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A8

CITY OF CLEVELAND
DEPARTMENT OF PUBLIC HEALTH AND WELFARE
DIVISION OF HEALTH

11 CITY HALL CLEVELAND 14, OHIO

SECOND CLEVELAND RAT CONTROL SYMPOSIUM

HOTEL HOLLENDEN

JUNE 3, 4, 5, 1947

conducted by,

THE CLEVELAND DIVISION OF HEALTH
FOOD AND DRUG ADMINISTRATION

THE CUYAHOGA COUNTY RAT CONTROL ORGANIZATION

DIVISION OF PREDATOR AND RODENT CONTROL
U. S. DEPARTMENT OF THE INTERIOR

The second Cleveland Rat Control Symposium starts next week, on Tuesday June 3, 1947.

Cleveland has a very comprehensive Rat Control program in operation. Profiting by our experience may save you many dollars in setting up any type of anti-rat program in your community. Experts in many fields will be here both to speak and to answer questions, as will be noted on the enclosed program.

If you plan to attend the Symposium please request your hotel reservation on the enclosed blank and return to us by air-mail, as hotel accomodations are extremely difficult to find here and we have been promised only a limited number of rooms.

A registration fee of twelve dollars anf fifty cents ($12.50) is being charged to cover the cost of the materials used, printed material furnished and the dinner on Thursday evening June 5th.

You and members of your organization are cordially invited to attend the Symposium.

E. B. Buchanan

E. B. BUCHANAN, M. A.
CHIEF OF FOOD AND DRUG ADMIN.
CLEVELAND DIVISION OF HEALTH

A8

PROGRAM

SECOND RAT CONTROL SYMPOSIUM

JUNE 3, 4, 5, 1947

HOLLENDEN HOTEL, PARLOR B

TUESDAY MORNING JUNE 3, 1947

8:00 A. M.
Registration

9:00 A. M.
Opening Remarks — Judge Lee E. Skeel

9:30 A. M.
Cuyahoga County Program, Introduction, Development, and Progress — George C. Petry

10:00 A. M.
History and Biology of the Rat, (#1-3-4)* — Milton Caroline

11:00 A. M.
Rats and their relation to Health (Diseases, Parasites, etc.) (#1-5) — Dr. Robert N. Hoyt

LUNCH HOUR

1:30 P. M.
Detection of Rat Infestation (#1-6-7) — George C. Petry

2:00 P. M.
Methods of Detection of Food Contamination (#1-8-9-10) — E. J. Kunde

3:00 P. M.
Studies in the Movements and Population Increase of Brown Rats. — Prof. David E. Davis

4:00 P. M.
Rat Control Ordinances — E. B. Buchanan
Neighborhood Programs — Grace L. Fullerton

DINNER HOUR

7:30 P. M.
Presentation of Evidence — Judge David C. Meck

WEDNESDAY MORNING JUNE 4, 1947

9:00 A. M.
Ratproofing of Homes, Business and Industrial Establishments "The Outer Line of Defence" (#2-#3-1-2C-7) — George C. Petry

A8

WEDNESDAY MORNING JUNE 4, 1947

11:00 A. M.
Cost of Ratproofing — Alvin H. Simon

LUNCH HOUR

1:30 P. M.
The Effect of Rat Control on Sanitation of Premises (#3-C8-D-E) — E. B. Buchanan

2:00 P. M.
Reductional Methods (#4-1-2-3-4-5) — Ernest Mills, Galen Oderkirk

3:30 P. M.
The Comparison of the Efficiency of Antu and other Poisons in Field Tests — Prof. David E. Davis

4:00 P. M.
Odors, Lures, and Repellants — Walter W. Dykstra

4:30 P. M.
Pest Control Operators' Participation in Municipal Rat Control — Albert M. Akers

DINNER HOUR

7:00 P. M.
U. S. Public Health Service Cooperation in Municipal Rat Control — James H. Crawford

8:00 P. M.
Dump Control — E. B. Buchanan

THURSDAY MORNING JUNE 5, 1947

9:00 A. M.
To Be Announced

10:00 A. M.
U. S. Fish and Wildlife Service Cooperation in Municipal Rat Control — Clifford C. Presnall

LUNCH HOUR

1:30 P. M.
Inspection Trips

A4

DINNER HOUR

RESERVATIONS MUST BE MADE IN ADVANCE

PANEL DISCUSSION,
ORGANIZATION OF CITY RAT CONTROL PROGRAMS

INSPECTION OF A RATPROOFED RESTAURANT

* (1-3-6) Refers to The School of Rat Control Manual that will be furnished.

A 8

THE CUYAHOGA COUNTY RAT CONTROL ORGANIZATION

11 CITY HALL   CLEVELAND 14, OHIO

SECOND CLEVELAND RAT CONTROL SYMPOSIUM

HOTEL HOLLENDEN

JUNE 3, 4 and 5, 1947

conducted by

THE CUYAHOGA COUNTY RAT CONTROL ORGANIZATION

THE CLEVELAND DIVISION OF HEALTH
FOOD AND DRUG ADMINISTRATION

DIVISION OF PREDATOR AND RODENT CONTROL
U. S. DEPARTMENT OF THE INTERIOR

The program consists of sound moving pictures and lectures covering all phases of rat control. Experts will give the latest information on methods of rat control, ratproofing, and the use of new poisons, such as Antu, and the dangerous poison 1080. Rat control on dumps and in public buildings will be discussed.

There will be exhibits of curtain walls, rat guards and many other ratproofing features. Inspection trips will be made to rat infested areas and ratproofed buildings. Gassing demonstrations will be held using methyl bromide and calcium cyanide.

On Wednesday evening June 5, dinner will be held at a completely ratproofed restaurant, followed by an inspection of the restaurant and a panel discussion on city rat control programs. Representatives from various cities will be on hand to answer questions on organization of city programs.

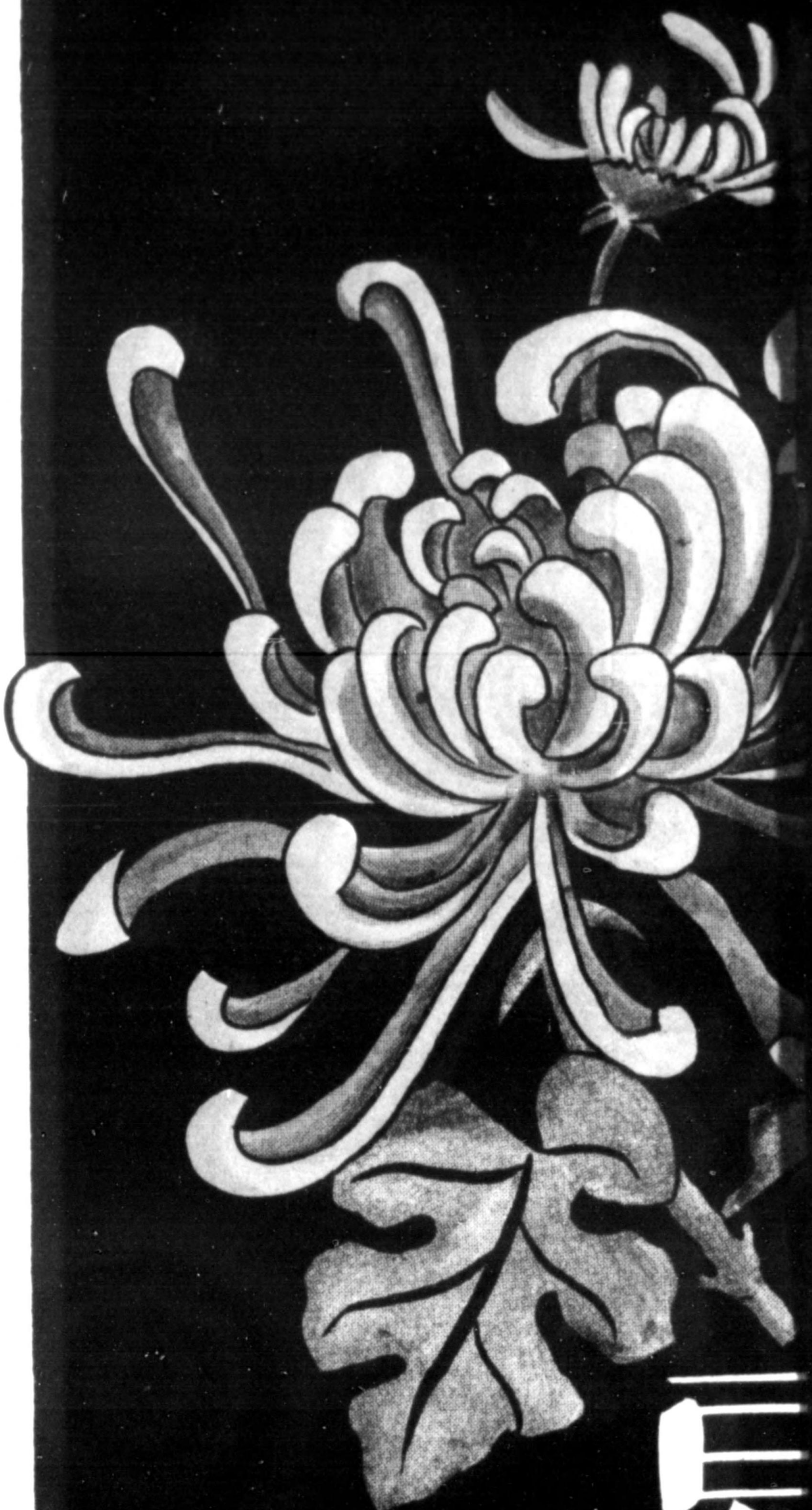
You and members of your organization are cordially invited to attend the Symposium.

A registration card and a copy of the tentative program are attached for your convenience. The card should be promptly returned to E. B. Buchanan, Secretary at the above address, so that we may know how many persons to plan for. A nominal registration fee of $12.50 will be charged to cover the cost of the symposium, a manual on rat control and the Wednesday dinner.

Upon request, hotel reservations will be secured, either at the Hollenden Hotel or as close to it as possible.

E. B. BUCHANAN, M. A.
SECRETARY

EBB:LDR



第5回

特別講演

『精神病をめぐる

松沢病院長 医博

他に演題四

来聴歓迎

◇とき◇11月13日

◇ところ◇日本医師

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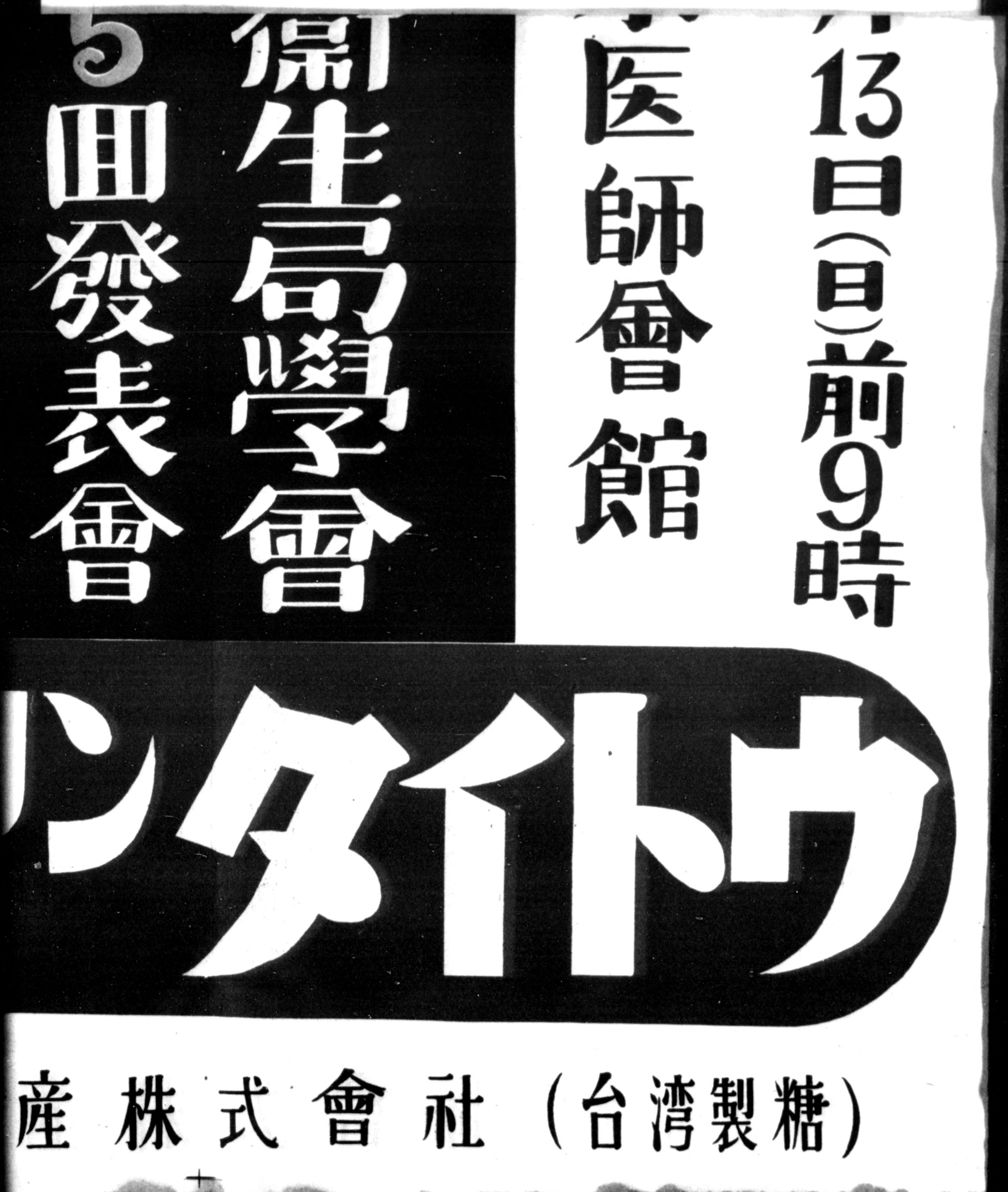

The 5th Study Meeting
of
Academic Society, Health Bureau
Tokyo Metropolitan Government

Date: 13 Nov. 1949

Place: Nippon Doctors' Hall

Subject: Various problems surrounding
lunatic diseases and 40 others

Lecterer: A. Hayashi, M.D.,
Director of Matsuzawa Hospital

More than twenty-five per cent of all the food produced in the United States is eaten in restaurants. Sixty-five million Americans eat at least one meal a day in public places. They have a right to expect freedom from disease.

The United States Public Health Service solemnly warns, "The amount of disease spread in restaurants is increasing...ranging in seriousness from sickness of a few hours to sickness ending in death."

Latest figures show 23,765 reported cases of food-borne disease throughout the nation in twelve months —389 separate outbreaks and epidemics affecting from a few to several thousand people. Your town may be next on the menu.

floating with staphylococci. In the State of Washington a baker was found kneading dough with infection under two of his fingernails.

In a restaurant in my own city I found the kitchen help, as an economy measure, drying dishes with soiled napkins which waiters brought in from the tables—napkins used to wipe mouths and, on occasion, I suppose, to catch the veritable flying circus of disease contained in a sneeze.

As one government health specialist remarked, "Pick any town at random. You'll find a few clean restaurants. But the great majority will be either 'half clean' or 'definitely dirty.'"

What the naked eye misses, the microscope often

Disease à la Cart

Are you one of the 65 million Americans who eat or drink in public eating places? If so, this vitally concerns you. Woman's Home Compan presents it as a public service. It is condensed here from the article of the same title, by Howard Whi in the December Companion, now on sale.

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ing dishes. Dr. James G. Cumming, of the District of Columbia Health Department, studied forty-six typical restaurants and reported that one third of the germs remained on eating utensils after washing.

To kill bacteria, dishes must be immersed in water at 180° F. for at least two minutes. That's much hotter than a dishwasher can put his hands into. He must use a rack to submerge them or use a dishwashing machine. **If you see a dishwasher working by hand, you know—unless he has a chemical disinfectant—that he is merely giving the microbes an invigorating bath, perking them up for a trip down your throat.**

If you see flies buzzing around a restaurant per-

rant workers. First-rate courses Fargo, North Dakota; Temple, Te and Flint, Michigan.

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Every community needs a staff It takes an expert to know wher filth. Don't let your city fathers b spectors. A staff capable of comb in town from three to ten times economical compared to the cost

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Every community needs a staff of trained inspectors. It takes an expert to know where to look for hidden filth. Don't let your city fathers balk at the cost of inspectors. A staff capable of combing every restaurant in town from three to ten times a year is fantastically economical compared to the cost of epidemics.

