cost of cement. For details of construction apply to your Block Development Officer. (See Figures 15 & 16.)

or: The Director,
Friends Rural Centre,
Rasulia,
Hosangabad District, M.P.

Note: Be sure squatting plate is set at least one foot above ground level.

- (f) Purdah pan.—Can be bought in the bazaar for about Rs. 30. It has a water seal and can be used inside the house.

Bored hole Latrines

These are very suitable for rural districts where soil is deep. They are cheap and require no maintenance. The latrine consists of a squatting plate put over a deep hole. The hole has a diameter of 30 cms. (1 foot). It is 5 to 6 metres (16-20 ft.) deep. It cannot be dug where the soil is rocky, stony or waterlogged. The hole is dug with a special earth-borer (auger). This costs Rs. 130, and can be bought from:

Agricultural Development Society,
P.O. Naini,
Allahabad District, U.P.

A bazaar made cutter costing about Rs. 12 has been used with success by the India Village Service. (Figure 38).

HOW TO MAKE THE CUTTER

The cutter is made of sheet iron. It is bucket shaped, with an open top and bottom.

Depth	..	20 cms. (8 inches)
Diameter at bottom	..	17 cms. (6½ inches)
" " top	..	14 cms. (5½ inches)

A solid bamboo pole is joined to the bucket by strong strips of iron 25 cms. (10 inches) long, 3 cms. (1 inch) wide, and $\frac{1}{4}$ inch thick. Three rivets join them to the bucket and two nut bolts go through each pole.

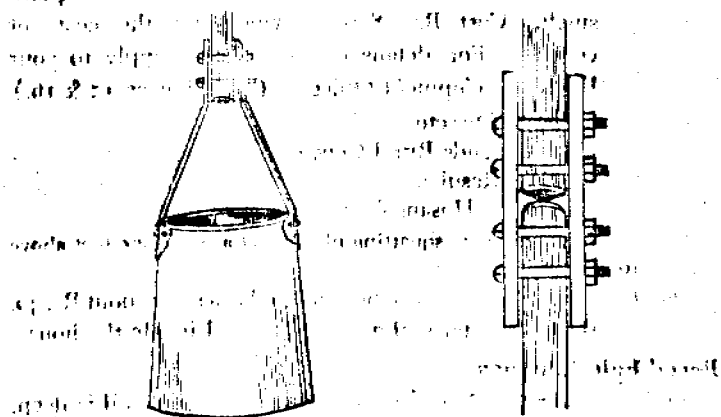


FIGURE 38. Bored hole cutter FIGURE 39. How to join on rods

A second pole is added to the first by more iron strips acting as splints. Two nut bolts go through each pole (Figure 39). When you once have your cutter any number of holes can be made for only the cost of labour.

The Bored hole in light soil

Where the soil is light the top 50 cms. (1½ feet) may have to be lined with brick. This will prevent the soil from falling in because of the weight of the squatting plate.

This pit is not shut off from the surface of the ground, so that you must watch from fly breeding. When you see this pour down boiling water or disinfectant. When the pit has filled up to within 1 metre (3 to 4 feet) from the top close it

with earth. It can be opened again in about six months and the contents used as fertiliser. Dig a second hole and move the squatting plate to it. When you are planning your screening make the enclosure large enough for two holes. Use these alternately.

A CHANNEL LATRINE WITH TIPPING TROUGH

(For Community Use)

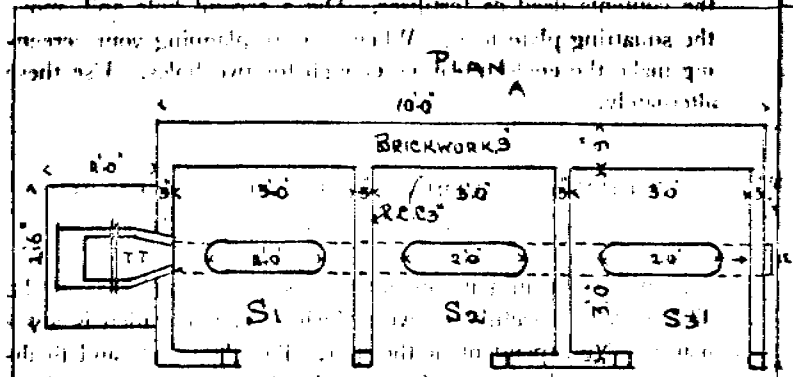
Many people find it difficult to flush out a latrine properly. This makes it useful to have a flushing system which is automatic and independent of the user. Porcelain seats and flushing tanks are ideal for use in towns, but in the country something cheaper, stronger, simpler and more fool proof is needed. This pattern is being used in many parts of the country with great success.