In some large cities you can telephone the health department and get the latest bacteria count for any restaurant in town. Wheeling, West Virginia, has published bacteria counts in the local newspapers. Why

The United States Public Health Service solemnly warns, "The amount of disease spread in restaurants is increasing...ranging in seriousness from sickness of a few hours to sickness ending in death."

Latest figures show 23,765 reported cases of food-borne disease throughout the nation in twelve months —389 separate outbreaks and epidemics affecting from a few to several thousand people. Your town may be next on the menu.

Health officials estimate that only five per cent of the diseases caused by food filth actually are reported. Food assault and murder are among the most difficult crimes to trace.

New York City in recent months launched a spectacular cleanup. Even in some of its swankiest eating places, reports Health Commissioner Israel Weinstein, "We found food exposed to rats and mice, garbage was uncovered, its filth carried to the cooking tables by flies and cockroaches. We found improper refrigeration, glasses ringed with germ-laden lipstick, spoons and forks ridged with food and saliva, filthy sterilization methods, food stocks nested with bugs and weevils."

If that is New York, where Health Department vigilance has always been eminently high, imagine what must obtain in the rest of the country! But look at the record.

A city in Alabama examined restaurant glasses, found their seemingly clean surfaces swarming with bacteria, forty per cent of which were pathogenic, disease-causing. In Ohio inspectors found rat excreta in flour bins.

In an Idaho restaurant the chef and two other kitchen helpers were found to be disease carriers. In Connecticut a health officer was shocked into action when two of his personal friends contracted syphilis from the rims of contaminated glasses. We once scoffed at this route of contagion for venereal disease—until Surgeon General Thomas Parran told us, "The spirochete (causing syphilis) has been found on a glass half an hour after inadequate rinsing."

In Texas the candy butchers on three trains sold poisonous sandwiches, rife with disease germs from the dirty shop where they were made. An investigator in Pennsylvania found a tea room scooping leftover butter off dirty dishes and reshaping it into tabs for the next customer, gathering scraps of bread left by diners and using it for bread pudding. Thousands of restaurants do it.

In a Utah restaurant a pot of gravy was virtually

In a restaurant in my own city I found the kitchen help, as an economy measure, drying dishes with soiled napkins which waiters brought in from the tables—napkins used to wipe mouths and, on occasion, I suppose, to catch the veritable flying circus of disease contained in a sneeze.

As one government health specialist remarked, "Pick any town at random. You'll find a few clean restaurants. But the great majority will be either 'half clean' or 'definitely dirty.' "

What the naked eye misses, the microscope often shockingly reveals. Dr. W. L. Mallman, of Michigan University, examined drinking glasses used in taverns.

* * *

On one out of seven he found trench-mouth spirochetes. The Public Health Service, using mobile laboratories, examined 50,000 utensils from 5,400 eating places in 156 cities. Only 28 per cent were free from dangerous amounts of bacteria.

The medical profession tells us that dirty cups, spoons and glasses are sources of influenza, tuberculosis, diphtheria, pneumonia, scarlet fever, whooping cough, colds, trench mouth, typhoid fever, dysentery, mumps and measles. But aside from gross violent illness, nearly all of us are frequently minor casualties of the microbe war.

Think of the times you have felt logy, upset, not up to par. You may say casually, "It's something I ate." That is almost correct. It is the filth on something you ate.

Twelve people in the State of Washington were taken violently ill with gastroenteritis. The search for clues turned up Boston cream pie as the one dish all of them had eaten. The chef merely had a cut finger. He was flabbergasted when an inspector later reported, "Innocent as it seems, there are enough staphylococci in that little cut to poison a thousand pies."

The perils these cases illustrate are run of the mine. All of us who eat out occasionally are at the mercy of the dirty dish, the unwashed utensil, the cook with the cut finger, the custard vat left open to vermin.

For its very special target, filth singles out our children. Children aren't as wary as grownups. That's why soda fountains, ice cream parlors, drugstore lunchrooms, hot dog and soft drink stands — where millions of teen-age girls and boys have their tête-à-têtes — are among the foulest purveyors of dirt and disease.

But it isn't always the overt nauseating filth which does the damage. It may simply be the method of wash-

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To kill bacteria, dishes must be immersed in water at 180° F. for at least two minutes. That's much hotter than a dishwasher can put his hands into. He must use a rack to submerge them or use a dishwashing machine. **If you see a dishwasher working by hand, you know — unless he has a chemical disinfectant—that he is merely giving the microbes an invigorating bath, perking them up for a trip down your throat.**

If you see flies buzzing around a restaurant perhaps you think nothing of it. Sanitary Engineer A. W. Fuchs, of the Public Health Service, declares, "You wouldn't eat lunch off a cuspidor, would you? Yet if a fly lights on one and then perches on your mashed potatoes, it's the same thing from a sanitation standpoint."

A few communities are fighting the plague of restaurant filth, tooth and nail. To protect yourself and your family, see that your community pitches in. If you haven't an adequate restaurant code, write to the United States Public Health Service, Washington, D. C., for a copy of its model ordinance. Don't allow your city fathers to compromise on anything less. Wave the model ordinance under their noses.

There is no sanitary device to prevent a waitress from scratching a sore on her neck before picking up your toast. Every community ought to have a food handlers' school, with required attendance by restau-

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In some large cities you can telephone the health department and get the latest bacteria count for any restaurant in town. Wheeling, West Virginia, has published bacteria counts in the local newspapers. Why not? Your city puts a warning sign at a railroad crossing!

The rest is up to you, personally.

Go to the drugstore where your children have lunches and sodas. Ask to see the kitchen, the back of the counter. See how the glasses are washed.

Whenever you go out to eat, demand the same cleanliness you take pains to maintain in your home. Why go to a restaurant and pay for the privilege of drinking from the quick-rinsed glass of a cold sufferer, a syphilitic or a typhoid carrier?

Don't laugh it off when a waiter brings you a cup ringed with lipstick. It is nothing more or less than good citizenship to warn the restaurant manager, to call in your local health department if the warning goes unheeded. You have every right to be militant when your good money brings you disease on a silver platter.

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page. This is part of the Companion's program of Public Service, covering questions of public concern. Write to:

WOMAN'S HOME COMPANION

ll-Collier Publishing Co., 250 Park Avenue, New York 17, N. Y.

AN'S HOME

MPANION

CIRCULATION, FIRST SIX MONTHS OF 1946, 3,690,880

HOME SERVICE · PUBLIC SERVICE

DECLASSIFIED E.O. 12065 SECTION 3-402/NNDG NO. 775013

A8

State Board of Health
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Commissioner
G. F. MATHEWS, M. D.

State Department of Health

State of Oklahoma

3400 NORTH EASTERN
OKLAHOMA CITY 5, OKLAHOMA

December 20, 1945

MEMORANDUM NO. 2

TO: ALL HEALTH OFFICERS AND ALL SANITARIANS

FROM: Mr. H. J. Darcey, Director, Bureau of Sanitary Engineering

SUBJECT: Policy of the State Department of Health in Relation to Dairy and Pasteurization Plant Inspections.

The State Department of Health first took an interest in milk inspection work when it secured the adoption of the U. S. Public Health Service Standard Milk Ordinance by the City Council of Lawton in 1929. Since that time, the ordinance has been adopted by a number of other cities and towns representing 40 percent of the population of the state.

During this period our efforts have been confined mainly to the cities and towns operating under the standard milk ordinance because of the shortage of field personnel. With the return of many members of the armed forces to their former positions in the State Department of Health and in the County Health Departments, it is deemed advisable to extend an active milk sanitation program to all communities in the state beginning January 1, 1946.

The purpose of the program is to provide a safe and higher quality milk supply for every community in the state. The outgrowth of this program will be the adoption of the standard milk ordinance by many cities and towns, thus providing definite local control over the milk supply sold in these communities.

In sponsoring this program it is not intended that other sanitation work be neglected, but rather that the milk work be integrated with your present work. This can be done through careful planning of your activities.

DECLASSIFIED E.O. 12065 SECTION 3-402/NNDG NO. 775013

The program will have to be based upon an active and AGGRESSIVE EDUCATIONAL PROGRAM. You must convince the dairyman or the plant operator that it will be to his benefit to produce milk in accordance with the requirements of the standard milk ordinance, if only for the satisfaction of knowing that he is selling a safe product to the public.

The local governmental officials, clubs, farm groups, and interested individuals should be enlisted in this program, and kept informed as to the progress being made. The progress of this program and the improvements you secure will be in direct proportion to the interest you take in the work and your ability to sell a worthwhile public health program.

HJD:o

A8

SECOND CLEVELAND RAT CONTROL SYMPOSIUM

TENTATIVE PROGRAM

PARLOR B - HOLLENDEN HOTEL

TUESDAY
June 3

Time	Activity	Speaker
8:00 a.m.	Registration	
9:00 a.m.	Introduction - Judge Skeel	Judge Skeel
9:30 a.m.	Cuyahoga County Program - School of Rat Control #1	George Petry
10:00 a.m.	School of Rat Control #1 - parts 3 and 4 History and Biology	Galen Oderkirk
11:00 a.m.	School of Rat Control #1 - part 5 Relation to Health	Dr. Robert N. Hoyt

LUNCH HOUR

Time	Activity	Speaker
1:30 p.m.	School of Rat Control #1 - parts 6 and 7	George Petry
2:00 p.m.	School of Rat Control #1 - parts 8 thru 10 Methods of Detection of Food Contamination.	E. J. Kunde
3:00 p.m.	Studies in the Movements and Population Increase of Brown Rats.	Prof. David E. Davis
4:00 p.m.	Rat Control Ordinances.	E. B. Buchanan

DINNER HOUR

Time	Activity	Speaker
7:30 p.m.	Presentation of Evidence	Judge David C. Meck

WEDNESDAY
June 4

Time	Activity	Speaker
9:00 a.m.	School of Rat Control #2 and 3. Ratproofing.	George C. Petry
11:00 a.m.	Cost of Ratproofing	Alvin H. Simon

LUNCH HOUR

Time	Activity	Speaker
1:30 p.m.	School of Rat Control #3 - part 2, C8 thru E. Sanitation and Rat Control	E. B. Buchanan
2:00 p.m.	School of Rat Control #4 Reductional Methods	
3:30 p.m.	The Comparison of the Efficiency of ANTU and Other Poisons in Field Tests.	Prof. D. E. Davis
4:00 p.m.	Odors, Lures and Repellants	Walter W. Dykstra
4:30 p.m.	School of Rat Control #4. Pest Control Operators Participation	Albert Akers

DINNER HOUR

WEDNESDAY
June 4

Time	Activity	Speaker
7:30 p.m.	Dump Control	E. B. Buchanan
8:00 p.m.	Demonstrations of Exhibited Products by Commercial Firms	

THURSDAY
June 5

9:00 a.m.	U. S. Public Health Service Cooperation in Municipal Rat Control	
10:00 a.m.	U. S. Fish and Wildlife Service Cooperation in Municipal Rat Control	

LUNCH HOUR

1:30 p.m.	Inspection trips	

DINNER

Reservations must be made in advance

Panel Discussion

Organizations of City Rat Control Programs

Inspection of a ratproofed restaurant

G-2 A 8

SUGGESTIONS

FOR

Residential Sanitation

MARYLAND
STATE DEPARTMENT OF HEALTH
BALTIMORE

RESIDENTIAL SANITATION

The many requests received by the State Department of Health for assistance in overcoming difficulties in rural sanitation have prompted the Department to attempt, through the medium of this pamphlet, to furnish some practical suggestions for solving the more important sanitary problems that affect the welfare of those living in rural homes.

R. H. Riley, M. D., Dr. P. H.,

Director, Maryland State Department of Health.

2-45—2M

RESIDENTIAL SANITATION

An adequate supply of pure water and a means for the safe and inconspicuous disposal of sewage and other wastes, are the chief requisites of residential sanitation.

The purpose of this pamphlet is to direct attention to precautions that should be observed in developing a rural water supply and to suggest means for the satisfactory disposal of sewage and garbage. An effort has been made to discuss the subjects in sufficient detail to meet general conditions, but expert advice should be obtained in cases where the proximity of the water supply to possible sources of contamination, unfavorable slope of the ground, or other conditions, present special difficulties.

The following are discussed in the order indicated:

WATER SUPPLY

- Sources—Relation of water to disease
- Streams—Protective treatment
- Springs—Protection from contamination
- Wells—Dug; metal-cased

SEWAGE DISPOSAL

- Chemical toilets
- Sanitary privies
- Water-carried sewage
- Disposal plants
  - Grease trap
  - Septic tank
  - Siphon chamber
  - Sand filters

WATER SUPPLIES

Sources of Supply—Surface streams, lakes or large diameter deep wells are commonly used as sources of water supply for larger communities, but the expense and care incident to the treatment necessary to render the supply safe, generally place such a source beyond consideration where comparatively small quantities of water are needed. Accordingly, the person who lives in a strictly rural section usually seeks his water supply from an underground source, frequently from a spring, but more often from a well.

The original source of all fresh-water supplies is rainfall. Notwithstanding that a portion of the rainfall flows over the surface of the ground to the larger bodies of water, and that other portions are utilized by growing vegetation, large quantities percolate into the earth and are stored in the soil and rock formations. It is this ground storage that may be made available for small water supplies by the development of springs or the installation of wells.

Because of the filtering action of the soil, the water stored in the earth's crust is usually, but not always, free from contamination. It often happens that samples from underground water supplies are found to be grossly polluted, due to wrong location, to faulty construction of the wells, or to improper development of the springs from which the supplies are obtained. The quality of a water supply can be judged, therefore, only in conjunction with possible sources of pollution.

Relation of Water to Disease—Certain diseases are classed as "waterborne," because they may be spread from person to person by the water which by accident or design is taken into our bodies. In this country, typhoid fever and dysentery are the two outstanding waterborne diseases. They are caused by specific bacteria which by their growth within our bodies produce the disease. These bacteria pass from the bodies of "carriers" and patients ill with the disease into the water supply and render it a source of infection. In some instances the germs are discharged in the urine; but more frequently they pass out in the feces. Unless effective precautions are taken to check the activities of these disease-producing germs, they may continue their course of destruction indefinitely. Therefore, in order that the water we use may be safe, it is necessary for the body wastes to be properly disposed of and the water supply to be properly protected. In planning for the protection of a water supply it is well at all times to keep in mind the danger from "carriers." A "carrier" is a person who apparently is well, but in whose body disease-producing germs continue to grow and to be eliminated. Very often a "carrier" does not know that he is a source of danger to others. As typhoid fever frequently results in the production of a "carrier," it is not necessary that there be an actual case of the disease in the neighborhood for an unprotected water supply to become contaminated, and to transmit the trouble to others.

Stream Supplies—Although surface streams are seldom drawn upon for small private water supplies, the possibility of their occasionally being so used makes a brief mention of their danger desirable.

With the knowledge that unknown "carriers," who are unwittingly distributing deadly germs wherever they go, may be among the inhabitants of the watershed of any stream, or may be among the occasional visitors to an uninhabited watershed, it is a wise precaution to regard all surface streams as potentially dangerous to health, and to avoid their use for domestic purposes unless the water is adequately treated.

If conditions justify the expense of treating a stream supply, the importance of properly treating it should be borne in mind and the equipment should be designed and its construction supervised by an experienced sanitary engineer.

Spring Supplies—Although spring water is frequently pure as it emerges from the ground, its chief danger is from contamination after it reaches the surface. To prevent this danger, the surroundings should be maintained in a sanitary condition, the spring should be encased in water-tight concrete or masonry walls extending several inches above the ground surface, provided with a water-tight cover and the water obtained by means of an overflow pipe or a pump. To protect the water further from surface wash, diversion ditches should be constructed around the spring basin. (See figure 1.) It is desirable to enclose a small area surrounding the spring with a suitable fence, to exclude animals and trespassers.

Well Supplies—Wells are of two construction types, dug wells and metal-cased wells. The dug well is usually relatively shallow, of comparatively large diameter and is generally lined with brick or stone masonry.

Metal-cased wells may be constructed by driving a small-diameter pipe to the water-bearing stratum, provided the stratum is located not over 60 feet below the surface and there are no intervening rock strata. If the water-bearing stratum is at a much greater depth than above mentioned, or if it is overlaid with rock formation, a larger-sized casing must be employed and its route prepared by the use of a drill. These types of metal-cased wells are distinguished respectively by the terms "driven well" and drilled" or "bored well."

In the construction of either type, careful consideration should be given to the site. A reasonably remote location, as protected as possible from potential sources of pollution, should be selected.

Dug Wells—The curbing of a dug well should be laid in cement mortar, preferably to the water-bearing stratum, but in any event not less than eight or ten feet below the ground surface. This water-tight construction should be continued to a height of six or more inches above the normal elevation of the earth at the well site and the supply further protected by a water-

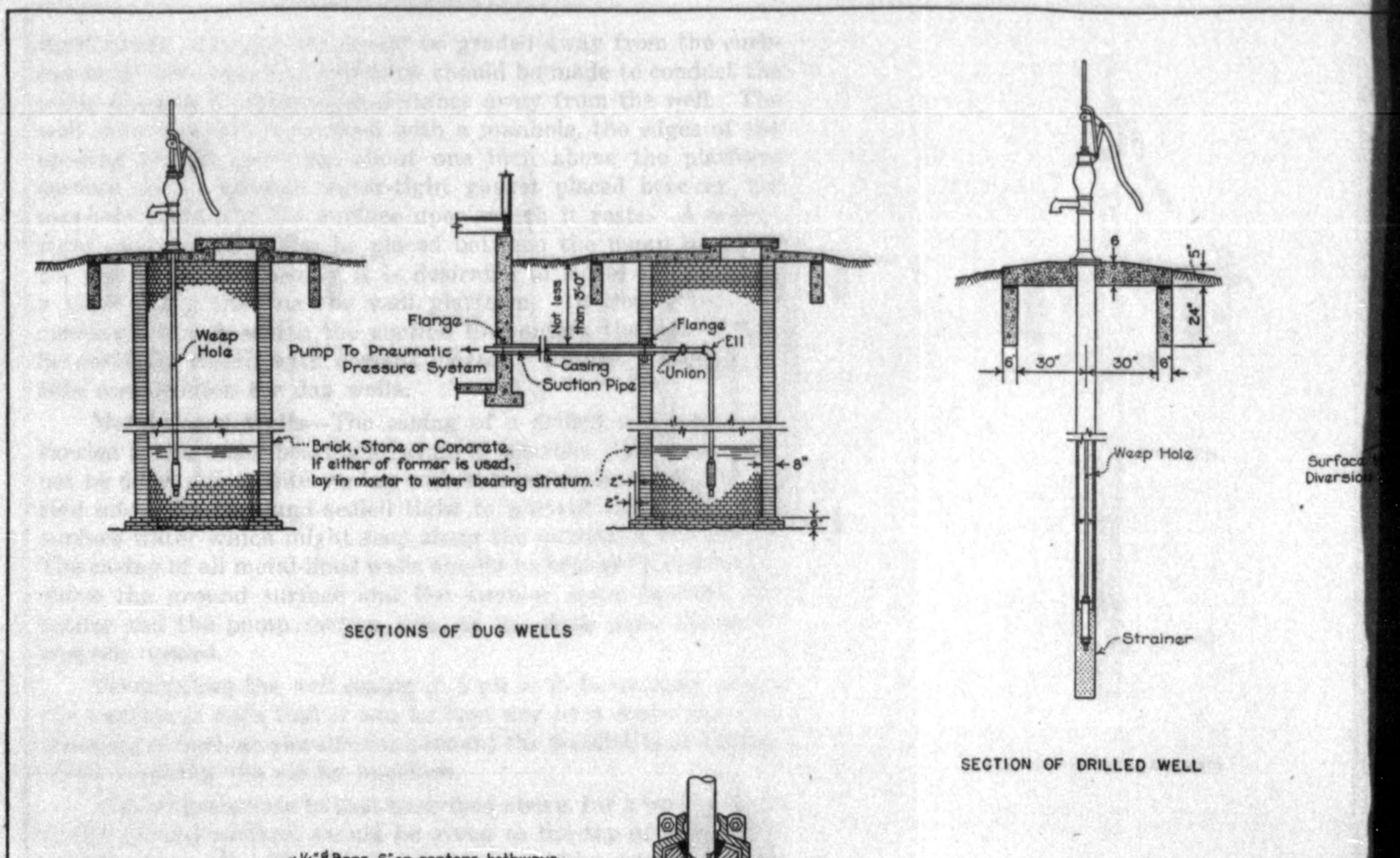


FIGURE 1—SUGGESTED PLAN FOR PROTECTION OF PRIVATE WATER SUPPLIES.

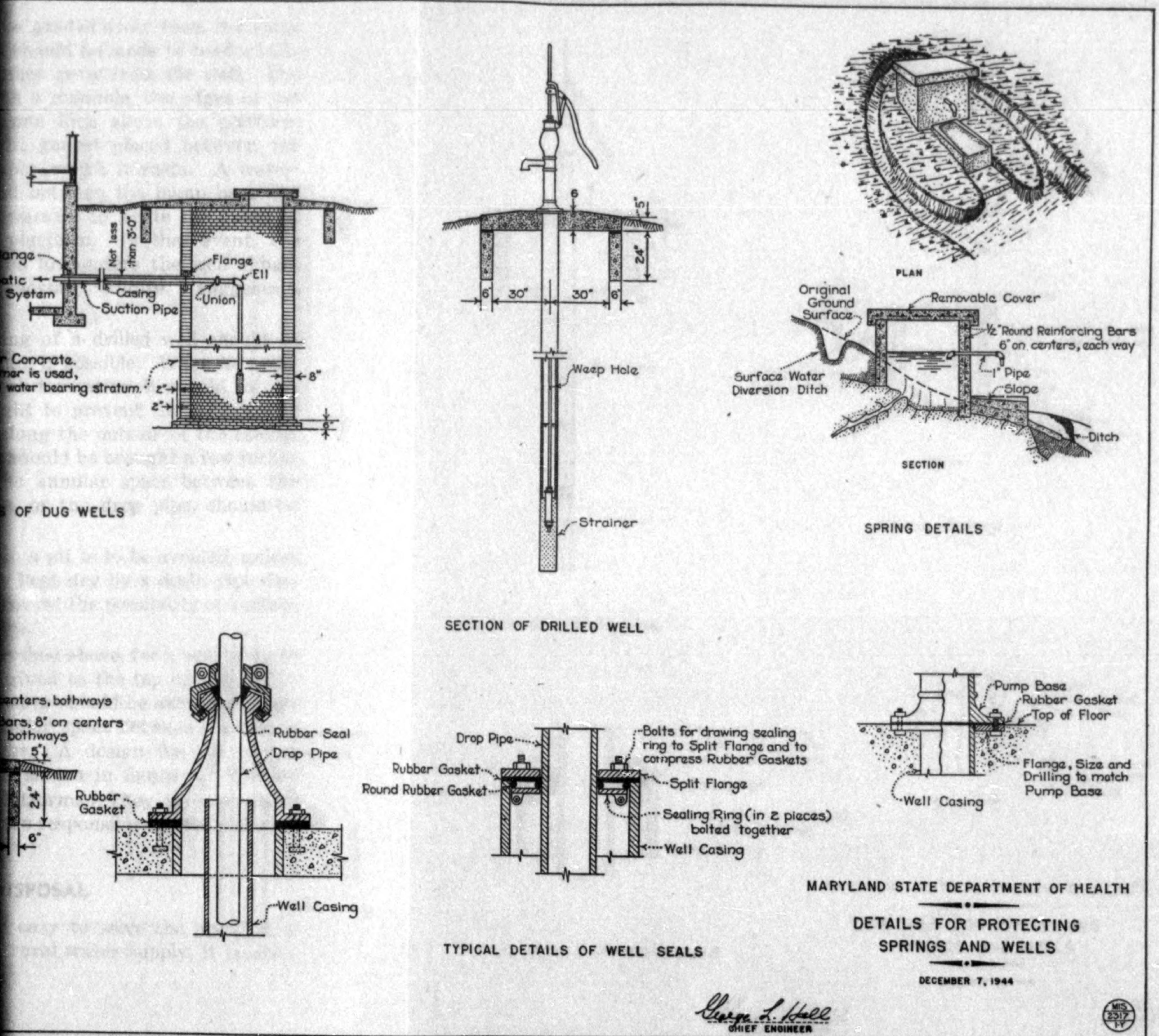


Figure 1—Suggested Plan for Protection of Private Water Supplies.

tight cover. The ground should be graded away from the curbing in all directions and provision should be made to conduct the pump drippings a reasonable distance away from the well. The well cover should be provided with a manhole, the edges of the opening should be raised about one inch above the platform surface and a suitable water-tight gasket placed between the manhole cover and the surface upon which it rests. A water-tight gasket should also be placed between the pump base and the platform. Frequently it is desirable to locate the pump at a place other than on the well platform. In that event, the opening through which the suction line enters the well should be carefully closed with cement mortar. Figure 1 suggests a safe construction for dug wells.

Metal-Cased Wells—The casing of a drilled well should be carried to the water-bearing stratum if possible. When this cannot be done, due to intervening rock formation, it should be carried into solid rock and sealed tight to prevent the entrance of surface water which might seep along the outside of the casing. The casing of all metal-lined wells should be brought a few inches above the ground surface and the annular space between the casing and the pump suction line, or the drop pipe, should be properly sealed.

Terminating the well casing in a pit is to be avoided, unless the location is such that it can be kept dry by a drain pipe discharging at such an elevation to prevent the possibility of surface water reaching the pit by backflow.

Similar protection to that described above, for a well brought to the ground surface, should be given to the top of a well terminating in a pit. That is, the casing should be extended a few inches above the floor and the annular space between the casing and the pump column sealed tight. A design for the proper protection of metal-cased wells is shown in figure 1. Wooden covers are not desirable for well platforms. They are susceptible to shrinkage and decay and often are responsible for the entrance of pollution.

SEWAGE DISPOSAL

Although it is comparatively easy to solve the problem of the sources and treatment of the rural water supply, it is often quite difficult to arrange for the disposal of the house sewage in such a manner that it will not create a nuisance or become a menace to health.

Intestinal, disease-producing bacteria are not dependent upon water alone for transportation. They are often transmitted by filth-loving and filth-carrying insects, the most common of which is the house fly which breeds and develops in filth. From such breeding grounds the mature flies often bearing deadly germs, are constantly traveling to our kitchens and dining-rooms. In arranging for the disposal of household sewage, provision must therefore be made not only to safeguard the water supply from pollution, but also to prevent the development of breeding places for insects.

Unfortunately there can be no standard design of sewage disposal that will be satisfactory in all cases. Many cases present individual problems that can be solved only after a study of the surroundings, the slope of the ground and the nature of the soil. With the hope of furnishing some suggestions, however, that may be of practical assistance in solving rural sewerage problems the following descriptions of various acceptable methods of disposal are given.

When the home is not equipped with water under pressure, the best that can be done is to provide either a chemical toilet or a sanitary privy, and to dispose of the kitchen wastes by burning the combustible material, and by underground disposal of the liquids.

Chemical Toilets—The chemical toilet consists of one or more bowls similar in appearance to those of a flush toilet. From these bowls a pipe leads to a metal tank directly beneath, into which a chemical, generally caustic soda, has been placed for the purpose of liquefying the solids. In order that the chemical may be fully effective, it is essential that the contents of the tank be thoroughly mixed two or more times each day. For easy accomplishment of the mixing, the tank is equipped with an agitator operated by a handle usually placed at the back of the bowl.

This type of toilet, due to the unpreventable escape of some odor, should not be installed within the dwelling, but may be placed in a structure in close proximity to the dwelling.

Periodically the tank contents must be removed and disposed of at some remote location by emptying into a series of trenches and allowed to seep into the soil or into a pit or other similar excavation of sufficient capacity to accommodate the entire tank contents.

Sanitary Privies—A sanitary privy is one so located and constructed as to give the least offense to the senses of sight and smell, amply protect the water supply, prevent the breeding of flies, and provide for easy cleaning and be properly ventilated.

Illustrations of several types of these privies are given in figures 2 to 7, inclusive, which indicate the methods employed to comply with the above mentioned requirements. Their construction is so simple that it is believed the average carpenter can build them without further instruction.

A privy should not be constructed over or in proximity to a stream or any other body of water.

The material removed from any type of privy, cesspool, or septic tank should be thoroughly disinfected with fresh chloride of lime or other disinfecting agent and buried with an earth cover at least 18 inches in depth. The location of places of disposal should be such that contamination therefrom cannot reach any water supply, any stream or any other body of water.

Water-Carried Sewage—For the home provided with water under pressure and equipped with sanitary plumbing, the following description of modern methods of sewage disposal may be of assistance to the owner in solving his individual problem.

Water-carried sewage may, under special circumstances, be disposed of either by discharging it into a body of water where it is rendered less harmful by dilution and oxidation, or by discharging it beneath the ground surface where it is gradually absorbed.

In Maryland the instances are rare where untreated sewage can be discharged with safety into a body of water. The required

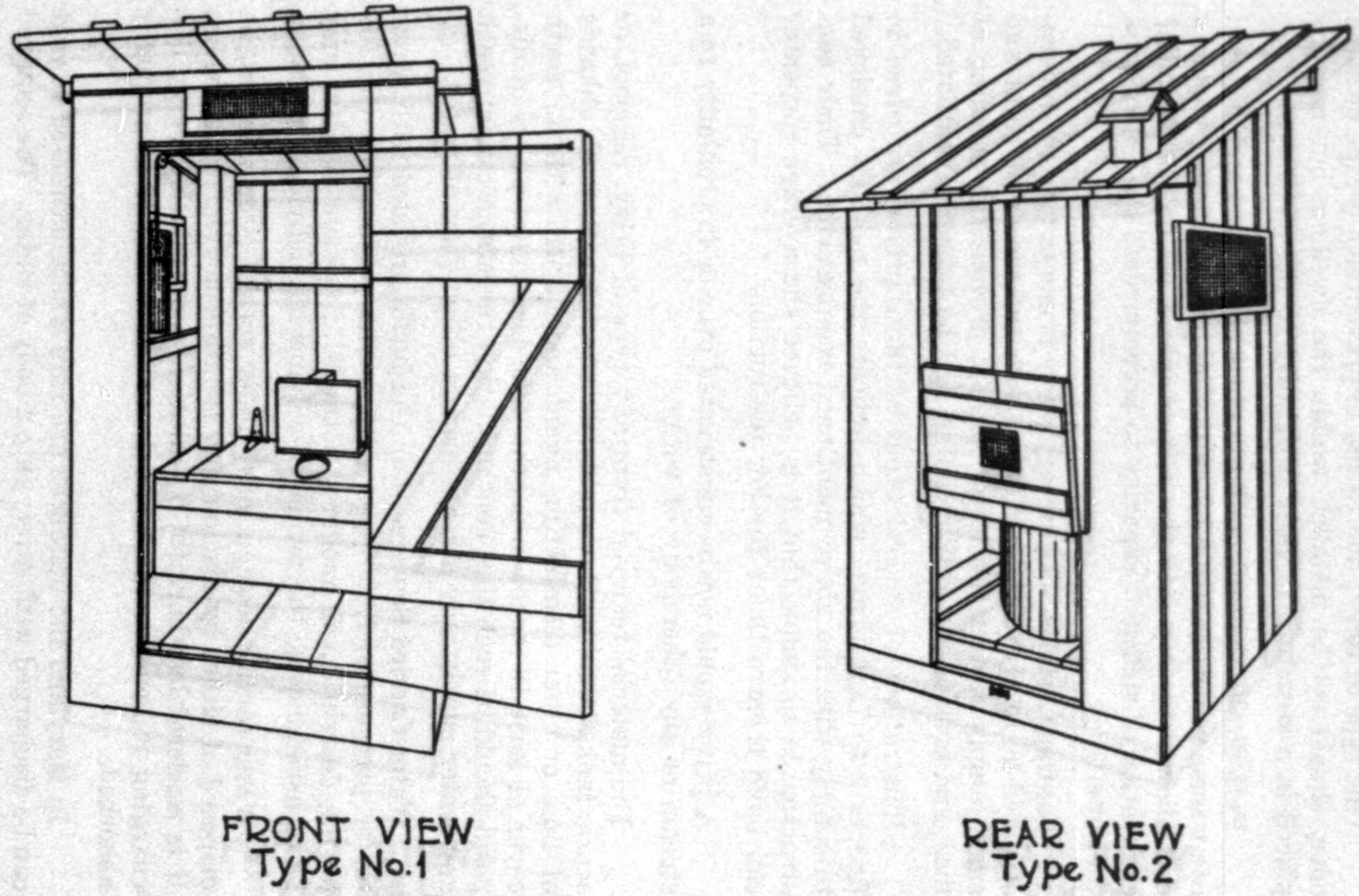
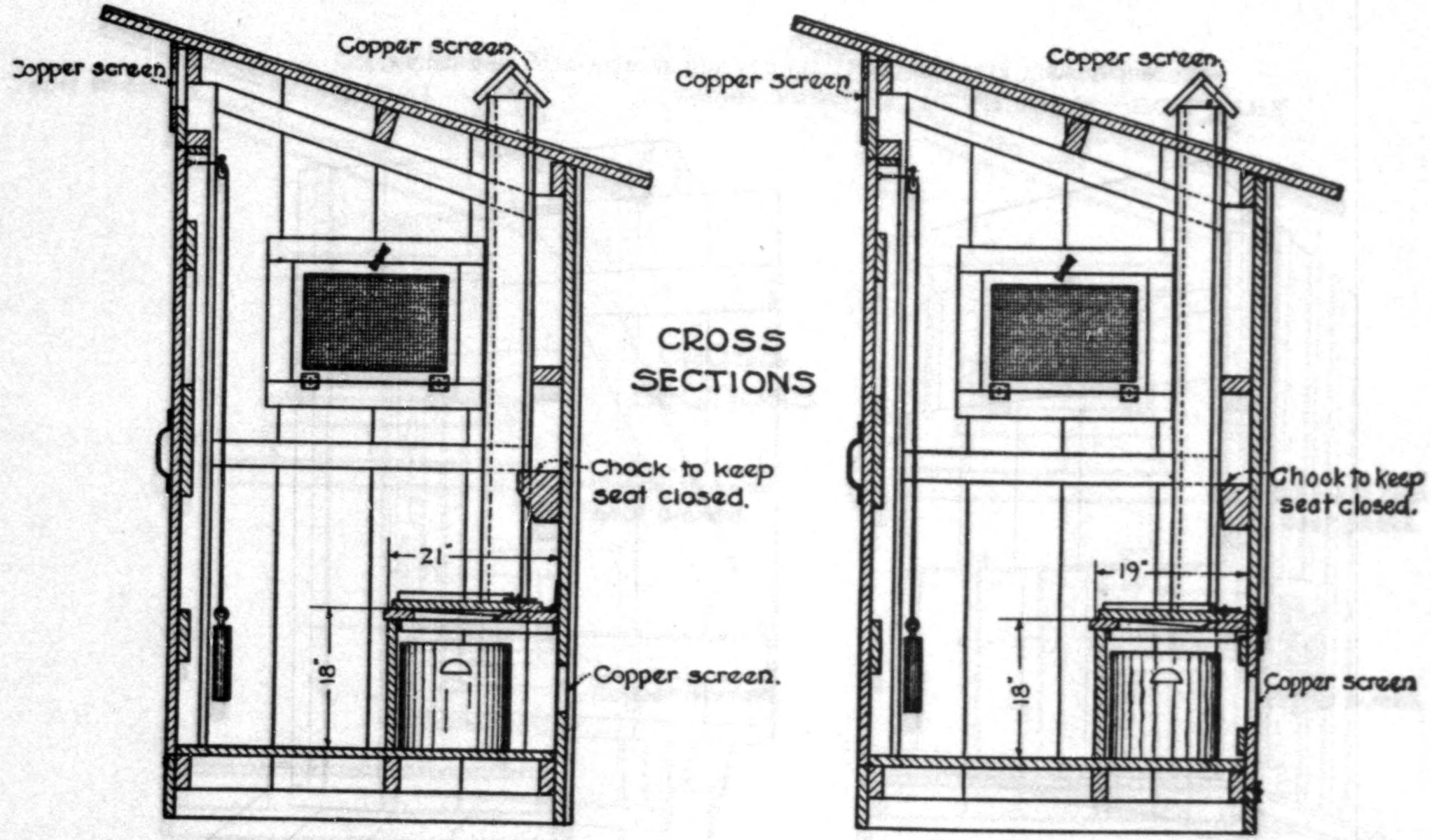