The diagram shows a three seat latrine. (Figure 40). You can make one with a single seat or more.

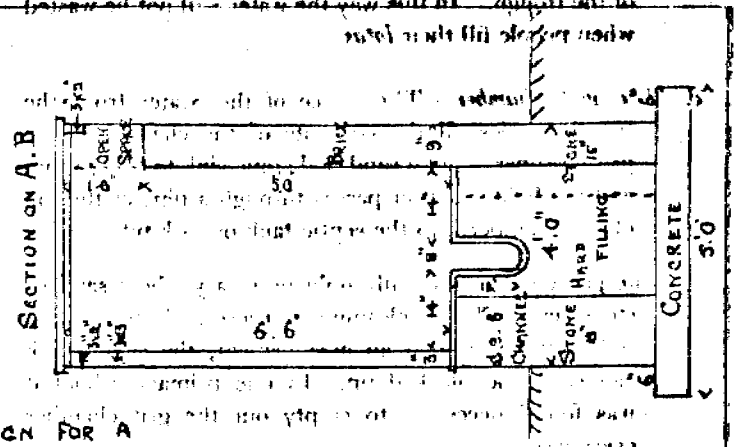
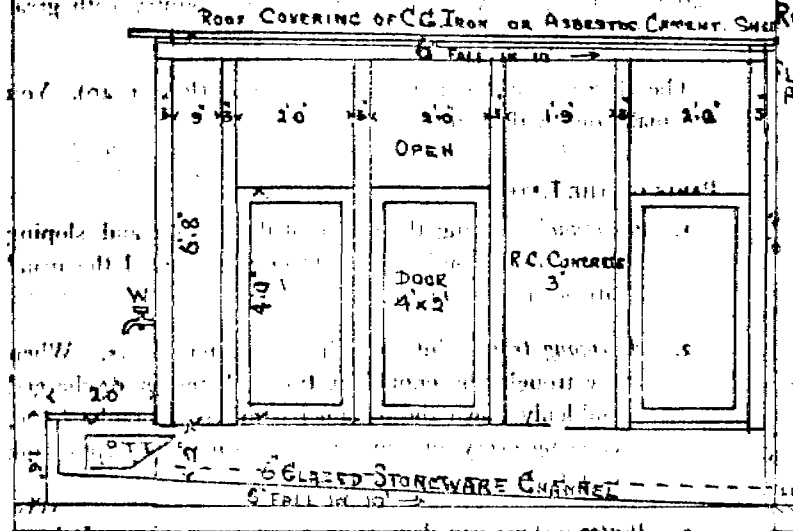
PARTS OF THE LATRINE

1. *A channel*, running the length of the latrine and sloping down to the outlet end. Over the channel the usual latrine structure is built.
2. *A tipping trough* into which the water flows. When the trough fills enough it tips. Water is discharged suddenly down the channel with considerable force, carrying everything in the channel into the septic tank or pit.
3. *Water*.—This can drip from a cistern or pipe. It is an excellent place to put a leaky tap. The flow of water should be regulated at different times of the day, faster when the latrines are in use, and slower at other times.

TIPPING TROUGH LATRINE



ELEVATION



DESIGN FOR A RURAL LATRINE

FLUSHED BY AN AUTOMATIC TIPPING TROUGH.

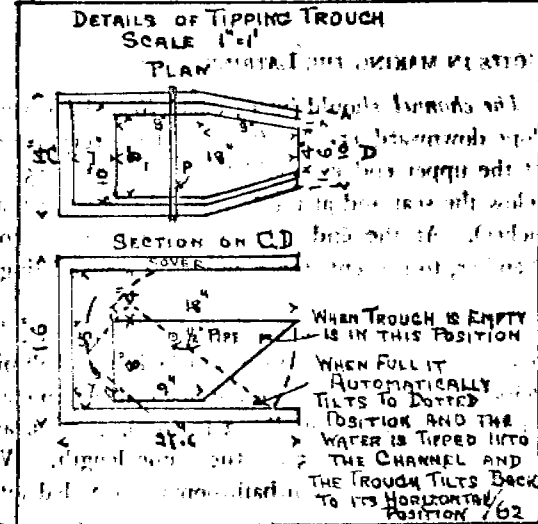


Fig. 40.