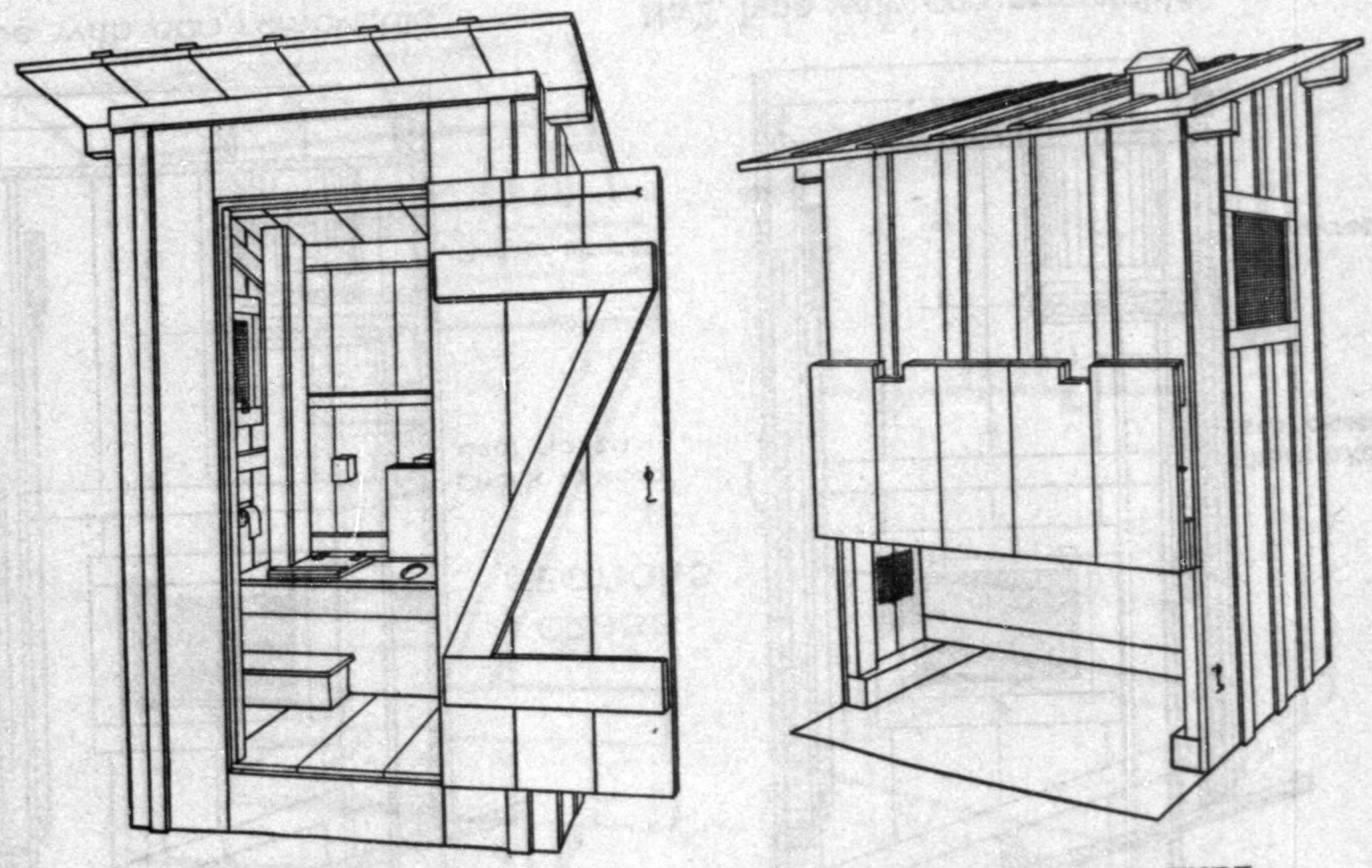
FIGURE 2—FRONT AND REAR VIEWS OF CAN TYPE.



No. 1, Type with can removable through front door

No. 2, Type with can removable from rear

FIGURE 3—CROSS SECTIONS OF CAN TYPE.



FRONT VIEW

REAR VIEW---BOX TYPE

FIGURE 4—FRONT VIEW OF BOX AND PIT TYPES AND REAR VIEW OF BOX TYPE.

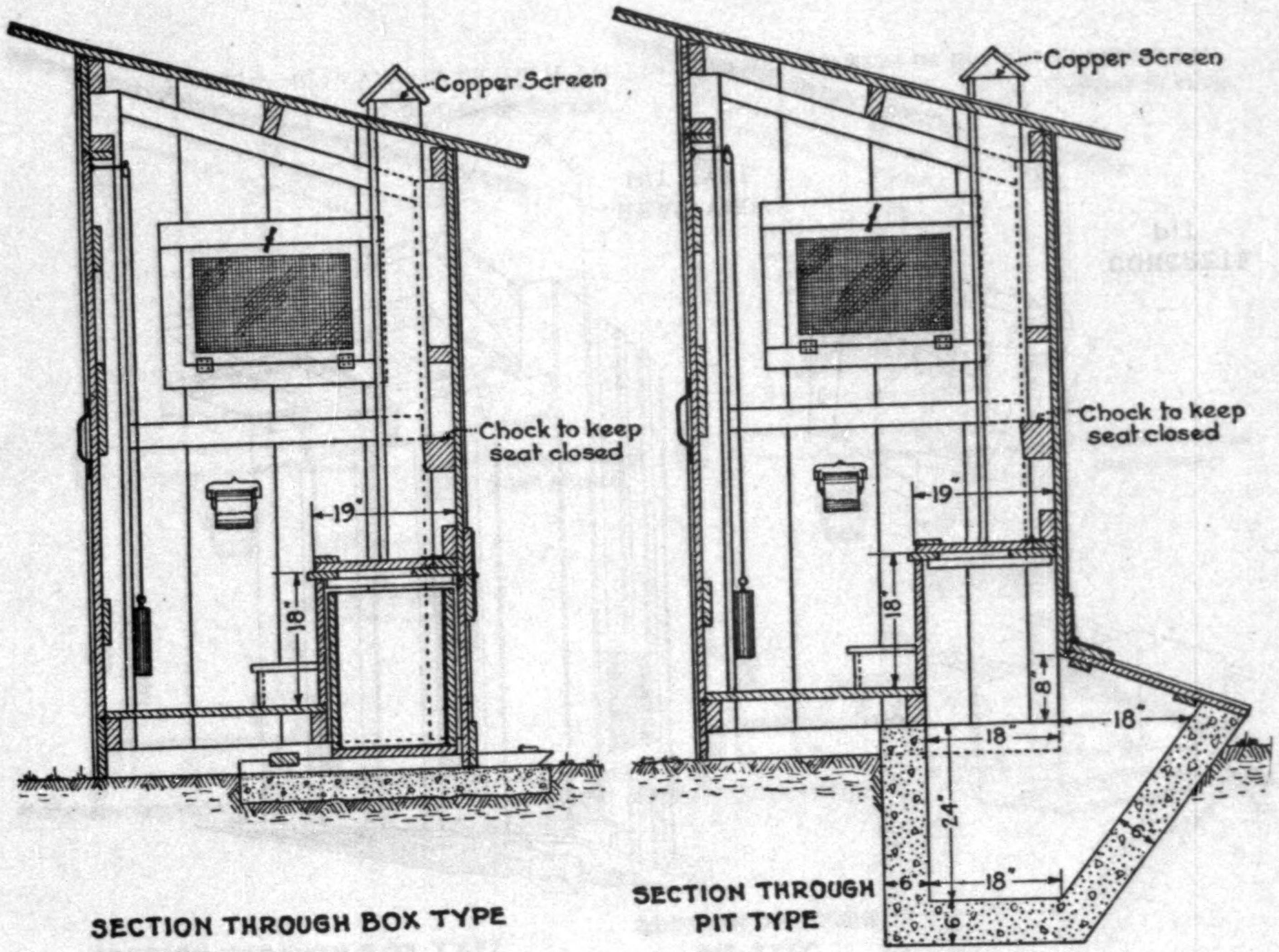


Figure 5—Cross Sections of Box and Concrete Pit Types.

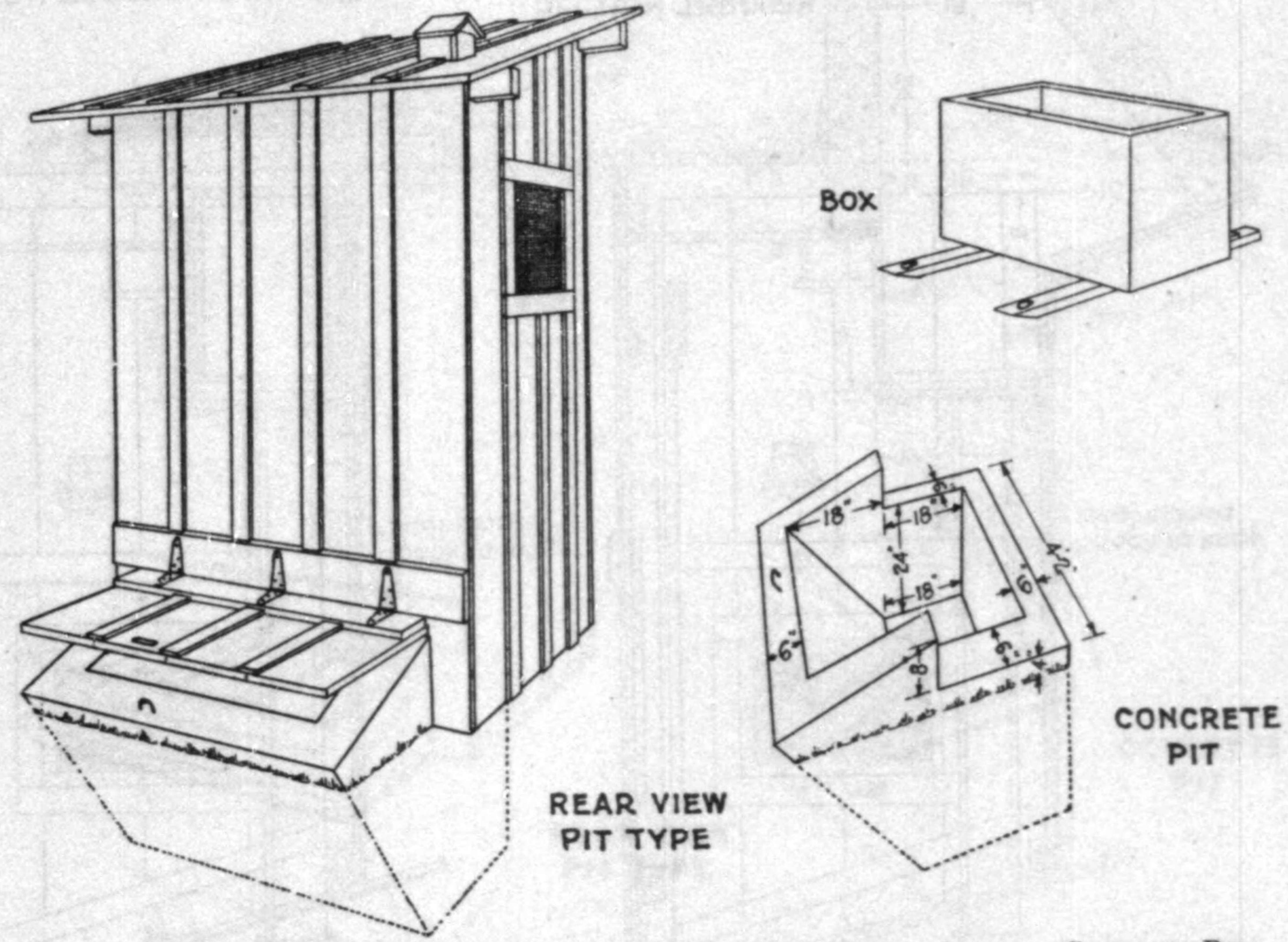


FIGURE 6—REAR VIEW OF CONCRETE PIT TYPE AND ARRANGEMENT OF BOX AND CONCRETE PIT.