(smaller) ...

If a water pipe is available, fix the tap over the broad end of the trough. In this way the water will not be wasted when people fill their *lotas*

4. *The grit chamber.*—The force of the water from the trough carries all the contents of the channel into a grit chamber. Here sand and stone sink to the bottom and the lighter matter passes through a pipe at the top of the chamber into the septic tank or soak pit.

The grit chamber is really only necessary where sand or stone is used for cleaning purposes. Where it is, unless there is such an arrangement, the septic tank can easily be blocked up. In one primary school it was found necessary to empty out the grit chamber every week.

NOTES IN MAKING THE LATRINE

The channel should be 15 cms. (6 inches) wide and should slope downward 15 cms. (6 inches) in every 3 metres (10 feet). At the upper end it should be not less than 15 cms. (6 inches) below the seat and at the lower end not more than 45 cms. (18 inches). At the end of the channel there should be a grit chamber, to prevent stones and sand from getting into the tank.

If the channel is made of cement it will cost about Re. 1 per 30 cms. (1 foot). You can also make it from half pipes of 15 cms. (6 inch) diameter. If these are made of brown glazed stoneware, the cost will be about Rs. 2 (1 foot), 30 cms. and if of white porcelain about Rs. 5 for the same length. Where water is scarce waste water from bathrooms can be led into the trough.

The tipping trough should hold about 9 litres (2 gallons) of water before it tips. This will be enough to flush out up to four latrines. The trough can be made locally by a good

fitter from 24" gauge galvanized iron sheet, and a half inch round iron axle. Figure 41 gives a plan of the construction of the tipping trough from which you can make a paper

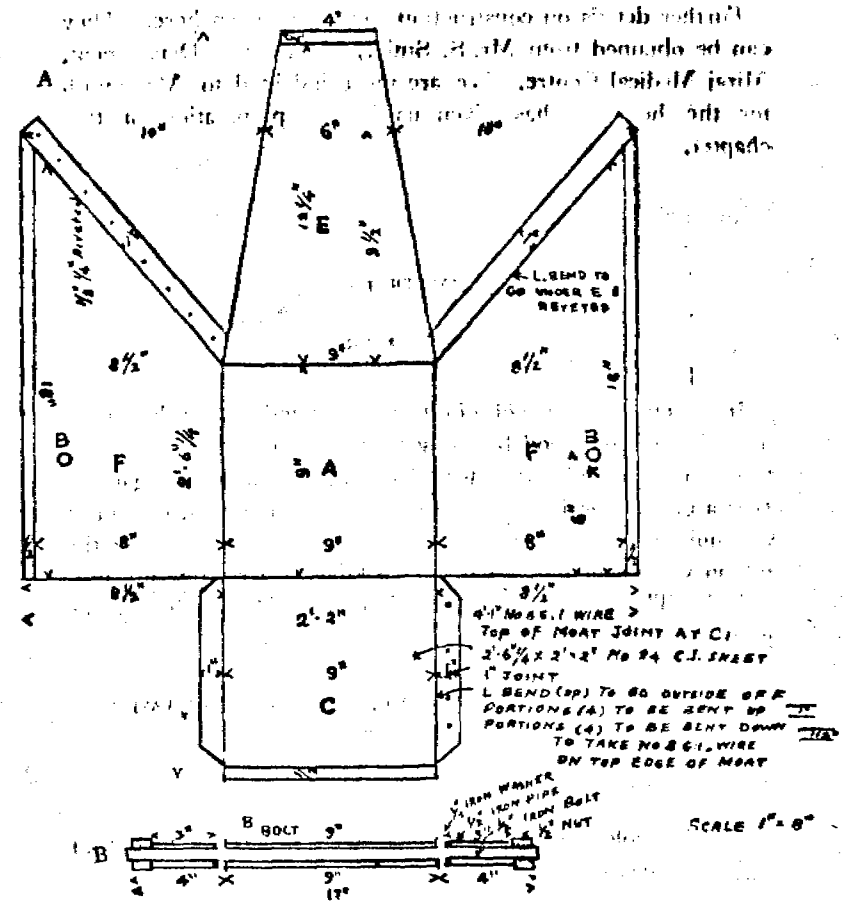


FIGURE 41. This enlarged drawing of the details of the tipping trough help you make a pattern for its construction. A. Tipping Trough. B. Iron rod.

pattern. It is important that the measurements given should be followed exactly, otherwise the discharge of water will not be as good as it might be.

Further details on construction cannot be given here. They can be obtained from Mr. S. Smith, Maintenance Department, Miraj Medical Centre. We are most indebted to Mr. Smith for the help he has given us in the preparation of this chapter.

CHAPTER 10

SOAK PITS.

It looks ugly to see pools of waste water standing near the house. These also make good breeding places for mosquitoes. Sometimes you can lead this water off to water trees or your garden. It is a good thing if you can do this. If you cannot, get rid of this nuisance by making a soak pit. If there are trees near the pit no water will be wasted. Two kinds of soak pits are described. The one you choose will depend on how easily the ground can absorb water.

A. SOAK PIT FOR GROUND WHICH CAN ABSORB WATER EASILY

You need

1. A convenient place.
2. A hole 1.2 metres (4 feet square), and 1.2 metres (4 feet deep).
3. A piece of wood at least 1.2 metres (four feet) long with a diameter from 23-30 cms. (nine to twelve inches).

4. Large stones about the size of your fist or larger.
5. Smaller stones.
6. A flat piece of metal or stone slab larger than the diameter of the wood or pipe.
7. A piece of tarred gunny 1.2 metres (4 feet) square.
8. A pipe 5 cms. (2 inches) or more in diameter, long enough to reach from where the water is thrown into the middle of the pit.
9. A piece of wire gauze large enough to cover the mouth of the pipe.

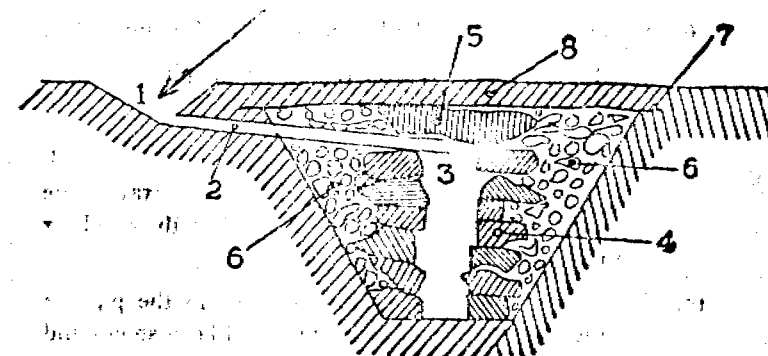


FIGURE 42. Soak pit for ground where water is easily absorbed
(Cross section)

1. Hole where water enters.
2. Pipe leading to central hole.
3. Central hole.
4. Large stones.
5. Stone covering hole.
6. Small stones.
7. Tarred gunny.
8. Earth.

How to make the soak pit :

1. Stand the large piece of wood or pipe upright in the middle of the hole.
2. Pack large stones round it carefully.
3. Fill up the rest of the hole to about 15 cms. (6 inches) from surface with small stones.
4. Take out the wood or pipe. This is no longer needed. You have now an open space (well) in the middle of the stones.
5. Put in your pipe or gutter with a slightly downward slope. It should be long enough to carry the water into the middle of the hole. You can make a gutter from stones, cement or tin.
6. Cover the well with the flat piece of metal or stone slab.
7. Lay the tarred gunny over the top of the pit.
8. Pack small stones round the pipe.
9. Fill the hole with earth to well above ground level. The pipe should be covered in the same way. The gutter can be left open or covered with wood or tin.
10. Put the wire gauze over the entrance to the pipe or gutter on the house side. This will keep stones and rubbish from blocking up the pipe.

Care of the soak pit

After a time the pit may stop absorbing water. When this happens it should be emptied out and re-made.

If there is much grease or soap in the water, do one of two things. Either make the central hole larger, or before the water enters the soak pit run it through a grease trap.

THE GREASE TRAP. A properly made grease trap will stop the soak pit from being blocked with grease and dirt. The size of the trap you need depends on the amount of water passing through and how dirty it is. The trap can be made of metal or of cement which will last longer. For a small family a kerosene tin would probably be big enough. In any case it would be good to make an experiment with one. When you have made it, put it in a line of the drain leading from the house to the soak pit.

To make the grease trap. Cut off one of the long sides of the tin. This open end will be the top. Make the inlet pipe enter at the top of one of the narrow sides. The outlet pipe will be on the opposite side one inch lower. This is important.