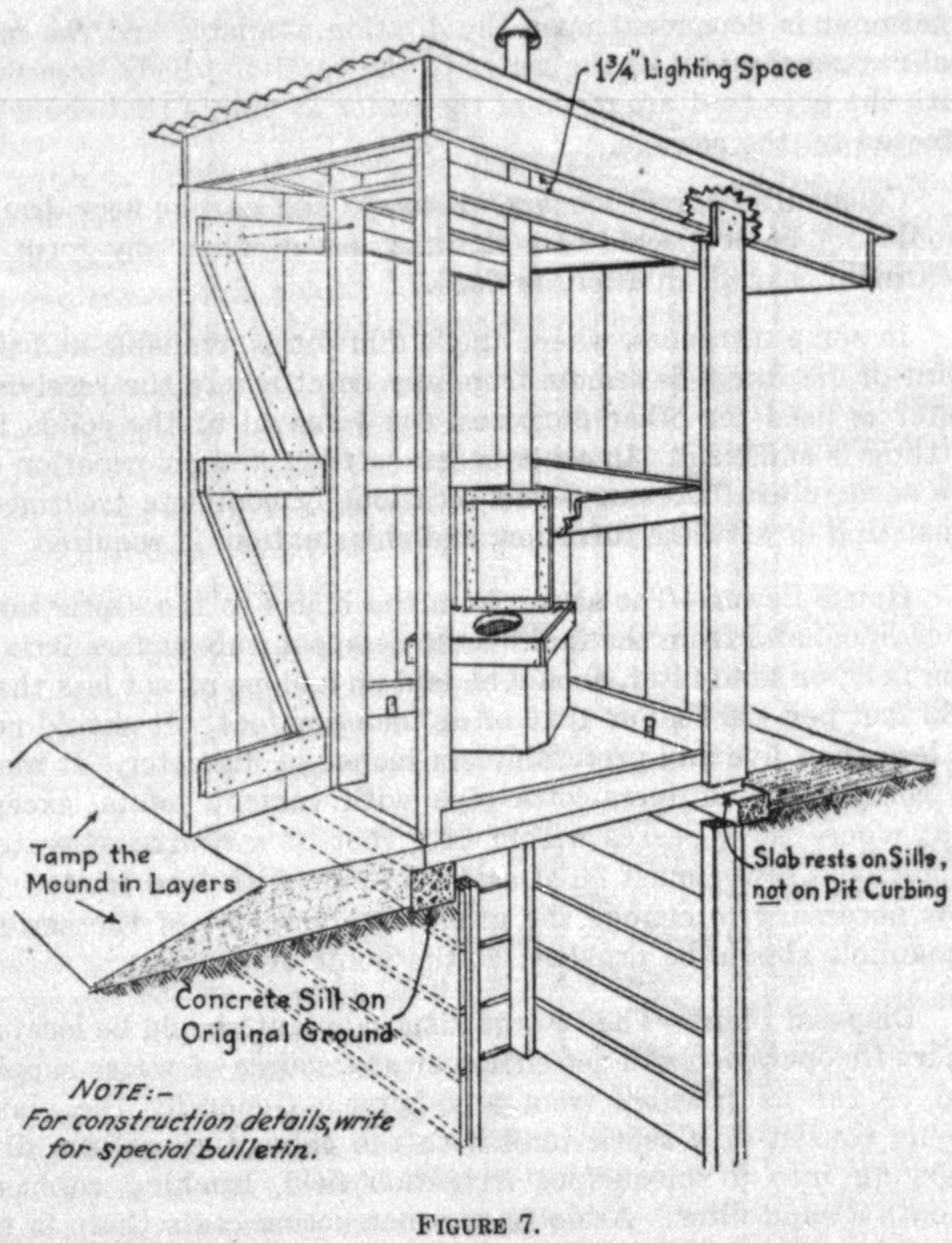

1¾" Lighting Space
Tamp the Mound in Layers
Slab rests on Sills, not on Pit Curbing
Concrete Sill on Original Ground
NOTE:- For construction details, write for special bulletin.

FIGURE 7.

treatment is dependent upon the dilution available and the normal oxygen content of the water in the receiving body, together with the uses that are made of the water at points that could be affected by the sewage.

Cellar drains, roof leaders, areaways and garage floor drains should not be connected to a sanitary sewer when any form of treatment, except dilution, is used.

In some instances, where ample dilution is available and the point of discharge is remote from any point where the receiving water is used for other purposes, the removal of the solids by settling is sufficient. In other cases, settling and chlorination of the sewage are necessary, and occasionally complete treatment consisting of settling, filtration, and chlorination, is required.

House Sewer—The sewer from the house to the septic tank or cesspool and from the tank to the cesspool, sub-surface irrigation field, or sand filter, should be laid on a slope of not less than 0.65 feet per 100 feet or 1/16 of an inch per foot. It should not be less than five and preferably six inches in diameter. It may be constructed of terra-cotta pipe with cement joints, except that wherever it passes within fifty feet of a source of water supply, the sewer must be of cast-iron pipe with lead joints. If it is necessary to change the grade or alignment of the sewer, a manhole should be provided at the point of change.

Disposal Plant—The sewage disposal plant should be located where its operation will not endanger any source of water supply and as far as possible from any home. Generally the plant should consist of a septic tank with the effluent therefrom discharging into a sub-surface irrigation field, leaching cesspool or onto a sand filter. Aside from construction costs there is no general order of preference in selecting the type of sewage disposal plant for an individual home. The area of the lot available, the type and proximity of a source of water supply and the nature of the local soil are the determining factors. No portion of a sewage disposal plant or the house sewer should be closer than fifty feet to any well, spring or other source of water supply.

Grease Trap—Special precautions should be taken to prevent kitchen grease from accumulating in and interfering with the proper operation of the different units of the sewage disposal plant. A grease trap is installed for that purpose. It is a small tank, easily accessible, which retards the flow of wastes from the kitchen a sufficient period of time to permit grease carried by the water to rise to the surface. The grease should be removed frequently. If possible, a separate line should run from the kitchen, out of the building, and connect to the main house sewer at some convenient point. The grease trap should be installed on the kitchen line before it connects to the main house sewer.

The grease trap outflow should be through a tee drawing from a point well below the surface of the liquid. The inlet may also be through a tee, but in this case the tee should extend only a few inches below the surface of the liquid. The trap should be provided with a removable cover to permit access for removing the accumulated grease.

Under no circumstances should a grease trap be installed in the basement or any part of the home. If the kitchen drain does not extend outside of the home before connecting to the house sewer, the grease trap should be omitted.

Septic Tank—In general, the septic tank for a family of 4 to 10 persons should be designed to retain the sewage for a period of at least 12 hours, based upon the use of about 50 gallons of water per 24 hours by each member of the family. It should, however, not be smaller than the tank shown in figure 8. The length of the tank should be approximately one and one-half times its width and its depth below the water line not less than four feet. The invert of the tank outlet pipe should be at the same elevation as that of the inlet. The incoming sewage should be carried about 12 inches below the surface of the liquid by a special pipe fitting or by means of a baffle placed across the tank approximately 18 to 24 inches from the mouth of the inlet. The opposite end of the tank should be similarly arranged to cause the outlet to draw from a depth sufficiently below the water surface to prevent the escape of scum, the formation of which is a normal function of the tank. The cover of a septic tank if not composed entirely of removable concrete slabs, should contain such a slab at each end of the tank to facilitate the replacement of the baffles and to permit access for cleaning. If the tank is remote from the dwelling, a short vent pipe should be installed near the center of its cover.

It should be remembered that a septic tank does not purify the sewage. Its function is merely to assist in the preparation of the sewage solids for final disposal.

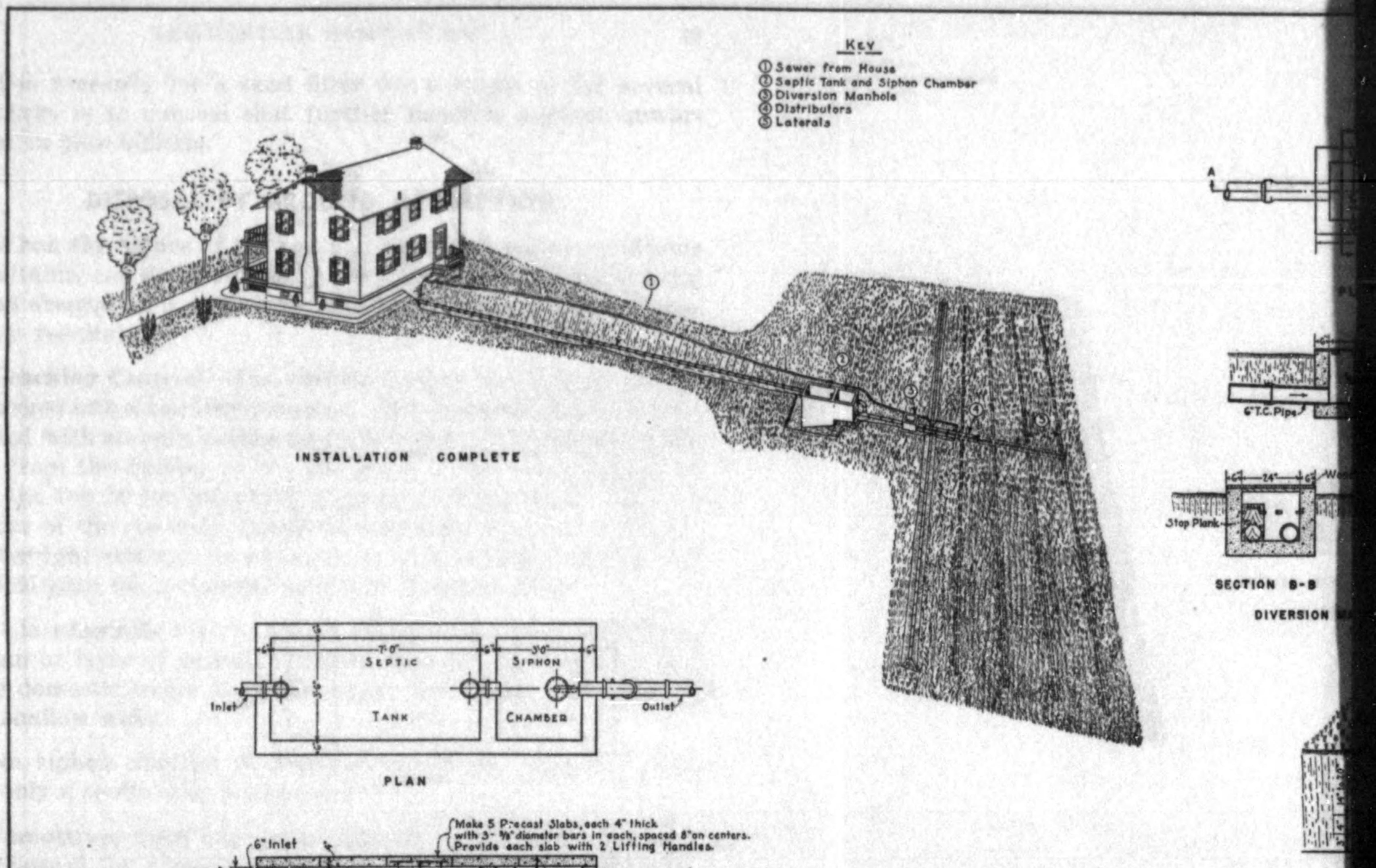
Details of a septic tank are shown in figure 8. Where sufficient head is available, a siphon chamber, equipped with automatic siphon, should be constructed with the septic tank so that the intermittent application of the settled sewage to the sub-surface irrigation field may be had if the latter is used.

Siphon Chamber—The siphon chamber should be comparatively shallow, but of such capacity that the amount of each discharge of the siphon will approximate one-half to two-thirds of the total capacity of the distributing pipes in the sub-surface irrigation field. A suitable tank and siphon chamber are shown in figure 8.

The purpose of the siphon chamber is to withhold the sewage until a predetermined quantity has accumulated, causing the siphon to discharge, partially filling the tile lines and bringing all of the field into service. In the absence of a siphon chamber, the flow to the field is continuous and the lines nearest the tank receive all the sewage, thus utilizing only part of the field. The part so used may become clogged and, therefore, ineffective.

Sand Filters—The purpose of a sand filter is to clarify and oxidize the tank effluent thus removing nearly all of the remaining solids and making the sewage less offensive otherwise.

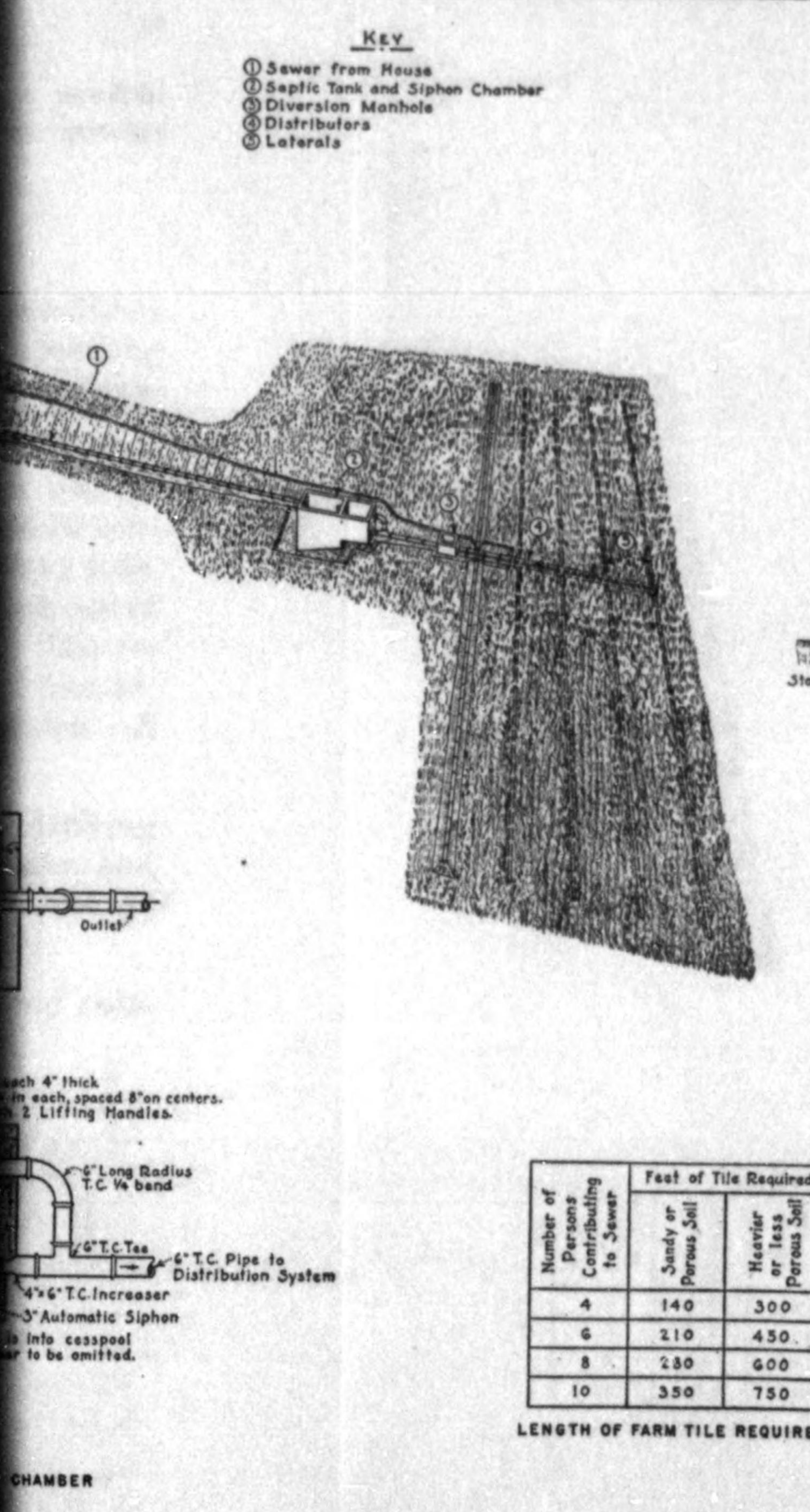
Where a small water course is available, a sand filter for further treatment of the septic tank effluent may be constructed. When this unit is used the sub-surface irrigation field is omitted. Briefly, it consists of approximately 2 feet of coarse sand underlain with graded gravel, all of which is properly underdrained with 4-inch farm tile. Sewage, after passing through the tank, collects in the siphon chamber where, at intervals, the siphon discharges it onto the surface of the sand filter. The sewage is then filtered through the sand and gravel to the underdrains through which it passes to the stream.

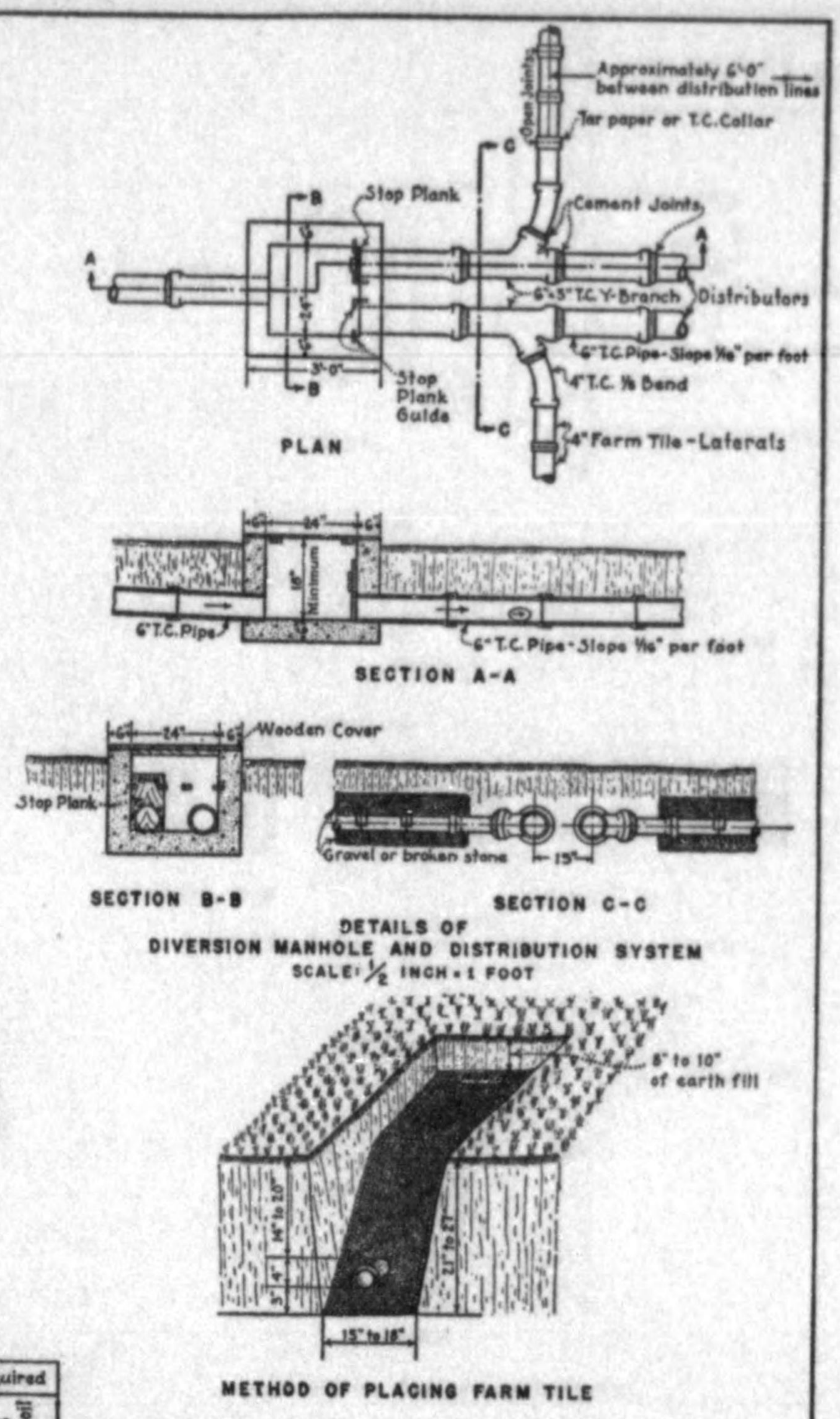


Number of Persons Contributing to Sewer	Feet of Tile Required	
	Sandy or Porous Soil	Heavier or less Porous Soil
4	140	300
6	210	450
8	280	600
10	350	750

LENGTH OF FARM TILE REQUIRED

FIGURE 8—PLAN OF SEWAGE DISPOSAL PLANT FOR PRIVATE RESIDENCE





Number of Persons Contributing to Sewer	Feet of Tile Required	
	Sandy or Porous Soil	Heavier or less Porous Soil
4	140	300
6	210	450
8	280	600
10	350	750

LENGTH OF FARM TILE REQUIRED

MARYLAND STATE DEPARTMENT OF HEALTH

PLAN OF SEWAGE DISPOSAL PLANT FOR PRIVATE RESIDENCE

SCALE: AS SHOWN — MAY 3, 1940

George L. Hall
CHIEF ENGINEER

—Plan of Sewage Disposal Plant for Private Residence

The necessity for a sand filter for a single or for several residences is so unusual that further mention appears unwarranted in this bulletin.

DISPOSAL BY GROUND ABSORPTION

When the nature of the soil and the surrounding conditions are suitable, one of the following methods of sewage disposal by ground absorption is frequently employed with reasonably satisfactory results:

Leaching Cesspool—The effluent from a septic tank may be discharged into a leaching cesspool. The cesspool should be constructed with an open bottom and with open joint masonry sidewalls from the bottom to the elevation of the incoming sewer or to the top of the absorbing stratum (porous soil). The remainder of the sidewalls should be laid tight in cement mortar. A watertight cast-iron or concrete cover should be provided. A practical plan for a cesspool is shown in figure 9.

It is adaptable only to places where there is an underlying stratum or layer of gravel or coarse sand free from water, and where domestic water supplies in the vicinity are not obtained from shallow wells.

No siphon chamber is required ahead of a leaching cesspool; only a septic tank is necessary.

Percolation tests may be conducted to determine the size of a cesspool for a specific location. A test hole should be excavated in the bottom of a pit excavated to about one-half of the depth of the proposed cesspool. The test hole should be at least 8 feet below the ground surface. The test is conducted as described for a sub-surface irrigation field. The data in table 1 may be used to determine the number of square feet of percolating area for the cesspool. The percolating area is the inside area of the cesspool side wall from the elevation below which the openings are provided to the top of the side wall footing. The area of the bottom should not be considered in arriving at the effective area.

Sub-surface Irrigation—This is a method by which the effluent from a septic tank is distributed underground by means

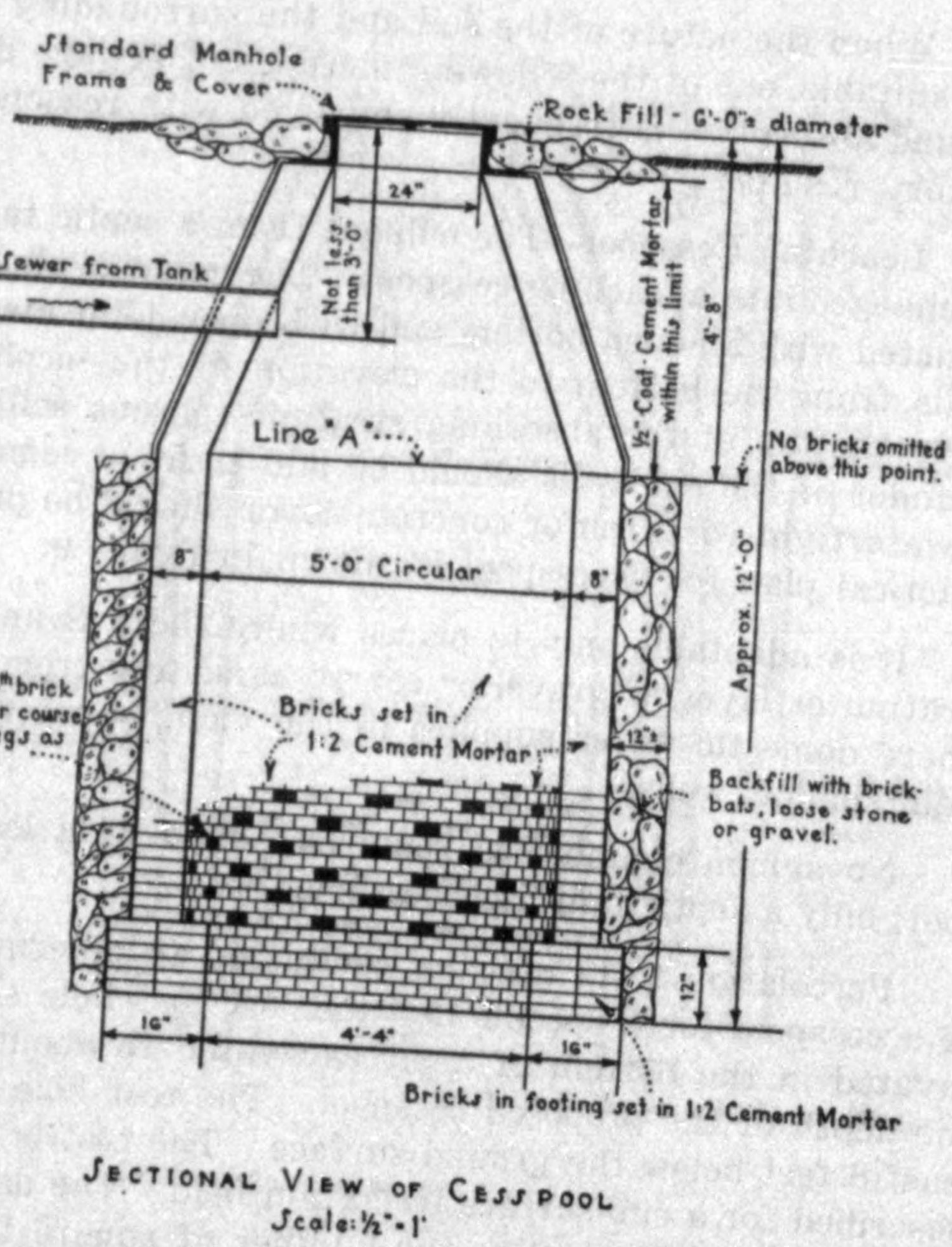


FIGURE 9—LEACHING CESSPOOL.

of a system of open-joint farm tile laid below the surface. It can be employed only when the soil is sufficiently porous to permit relatively rapid absorption, otherwise the sewage will appear above the ground surface and become a possible menace to health and an odor-producing nuisance.

A siphon chamber is desirable where a sub-surface irrigation field is used. A grease trap should be installed on the house sewer ahead of the septic tank but may be omitted, if desired, for a single home.

For small installations only one tiling field is necessary. The main distributor should be not less than 6 inches in diameter, of bell and spigot terra-cotta (vitrified clay) sewer pipe laid with cement joints. "Y" branches and one-eighth bends are placed at intervals of approximately 6 feet and the lateral tile lines are extended from them. Alternate laterals should be placed on opposite sides of the main distributor. The laterals should be of 4-inch farm tile laid with open joints about ¼-inch wide and at a depth of 14 to 20 inches below the ground surface. Tar paper should be placed over each joint to exclude the soil which otherwise may enter and obstruct the tile. Trenches for the tile should be dug from 15 to 18 inches wide and 21 to 27 inches deep. The underground seepage of the sewage will be materially helped if the drains are laid on 2 or 3 inches of broken stone, gravel or coarse cinders, and the trench filled with the same material to a depth of 8 or 10 inches before the final refill of earth is placed.

Both the main distributor and the laterals should be laid to a grade of about 1/16 of an inch to the foot.

The total length of tile required is dependent upon the nature of the soil in which the lines are laid and upon the quantity of sewage discharged into the tile field. The following data assume that each person will contribute 50 gallons of sewage per day, for greater or lesser amounts the data should be modified as required. In general 25 to 30 feet of tile are required per person for sub-surface irrigation fields constructed in coarse sand or gravel soils. If the sand is very fine or mixed with clay, 70 to 80 feet may be required. More accurate information may be obtained by conducting percolation tests and from the results obtained determine from table 1 the quantity of 4-inch tile required.

Excavate at least two test pits 12 inches square and 24 inches deep. Wet the sides and bottom and fill with water to a depth of 6 inches. Observations should be made to determine the average time for the water level to drop 1 inch. From table 1 the number of feet of tile per person may be determined.

TABLE 1

Time, in Minutes for Water to Drop 1 Inch	Linear Feet of Tile Required for Each Person	Vertical Feet of Side-wall Per Person Measured below "Line A"
1	12	1'-0"
2	15	1'-3"
5	20	1'-6"
10	30	2'-3"
30	60	4'-3"
60	80	Unsuitable

Abandoned Wells Used as Cesspools—Occasionally it becomes necessary or desirable to abandon the use of a shallow or dug well as a source of water supply.

The abandoned well should never be used as a cesspool. Although water from it may no longer be used, there is always the probability that the same water-bearing stratum supplying water to this well also supplies water to other wells even though they may be an appreciable distance away.

Very often underground water travels long distances, sometimes many miles, following and flowing through a layer or stratum of sand and gravel or through crevices in limestone. It is readily apparent, therefore, that discharging sewage into an abandoned well may cause serious, yet unsuspected pollution to an otherwise safe source of water supply.

OPERATION

The various devices described for the disposal of sewage, if properly located and constructed, should require little attention.

The grease trap should be inspected at frequent intervals, and the grease removed, otherwise this unit will cease to function. The grease removed should be buried.

The septic tank should be inspected several times a year and the sludge not allowed to reach a depth of over 2 feet. No appreciable amount of sediment should be allowed to accumulate in the siphon chamber. The sludge when removed should be buried at a place remote from a water supply. Practically nothing can be done to prolong the life of a cesspool, or an irrigation field, except to protect them from the reception of as much solid material as possible by a faithful adherence to the instructions given for the care of the grease trap, the septic tank, and the siphon chamber. The length of their period of service is always problematical, but, under favorable circumstances, they usually give satisfactory service for a number of years. As the functioning of a cesspool or sub-surface irrigation field is dependent upon absorption, their failure is due to clogging of the soil and can be corrected only by constructing a new one in a new location.

BILL OF MATERIALS FOR SEPTIC TANK AND CESSPOOLS

In order to assist those interested in building septic tanks with or without siphon chambers, and cesspools, the following bill of materials is presented, especially pertaining to the amount of cement, sand and gravel required for the concrete work and the cement, sand and number of bricks for a cesspool with a total depth of 12 feet.

Septic tank with siphon chamber
- 30 bags of cement
- 60 cubic feet of sand (3 tons)
- 120 cubic feet of gravel or crushed stone (6 tons)

If siphon chamber is omitted, deduct 8 bags of cement, 16 cubic feet of sand and 32 cubic feet of gravel or crushed stone.

Cesspool—12 feet deep from top of masonry to bottom of footing
- 27 bags of cement
- 54 cubic feet of sand (approximately 3.0 tons)
- 2700 bricks

For each additional foot of depth add 2.25 bags of cement, 4.5 cubic feet of sand and 225 bricks. For each foot less than the 12-foot depth, deduct a similar amount.

GARBAGE DISPOSAL

Garbage consists of household wastes of a vegetable or animal character. In warm weather it quickly decomposes and, unless properly disposed of, will produce odor nuisances and promote fly breeding.

Garbage should be deposited in a can constructed of substantial material and equipped with a cover sufficiently tight to prevent the entrance of flies or the escape of odors. The material should not be allowed to remain in the can for too long a period and care should be given to maintain the receptacle in as clean a condition as possible.

The preferable methods of garbage disposal are by burying or burning. The garbage may be buried by dumping it in low places or by placing it in trenches dug about 1½ feet deep. In either instance the material should be covered immediately with a thick layer of soil. Sometimes conditions make it more desirable to dispose of the garbage by incineration. This method of disposal, due to the large amount of moisture present, requires specially constructed furnaces. There are a number of incinerators for private homes on the market that may be purchased at moderate prices and that will give adequate service when reasonably operated. For those who prefer to construct their own incinerators, however, a satisfactory type is shown in figure 10.