You need a partition (baffle) to put into the tin. You can cut this from the piece of tin you have removed. Fix this firmly about 15 cms. (6") from the outlet end. The top of the baffle should be at the same level as the top of the trap. At the bottom there is a gap of 4 cms. (1½") between the bottom of the baffle and the floor of the trap. The open top of the trap must be covered with a lid which can be easily removed. The trap needs cleaning out at least once a week. The grease and dirt can be scooped out with a shallow tin nailed on to a stick.

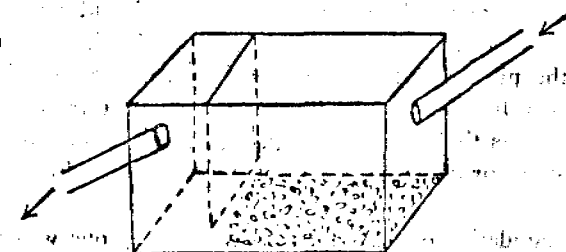


FIGURE 43. Grease trap

The principle on which a grease trap works is that the flow of water is slowed down. This makes the grease and soap rise to the top, the dirt fall to the bottom, and the comparatively clean water flow on under the baffle and out of the outlet hole into the soak pit. (Figure 43).

B. SOAK PIT FOR GROUND WHICH DOES NOT ABSORB WATER EASILY

A different kind of pit is needed where there is rock near the surface of the ground, or the soil is too hard to dig through with a pickaxe. This will probably mean that you cannot dig the pit as deep as you would like. It will therefore have to be a long one. The open top will need covering. The size of the covering will determine the width of the pit. Stone slabs, where they are available, make an excellent top or you can use metal or wood. In any case the cover must overlap the pit on all sides by at least 5 cms. (2 inches). The ideal is to have a pit which will hold at least three days input of water or even more in places where the rains are very heavy. (Figure 44).

Making the soak pit

Dig the pit and line it with bricks, (old chipped ones can be used). These are laid alternately longways and crossways forming an openwork pattern. The wall should be built to at least 15 cms. (6 inches) above ground level. The bricks inside the pit are laid one on the other without any binding. The upper few layers may be set in lime or cement mortar. This prevents the cover from slipping or falling into the pit in wet weather, or being pushed in by animals or children.

The foundation of the house can be used as one wall of the pit. When this is done it must be deeply pointed with cement for some distance on each side. Any space left between the