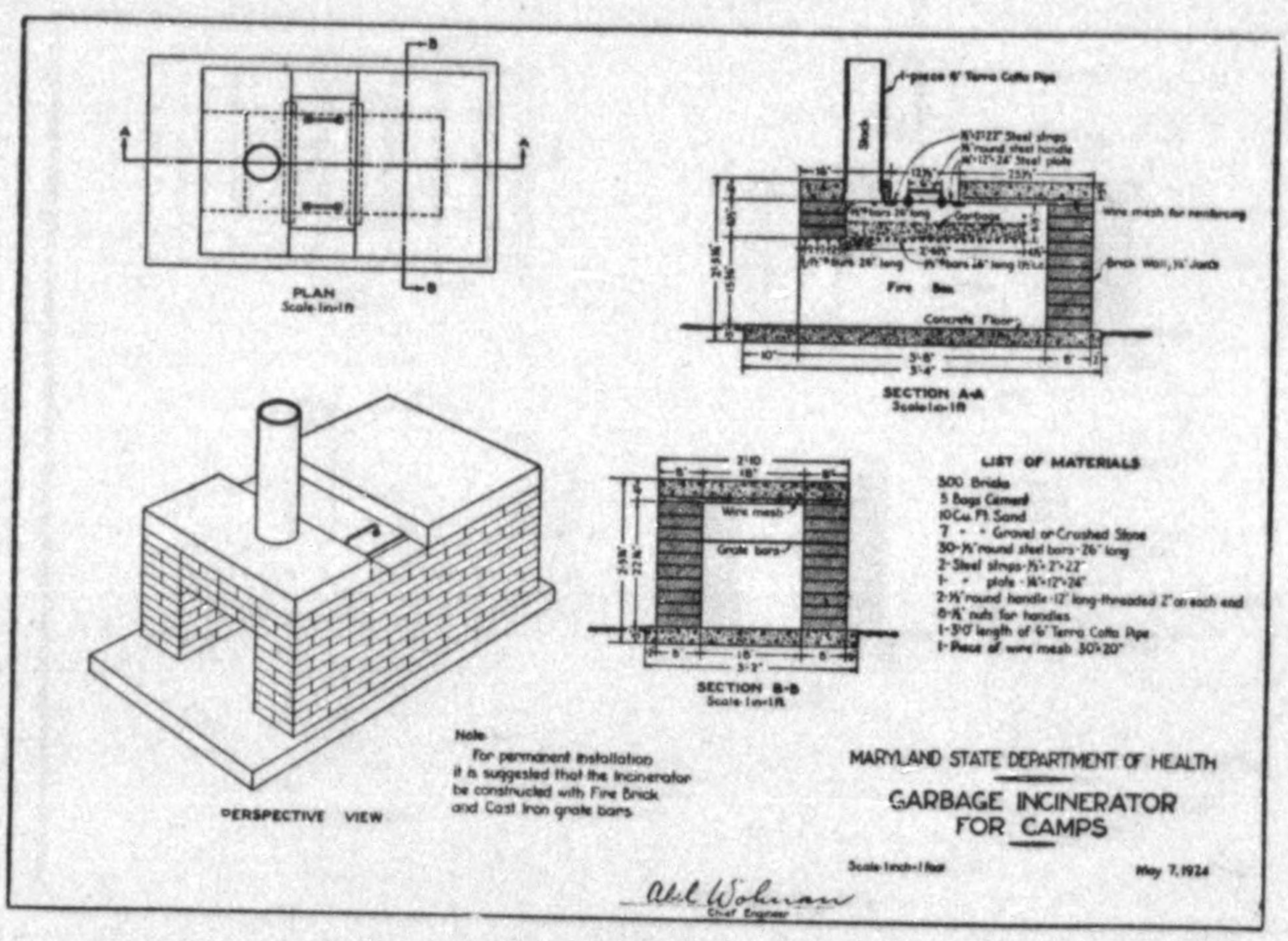


FIGURE 10—GARBAGE INCINERATOR FOR CAMPS.

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IOWA STATE DEPARTMENT OF HEALTH

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FOREWORD

Disease is spread through many mediums. Animals may be the instrumentality of its transmission; man himself is often responsible; and frequently weaknesses in environment permit its passage.

The public health engineer endeavors to control spread of disease through the latter sources. Beneficial though they are to society, water supplies, dairy products plants, sewage treatment plants, various industrial establishments, and manifold allied institutions sometimes incur breakdowns through which disease reaches man.

The engineer in public health has the dual task of finding means to prevent such occurrences and of correcting them when they do take place. This bulletin is devoted to a discussion of the efforts that are being made in Iowa in this regard.

Walter L. Bierring

Commissioner of Health.

IOWA PUBLIC HEALTH BULLETIN

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WALTER L. BIERRING, M.D., Commissioner........................Editor
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ENGINEERING IN PUBLIC HEALTH

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When you get a drink of water today, you probably will take for granted that the water which runs from your faucet is perfectly safe. With few exceptions, you will be forgetful of the terrific toll of lives claimed no longer than a generation ago by typhoid fever, Asiatic cholera and other intestinal diseases transmitted mainly by water.

Rapid progress in their control during recent decades has contributed materially to your sense of security, and dread of these water-borne diseases seldom interferes with the routine act of quenching your thirst.

The ordinary citizen, however, little realizes the labor, research and ingenuity of any army of scientists and engineers engaged in the development, purification and distribution of water, so that he may approach his water faucet with a feeling of safety. He forgets also that typhoid, cholera and other diseases carried in water might strike with increased vigor were it not for constant watchfulness on the part of public health officials.

Likewise, with milk. The housewife going to the front door every morning for the day's milk supply has no thought of the possibility that disease germs might lurk in the bottle. She feels secure in the knowledge that the milk is safeguarded from cow to consumer, and she depends upon the cooperation of veterinarians, dairymen, distributors and public health sanitarians to continue bringing her milk which is fit for her family.

Also, the average citizen pays but slight heed, if any, to the ultimate disposal of waste, both domestic and industrial, as long as it is removed from the premises in such a manner as not to offend the senses. He is unaware of the difficulties encountered in constructing vast networks of drains and sewers; he is rarely acquainted with the intricacies of developing and operating works for the treatment of wastes which render them innocuous and stable.

He barely notices ventilation unless faulty construction engenders discomfiture from drafts. The hazards of certain dusts, fumes, gases and vapors in his working environment are ignored unless they are such as to cause acute physical disturbance.

Thus it is with many phases of man's environment—in the home, in the office, in the school, and in the factory—and without artificial control of our outside surroundings, modern civilization would be impossible. Disease would decimate us were it not for the barriers erected in its path.

Behind the scenes in this conquest of environment is a man whom the average citizen not often meets. When his title is mentioned, the layman frequently asks, "What is that?" "What does he do?"

This man is the public health engineer, the specialized worker whose duty it is to prevent the spread of disease through environment, to find disease sources when it is believed they are in the environment, and to maintain the safety of man-made structures which are potential disease menaces. At work he presents much the same picture as his colleague in private industry. You will see him buried to his shoulders in blueprints, scratching his head over measurements, locations, materials and other factors of design that fill an engineer's mind.

But there is a difference. Where the private engineer at one time or another may deal with various kinds of building activities, the public health engineer is chiefly concerned with sewerage systems, water plants, sewage treatment plants, pollution of streams, swimming pools, wells, or in short, public or private utilities which may affect public health.

Away from his desk, the public health engineer may be found drawing a sample of water from a well thought to be contaminated, rushing to the scene of a flood where typhoid danger exists, surveying an industry for potential disease hazards, studying garbage disposal methods, checking the sanitation of dairy plants, observing environmental conditions in schools, or conferring with governmental officials on many other engineering problems.

In contrast with members of the medical profession and allied groups whose principal interest relates to individual hygiene and the direct spread of disease from person to person, the public health engineer undertakes control of environmental sanitation which also has to do with the spread of disease from person to person but indirectly through the medium of some outside agency or element in the environment.

Both in matters of individual hygiene and in the control of environment, scientific knowledge has far outstripped the means of putting it into practice. Diligent pursual of research and study, of course, must continue as there are still many unknown or little understood factors in the broad field of public health. However, the main responsibility now confronting public health workers is to direct their energies to the intelligent application of knowledge now available.

Toward this end the entire staff of the Iowa State Department of Health is working, and this bulletin is devoted to a discussion of the work of the department's public health engineers, whose importance in the field of applied disease prevention is often overlooked through lack of understanding on the part of the public.

It is hoped that the bulletin will clarify the nature and scope of public health engineering and renew interest in potential environmental disease hazards which still exist, despite remarkable progress in Iowa, and which the public health engineer is attempting to ferret out and correct in the most economical manner.

The very fact that prevalence of numerous disease scourges has spectacularly fallen before the onslaught of preventive medicine and public health engineering, has led to an indifferent and apathetic lay attitude. This attitude, which is unwarranted because there are still far too many illnesses and deaths from preventable diseases, necessitates greater alertness on the part of the public health engineer to prevent recurrences.

Typhoid fever and gastroenteritis are examples. In spite of the fact that the typhoid death rate in the United States skidded downward from 35.8 to 4.9 deaths per 100,000 population during the years 1900 to 1928, is is reported that 242 water-borne outbreaks of these diseases occurred in this country in the decade, 1920-1930.

A similar story could be told of other diseases; the death rate has declined but unnecessary deaths continue. In this respect, Iowa mirrors the national picture, though the public health engineer in this state confronts disease problems which are unique to rural areas. Obviously, the increase in national population with the resulting crowding of people into small areas has multiplied the problems of disease control; yet, paradoxically, many diseases responding to control of environment are less prevalent in the large cities than in less heavily populated areas because of sheer necessity greater attention has been given to the control of these diseases in metropolitan centers.

While the general tone of health in Iowa is above average, the files of the public health engineering division of the State Department of Health, nevertheless, contain many examples of epidemics traceable to environmental sources which could have been blocked if communities had taken proper preventive precautions.

Such epidemics are the "cases" of the public health engineer. Finding the cure for them is his task in the same sense that the doctor diagnoses a patient's illness and gives the required treatment for recovery. A few actual public health engineering "cases" follow, most of which occurred in Iowa. In practically all of these, "treatment" of the trouble not only checked further spread of the epidemic but also the "diagnosis" revealed a disease source which could have been prevented by prior application of sanitary safeguards.

Gastroenteritis Due to Cross-connected Emergency Water Supply

In February, 1937, an explosive outbreak of gastroenteritis occurred in the City of ————, Iowa. Of a population of 3,372, about 1,800, more than half the town's inhabitants, became ill within a few days.

Acting speedily, the townsfolk called epidemiologists and public health engineers of the Iowa State Department of Health to the scene. Upon arrival in the city, the public health men learned that the outbreak was explosive in nature and that a very large number of cases were involved. They therefore first checked the city water supply and found that 70 per cent of the people drinking it became ill while of those living in the outskirts using private wells, only 5.6 per cent were caught in the epidemic. It was also revealed that the latter cases, in the course of their work or otherwise, frequently used the city water which could account for their illness. Milk and foods were not overlooked as possible causes for the epidemic, but investigation revealed such varied sources of these supplies that it seemed highly improbable they could be implicated.

The public health engineers recommended chlorination of the city water supply. This was done promptly, and the outbreak ended with no recurrence. For the most part, the disease was mild and no cases of typhoid fever occurred. There were no deaths.

Previous to this outbreak, reports of the public health engineering division had repeatedly warned of the danger of a cross-connection in the city water supply. The water was from deep wells, perfectly safe at its source as indicated by frequent inspections and analyses and by clinical record. However, the water was pumped first into a surface reservoir from which it was repumped into the high pressure system. A fire pump, to be used **only** in cases of serious conflagration, took suction from this reservoir and also from a nearby polluted river.

A small amount of raw river water apparently was drawn into the water system during reconstruction work not long preceding the outbreak. At that time it was necessary to use the fire pump to transfer water from the surface reservoir into the system, and though reportedly the valve in the branch of the suction line to the river was closed, evidently it was slightly open.

Except for the cross-connection, the city had a good water supply, and the possibility of contamination, depending upon a number of factors occurring simultaneously, would appear remote to a layman. This epidemic would not have broken out, however, if the warnings of the State Department of Health had been heeded.

Typhoid Fever Resulting from Faulty Well Construction

In November, 1936, an epidemic of typhoid fever resulted in 39 cases and four deaths among inmates and employees of an Iowa county farm and among teachers and pupils of an adjoining school. Investigation revealed that the disease was spread by infected water.

In this case, a common water supply was used for both the county farm and the school, the latter deriving its supply from the county institution. The water was pumped from wells some distance away into an old dug well at the county home grounds which served as a storage cistern. From here it was repumped into the high pressure system. This cistern terminated in the basement of the boiler house several feet under ground and was covered, except for a manhole, with a **badly cracked** concrete cover. About two weeks before the outbreak, the main sewer had clogged, backing the sewage through a floor drainage connection onto the boiler room floor. Before the clogged sewer was discovered, the well top was flooded with sewage which seeped through the cracks into the well.

This arrangement had been used with impunity for 15 years. It required (1) a cracked well top, (2) a clogged sewer, and (3) a typhoid carrier in the institution to complete the cycle and cause the epidemic. The danger would have been noted at once upon inspection by a trained public health engineer.

Prior to an intensive campaign the State Department of Health inaugurated some 15 years ago, almost identical potential hazards existed at a number of municipal supplies.

Fly-Borne Typhoid Fever

For several years, typhoid fever had been more or less prevalent in ————, Iowa, and in 1927 the State Department of Health was requested to investigate 27 cases. The outbreak was not explosive, and cases did not develop simultaneously as in an epidemic, but occurred over a period of several weeks. Patients were scattered throughout the city, and with no history of previous contact.

Painstaking and complete epidemiological investigation was made but no common source of the disease could be found. One outstanding condition was noted, however. An unusually large number of insanitary privies were in use in all parts of the community, though the city was well sewered.

The sanitary safeguard of removing the fly-breeding privies was recommended. Within the next year, in accord with this recommendation, 500 sewer connections were made in this city of 6,500 population, and there has been no recurrence of typhoid fever.

Flies are believed to play an important part in the spread of enteric diseases. Such spread is usually not of epidemic proportions. That such diseases are fly-borne cannot easily be proved and outbreaks as clear-cut as the above are not common.

Typhoid Resulting from Inadequate Purification of Water

In spite of repeated warnings from public health officials, the town of ————, South Dakota, neglected to correct inadequacies in its water treatment plant. As a result, in December, 1932, typhoid fever struck, and of a total population of 1,530, 282 became ill and 29 died.

In this town, as in many others, sole dependence for safety was placed upon chlorine treatment of the water supply. State health authorities pointed out that the water treatment plant was entirely inadequate for treatment of the turbid river water which the town was using; yet, because the water had been used for years with no serious consequences, the people ignored this advice. The town was safe as long as the water contained no actual disease-producing bacteria.

In this case, however, active infection was probably introduced by a carrier or carriers in a boarding school from which sewage was discharged into the river a few miles upstream. Typhoid infection was carried to the townsite, and the chlorine dosage of the water treatment plant there was too small for efficient germicidal action.

The result was a disastrous outbreak which should never have occurred. Adequate treatment of the water would have obviated this epidemic.

Streptococcus Infection Spread by Milk

Pasteurization of milk would have averted an outbreak of 645 cases of streptococcic (septic) sore throat and scarlet fever in ———, Iowa, and contiguous area from October to December, 1937.

Suspicion here pointed to one raw milk dairy, and mastitis was discovered in the herd. Streptococci of the same strain as found in the throats of the victims were isolated from the milk of one cow. Probably, though this has not been definitely established, the cow had been infected by a milker or carrier suffering with streptococcic infection.

The dairy was closed and immediately the epidemic waned, except for a relatively small number of secondary contact cases.

Regardless of the infected employee and animal, this epidemic would not have developed had the milk been properly pasteurized. Of course, the infected employee should not have been allowed to work while sick, and the infected animal should have been removed from the herd.

Routine dairy inspections probably would not have revealed the carrier or the animal in time to have checked some spread of this disease, but this case is an excellent example of accidental infection where pasteurization would have protected a community.

Typhoid Fever from Presumably Pasteurized Milk

Unless pasteurization is properly carried out and unless the milk is properly handled after pasteurization, a false sense of security may result. Witness the city of ———, Iowa, in November, 1929.

Eighty-nine cases of typhoid fever resulting in 16 deaths occurred and investigation revealed a dairy as the only common source of contact of the cases.

The milk was apparently properly pasteurized, although records of pasteurization were incomplete. Milk bottles were washed at the plant but were not sterilized. The most probable source of infection was bottles which had become infected by handling either in a store, home or in delivery. Presumably milk had been delivered to a home in which there were typhoid cases, and these bottles were returned to the dairy and washed with other bottles at the dairy. In this way it was possible that the bottles may have become infected.

Effective pasteurization was nullified in this case by careless handling of milk after pasteurization. Even though milk is properly produced and pasteurized, it must be handled in such manner after pasteurization as to preclude any possibility of recontamination or reinfection.

Gastroenteritis Due to Multiplication of Bacteria in Food

The filling of cream pie ordinarily is an innocent substance, but in November, 1937, it was guilty of causing an outbreak of gastroenteritis which involved more than 300 inmates and employees of an Iowa state institution.

The filling had been prepared the day before it was eaten and permitted to stand in a hot kitchen overnight. With ideal food and temperature conditions, staphylococci in raw milk used in the filling multiplied so rapidly as to produce a chemical toxin or poison which was the cause of the illness.

The causative organisms were demonstrated in the raw milk and in the pie. Mastitis was found in the dairy herd and the organisms isolated were of the same strain as found in the pie.

Several things might have prevented the epidemic. Thorough boiling of the milk or pie filling would have destroyed the organisms. Immediate refrigeration of the filling would probably have prevented sufficient multiplication of the organisms to have averted trouble. The safest preventive, however, would have been the pasteurization of the milk.