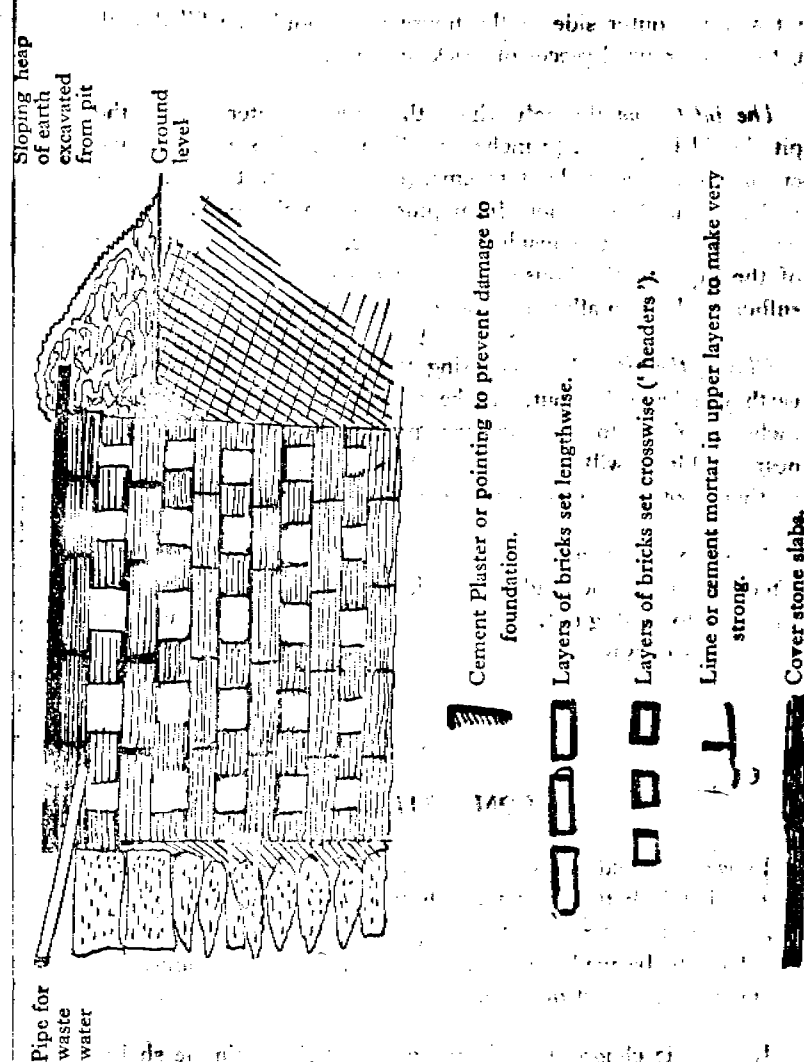


FIGURE 44. Soak Pit for ground where water is not easily absorbed

pit and the outer side of the house wall should be filled with fist or larger sized pieces of brick or stone.

The inlet pipe through which the waste water enters the pit should be 5 cms. (2 inches) in diameter. It should be long enough to project at least 15 cms. (6 inches) into the pit. This will prevent thirsty roots from plugging up the pipe. If this happens, scrape the inside of the pipe. Protect the opening of the pipe on the house side by a cast-iron screen set at a sufficient slope to allow the water to flow freely.

Closing the pit. After covering the pit, bank it up with the earth you have dug out. Make a slope of at least 15 cms. (6 inches). You can plant banana, papaya or other fruit trees near it. These will absorb water from the lower part as soon as their roots have grown deep enough.

A soak pit built in this way will not give any trouble, though after some years the mud and sand, washed in from muddy feet, will have to be dug out. There is no smell and the pit does not attract flies or wasps.

CHAPTER 11 COMPOSTING

In well drained soil compost is best made in a pit. In low wet soil it is better to make a heap above the ground. This prevents water-logging and poor quality compost. A heap may also have to be made in hard rocky soil. Put a low mud wall (*bund*) round the pit or heap.

If possible choose a shady place, and make a simple shelter (thatch is good) over it to protect it from sun and rain. (Figure 45).

The Compost pit

Depth 1.2 metres (4 ft.)

Width 1.9 metres (6 ft.)

Length 1.9 metres (6 ft.)

What to put into the pit

- A. Dry grass, leaves, weeds, household waste in 15 cm. (6") layers.
- B. Farm yard waste, sheep, goat and poultry manure.
- C. Soil and wood ash in layers of about 3 cms. (1").

What not to put in

Tins, pots or glass.

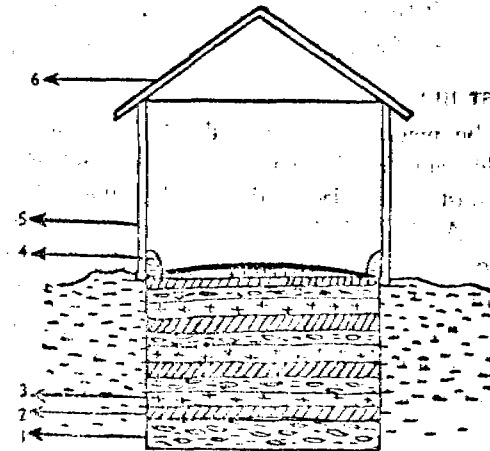


FIGURE 45. Compost Pit

1. Leaves, grass weeds, waste ; 2. Cattle manure ;
3. Soil and wood ash ; 4. Earth bund ; 5. Wall of shelter ; 6. Roof.

Making the compost

1. At the bottom of the pit put a 15 cm. (6") layer of grass, leaves, straw and household waste, then cowdung and farm yard waste and on the top of this put a thin layer of soil and ashes.
2. Repeat these layers till the pit is full.
3. Stir the contents from time to time.
4. In dry weather sprinkle with water. This makes the waste decompose more quickly and gives better quality compost.
5. Fill the pit to above ground level. This allows for shrinkage. Or else you can let the contents settle for a few days and then add more before closing.
6. Close the pit with a plaster made from mud and cowdung.
7. In hot weather, a layer of straw on the top of the pit will prevent it from drying too quickly.
8. Leave the pit for 2-3 months or more before opening.

THE COMPOST HEAP

This can be made against a wall. Leave room for three heaps. Build your first heap up against one end of the wall. Pile up the waste in the layers described in the making of the compost pit. At the end of the first month move the heap into the second position. Put the top layer of the first pit at the bottom and the bottom layer at the top. At the end of the second month move the pit into the third position. Reverse its contents as before. Start a new heap each month in the empty space.

The compost should be ready for use as fertilizer after three months.

For further reading :

COMPOST IS EASY TO PREPARE—a pamphlet costing 10 P. Available from the Farm Information Unit, Directorate of Extension, Ministry of Food and Agriculture, New Delhi.

CHAPTER 12

THE SAWDUST STOVE

In some places sawdust is plentiful and cheap. Where this is so it makes good fuel. One drawback to sawdust is that it burns with a thick black smoke. For this reason it is better, if you have this kind of stove, to cook outside the house.

The Stove

Sawdust stoves, costing from Rs. 1.50 to Rs. 2.00 can be bought in many of the bazaars in Central India. They are made of sheet iron.

The sawdust stove stands on three or four legs. It is circular in shape, covered at the bottom and open at the top. A convenient size to make the stove is 15 cms. (6") in length and with a diameter of about the same size. About $1\frac{1}{2}$ cms. ($\frac{1}{2}$ ") from the bottom of the stove, there is a hole 5 cms. (2") in diameter. (Figure 46). From this hole a short tube runs horizontally into the centre of the stove (Figure 47).

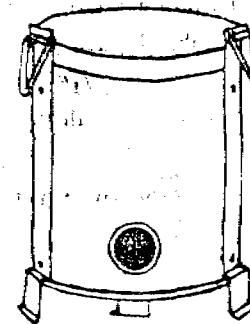


FIGURE 46.
The stove from the outside

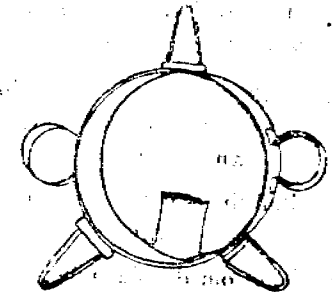


FIGURE 47.
Inside of the stove seen from
the top. The bottom of
the stove is not shown

CHAPTER 13

A VILLAGE FOOD COOLER

The *Anklesvar Food Cooler* can be made by the local potter. It consists of five pieces.

1. *A bowl for water.* This is a flat bowl with sides 8 cms (3") high. It is 4 inches larger than the cooler which stands in the middle of it.
2. *The Cooler* is a circular piece of pipe (tile) 15 inches high, with a diameter of from 10-12 inches. The bottom of

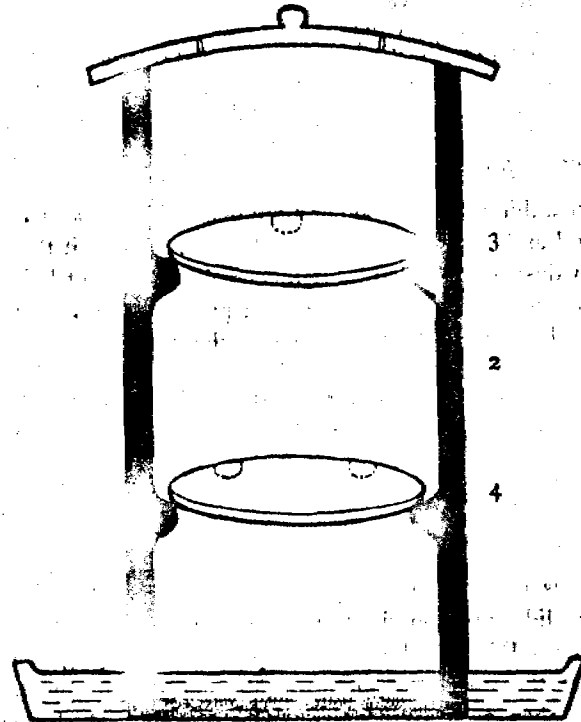


FIGURE 50. A Village Food Cooler

the pipe is closed and the top left open. (This is not clearly shown in figure.)

On the inside of the cooler there are a number of knobs to support the plates. They are put at two levels, with three knobs at each level. The position of the knobs alternates at each level. Sand can be put at the bottom of the cooler. This makes it easy to store eggs.

3 & 4. Are two plates made that they can be slipped into the coolers and rest on the projecting knobs. On these meat, milk, fruit etc. can be kept cool.

5. The pottery lid has a number of good sized holes in it for ventilation. To make the cooler more efficient, a damp cloth should be spread over the whole cooler.

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