Amoebic Dysentery Spread Through Faulty Plumbing

An outbreak of amoebic dysentery in the summer and fall of 1933 was traced to faulty plumbing in a hotel in a great American city. Because guests of this hotel came not only from all parts of the United States but also several countries of the world, the exact extent of the outbreak will never be known. Fourteen hundred and nine cases and 98 deaths are known to have occurred.

Investigations by public health engineers revealed that sewage could gain access to the drinking water, and presumably did on a number of occasions during the period, due to overloaded and leaky sewers, faulty plumbing and physical connection between the water pipes and drains.

This was by no means an exceptional example of bad plumbing arrangement. There are thousands of buildings in the United States where similar conditions could arise under a proper chain of circumstances, and no doubt many cases of disease, the epidemiology of which has not been worked out, have resulted from similar situations.

Back Siphonage Responsible for an Undulant Fever Outbreak

None of the 80 students affected in a recent outbreak of undulant fever in one of the nation's great universities was permitted entrance to a special laboratory where research in this disease was going on, yet they became infected.

Working in the same building which housed the special laboratory, these students were the victims of infection carried to them in their drinking water as a result of back siphonage. Rubber tubing attached to the water faucet in a sink where culture dishes and tubes were washed in the special laboratory formed the necessary cross-connection between the sink and the pure water pipes. Back siphonage of sink contents into the water line due to interruptions of pressure in the water pipe were demonstrated by use of dye. Plumbing fixtures were being installed during the month of the outbreak necessitating shutting off water frequently, thus adding to the probability of back siphonage. Thus, it was demonstrated beyond reasonable doubt that the epidemic was caused by infection of the drinking water through a connection with the laboratory sink. The danger of back siphonage is not limited to such uncommon instances as this. Back siphonage of toilet contents into the water pipes might occur in any building with faulty plumbing.

Lead Poisoning in a Factory

As a result of a recent study in a small storage battery plant conducted by industrial hygiene engineers of the U. S. Public Health Service, 56 workers were examined for lead poisoning. Of these, 31 were on production work in a lead environment and 17, or 55 per cent, were found to be suffering from lead poisoning.

Preventive measures recommended in this case should be followed in many industries for the protection of the workers. The engineers recommended: (1) isolation or segregation of hazardous processes; (2) improvements in ventilation; (3) housekeeping improvements; and (4) installation of shower baths, separate lockers for working clothes, and other items connected with maintenance of personal hygiene.

While this study was made outside Iowa, numerous establishments in this state may operate under similar dangerous conditions.

Anthraco-Silicosis Among Pennsylvania Coal Miners

In this study by the U. S. Public Health Service, 2,846 men were examined and 23 per cent of the workers were found to be suffering with anthraco-silicosis. The number of cases was definitely dependent upon the concentration of silica in the dust and to the duration of exposures.

Bituminous coal mining is not considered as hazardous as anthracite mining because of the comparatively small amount of silica in bituminous coal measures. However, complete engineering and medical studies are necessary to determine the extent of hazard.

Working side-by-side with the epidemiologist, applying his understanding of environmental disease sources to the outbreak at hand, the public health engineer contributed vital knowledge toward the control of these epidemics. Numerous other epidemics could be cited to show that control of environment is far from finished. Less spectacular but of more frequent occurrence are the scattered cases of sickness and death caused by faulty environment. In most of these cases, epidemiological studies either are not made or do not reveal the source of infection, yet definite knowledge of the mode of spread of diseases indicates that some factor of environment is often responsible.

Another striking example of the effect of improvement of environment is the steady decrease in death rate of diarrhea and enteritis in the city of Chicago, Illinois, in children under two years of age. This rate decreased from more than 140 deaths per 100,000 population in 1913 to 2.5 deaths per 100,000 population in 1932. Pasteurization of practically all the milk in the city has been given as a probable cause for this tremendous decline. It is immaterial whether or not improved milk sanitation, improved water supply, improved processing and refrigeration of foods, improved waste disposal or more wholesome foods constituted the main reason for this decline, for it is reasonably certain that better control of some or all of these environmental factors were largely responsible.

The role of mosquitoes in the spread of malaria and yellow fever; of other insects in the spread of spotted fever and typhus; of rodents in the spread of plague; of animals in the spread of tularemia, are equally well known. Notable progress has been made in the control of some of these diseases, in others progress has been less satisfactory.

Other phases of environment are responsible for the spread of disease, but due to a complication of factors it is difficult to lay a finger on the exact cause. There is evidence that overcrowding in living quarters and lack of adequate sunlight and fresh air definitely contribute toward increased incidence in tuberculosis.

Certainly most communicable diseases are more prevalent and general health conditions are at a lower level among groups subjected to poor housing than among those enjoying comfortable homes. Conclusions as to housing being the causative factor must be approached with caution because usually a general low standard of living is associated with poor housing.

Entirely aside from specific diseases and accidents caused by exposure to dust, fumes, gases, mists and vapors in the factory or workshop, statistics reveal that the average span of life of the industrial worker is several years less than that of the other workers, and that incidence of tuberculosis, pneumonia and degenerative diseases is more prevalent among this group.

Epidemics of specific diseases spread through environmental sources, fortunately, are largely accidents, and prevention of them represents the negative side of public health. Potential hazards may exist for a long time without untoward results, as shown in several of the instances cited. In these, a series of circumstances had to take place simultaneously to cause the epidemic, and were it not for the fact that the odds of pure chance are so heavily against such occurrences, the task of control would be almost hopeless.

By the law of averages, on the other hand, it is too much to hope for a complete elimination of spread of diseases due to faulty environment. There is much, however, which can be done to prevent disease transmission through paths in environment which are known, and in which effective barriers can be erected. We can still greatly lengthen the odds against recurrence of many cases of disease by applying the practical control measures now at our command.

On the positive side of health, which is concerned with raising the general health level and physiological tone by a general improvement of environment, there is also much to be accomplished.

The effect of many factors in environment on our health are admittedly unknown. Minor illnesses resulting principally in loss of time, such as common colds, are far more important from an economic standpoint than are the epidemics reported above and probably are responsible for more unhappiness. Yet we have not succeeded in controlling this ailment nor do we know just what part environment plays in its spread.

We know the result of using water or food containing specific disease-producing germs, but we understand little about the physiological effect of drinking water or eating food which has been contaminated with substances of a non-specific nature.

Many advancements were made in health practices long before the scientific reason for them was known. As an example, water filtration was introduced for aesthetic reasons, but it was discovered that it lessened prevalence of Asiatic cholera and typhoid fever long before the germ theory of disease was advanced.

Today engineers are giving attention to noise abatement as a public health measure although the exact physiological effects of noise are as yet undetermined, except that it is unpleasant.

Modern ventilation and air conditioning are based more upon physical comfort than upon the physiological considerations of former years, most of which have been proved fallacious.

Smoke abatement is receiving serious attention as a public health measure.

No case has been proved against obnoxious odors, yet for many years control of odors has been considered a function of health agencies.

Past experience has taught health workers to be cautious about minimizing the health significance of objectionable environmental conditions which have not been demonstrated to be responsible for specific conditions of disease. More and more health workers are using physical comfort as a criterion in matters of environmental control where such conditions have not been proved to be specifically injurious but are definitely annoying.

Man has always struggled to overcome environment. He has spanned vast oceans, harnessed mighty inland rivers, and tunneled towering mountains.

He has succeeded in myriad ways to mold environment to his uses but his surroundings still loom before him with unconquered barriers. Among these are some which have grown out of the same instruments he has built in resisting environment.

They disturb man and slow his progress. They are hindrances to the physical perfection which he strives to attain.

Improving environment by mastering these obstructions to robust positive health is the public engineer's obligation for the future. Preventing spread of disease through environmental sources in existence today is his job for the present.

PUBLIC HEALTH ENGINEERING ACTIVITIES IN IOWA

Service is the keynote of the work of the public health engineering division of the Iowa State Department of Health. It aims in its inspections and investigations to cooperate with local authorities and to render service in assisting to solve some of the local problems where special technical knowledge is required. It has certain functions made mandatory by law. It has other functions authorized by law either specifically or by implication under general terms. The policy followed, however, is to secure improvements in sanitation by cooperation insofar as possible and to invoke law enforcement powers only as a last resort.

The need for public health engineering in Iowa was formally recognized in May, 1913, when a division of sanitary engineering was created in the Iowa State Department of Health. From then until 1923, one engineer was associated with the department. In the latter year an assistant was added, and in 1925 two more assistants joined the staff for the purpose of carrying out studies contemplated under the Stream Pollution Law which was adopted by the General Assembly in 1924. Now known as the division of public health engineering, it includes a director and seven assistant engineers.

Their duties in the field of sanitation may be enumerated as fact-finding, advisory, educational and law enforcement. Emphasis is placed upon the first three.

Scope of Public Health Engineering Activities

The engineering division of the State Department of Health is engaged in the following activities:

A. Public Water Supplies
  1. Municipal
    a. Makes routine surveys of existing water works and recommends improvements to local officials.
    b. Reviews and approves plans for new plants and extensions or improvement of existing plants.
    c. Makes special investigations upon request.
    d. Advises local superintendents on operation, laboratory procedure, etc.
    e. Checks operation efficiency of treatment plants with field laboratory.
    f. Collects specimens and interprets reports of analysis made by State Hygienic Laboratory.
    g. Makes well location surveys in cooperation with Iowa Geological Survey.
    h. Reviews weekly operation reports submitted by operators.
    i. Holds regional conferences for operators and superintendents.
  2. Makes inspections and certifies to U. S. Public Health Service all drinking water used on common carriers.

B. Public Sewerage, Sewage Disposal and Waste Disposal
  1. Municipal
    a. Reviews and approves all plans for new sewer systems and sewage disposal works, and for extensions to same.
    b. Makes routine inspections of sewage treatment plants, and recommends improvements to local officials.
    c. Makes special field investigations with field laboratory to:
      (1) Check efficiency of plant.
      (2) Advise operator on plant operation and plant laboratory procedure.
    d. Holds regional conferences for superintendents and operators.
    e. Makes investigations and advises local officials on garbage and refuse disposal.

C. Stream Pollution
  1. Makes investigations of stream pollution including:
    a. Bacteriological and chemical examinations of stream water to determine extent of pollution.
    b. Determination of source of pollution, and chemical examination of sewage and industrial waste.
    c. Examination of the physical condition of stream.
  2. Prepares reports covering stream pollution investigation.
  3. Assists in conduct of hearings on stream pollution before the Commissioner.

D. Swimming Pools
1. Reviews and approves plans and specifications for new pools.
2. Makes inspections and advises managers and operators through reports and bulletins.
3. Interprets results of analyses.
4. Reviews weekly operation reports.

E. State Institutions
1. Makes routine inspections of water supply, sewerage, garbage disposal and milk sanitation, and reports findings to Board of Control.
2. Reviews and approves plans and specifications for sanitary facilities.

F. State and Federal Parks
1. Reviews plans and specifications for all sanitary facilities.
2. Makes inspections of water supply, sewerage, garbage disposal and swimming beaches, and reports findings to Conservation Commission.

G. Communicable Diseases
1. Cooperates with epidemiologist by making the necessary sanitary investigation such as water, milk, insects and rodents, and plumbing, in the conduct of an epidemiological study.
2. Supervises emergency installations of water purification devices, etc., in case of epidemic or threat of epidemic.

H. Plumbing
1. Prepares, revises and interprets State Plumbing Code.
2. Acts in advisory capacity to local enforcement agencies.

I. Housing
1. State Housing Law (applicable to first class cities only).
   a. Acts in advisory capacity to local enforcement agency.
   b. Interprets state code.
   c. Conducts hearings on disputes before Commissioner.
2. Makes inspections and advises local boards of health upon request.

J. Public Health Nuisances
1. Makes investigations on request of local boards of health or five citizens.
2. Acts in advisory capacity to local boards.
3. Enforces laws upon failure of local board to act.

K. Summer and Other Camps
1. Makes inspections of sanitary facilities including water supply, sewerage, sewage disposal, refuse disposal, swimming pools, milk, housing and food handling, and advises directors and operators on general sanitation matters and suggests improvements.

L. Milk Sanitation (Milk sanitation by law is a function of the State Agriculture Department and local boards of health)
1. Makes fact-finding surveys of condition of milk sanitation at request of any local board of health.
2. Assists any local board of health in drawing up ordinance and in setting up local inspection and laboratory service.
3. Makes rating of efficacy of local inspection upon request.

M. Industrial Hygiene
1. Conducts preliminary survey of all types of industry to determine nature and magnitude of hazards caused by dusts, gases, vapors, improper ventilation, poor lighting, etc.

2. Makes studies of hazardous processes and conditions, advising industries of findings and recommending methods of control.
3. Reviews occupational disease reports and investigates cases reported.
4. Promotes keeping of sickness records by industry and associated organizations and makes statistical analyses of such reports.
5. Acts in advisory capacity to enforcement agencies, including Bureau of Labor, Mine Inspector and Industrial Commissioner.
6. Conducts educational program to acquaint industry, labor and other interested groups with importance of program.

N. School Sanitation
1. Acts in advisory capacity to Department of Public Instruction on water supply, sewage disposal, heating, lighting and ventilation.
2. Prepares and distributes bulletins and standard plans on sanitary facilities.

O. Rural and Community Sanitation
1. Sponsors and supervises W. P. A. privy program.
2. Prepares and distributes standard plans on private water supply and private sewage disposal.

P. Cooperative Work with Other State and Federal Agencies
1. Reviews plans and specifications of all sanitary projects financed with federal aid.
2. Makes inspections and acts in advisory capacity on matters of sanitation to state and federal agencies, including Farm Security Administration, Federal Housing Administration, Department of Social Welfare and Civilian Conservation Corps.

ENGINEERING IN LOCAL HEALTH SERVICES

Considering the array of functions listed above, the staff of engineers in the State Department of Health is entirely inadequate to cover the state thoroughly. Therefore, many of the activities are admittedly of a superficial nature and many other phases of control of environmental sanitation are as yet untouched. Further, it is believed that many of the phases of sanitation can best be handled by local agencies with the State Department of Health acting as a coordinating, correlating and advisory agency.

There are, for example, 9,019 rural one room schools in the state. Surveys by district and county engineers in 10 scattered counties reveal that 48 per cent of the schools have no water supplies at the school, less than one per cent have water piped into the schools, and many of the existing wells were inadequately protected against contamination; less than one per cent had water flush toilets; 79 per cent had insanitary outside toilets; 78 per cent had window arrangement resulting in cross-lighting.

Reports from the State Hygienic Laboratory indicate that 85 per cent of all samples of water submitted from private wells are unsatisfactory.

Only 33 of the 917 municipalities in Iowa have any local milk inspection service.

There is no provision for housing inspection and control except in the sixteen first class cities.

Plumbing inspection is mandatory only in cities of over 6,000 population. Few cities under this size exercise any control over plumbing.

Most semi-public water supplies, such as at restaurants, tourist camps and other such places not having a municipal water supply available, are neither inspected nor regularly checked by analysis.

Except in a few of the larger cities, there is no local inspection of restaurants and other food handling establishments.

These and other findings which have not been included give some indication of the magnitude of the task and need for greater attention to sanitation by local health agencies.

Prior to 1936 there was no public health engineer in any local health agency in the state. Beginning with that year, engineering service in district and county health services has expanded to include 29 counties as follows:

District No. 1 (Lyon, Osceola, Sioux, O'Brien, Plymouth, Monona and Sac counties)

District No. 2 (Marion, Mahaska, Clarke, Monroe, Decatur, Wayne and Appanoose counties)

District No. 3 (Allamakee, Black Hawk, Delaware, Dubuque, Jackson, Tama and Johnson counties)

District No. 4 (Calhoun, Webster, Hamilton and Boone counties)

County units in Woodbury, Polk, Washington and Des Moines counties.

These district and county engineers represent the State Department of Health in their respective areas in routine functions such as investigation of public water supplies, sewerage, nuisances, etc., under general supervision of the central division. In this way better service can be rendered than could be given from the central office.

Here again, in districts comprising several counties, the duties are so multitudinous as to preclude the possibility of covering all the neglected functions noted above.

In two of the county units the engineer has direct charge of milk inspection services; in two counties the engineer serves in an advisory capacity in the various sanitary inspection services conducted by the local board of health; in most of the counties in the districts a considerable amount of school sanitation work has been done and demonstrational and educational programs on milk sanitation and all phases of rural sanitation are being carried out.

The services in the several district and county units vary somewhat as necessitated by local conditions and needs. Furthermore, much of this work is new in Iowa and the best methods of approach must be worked out by trial and demonstration.

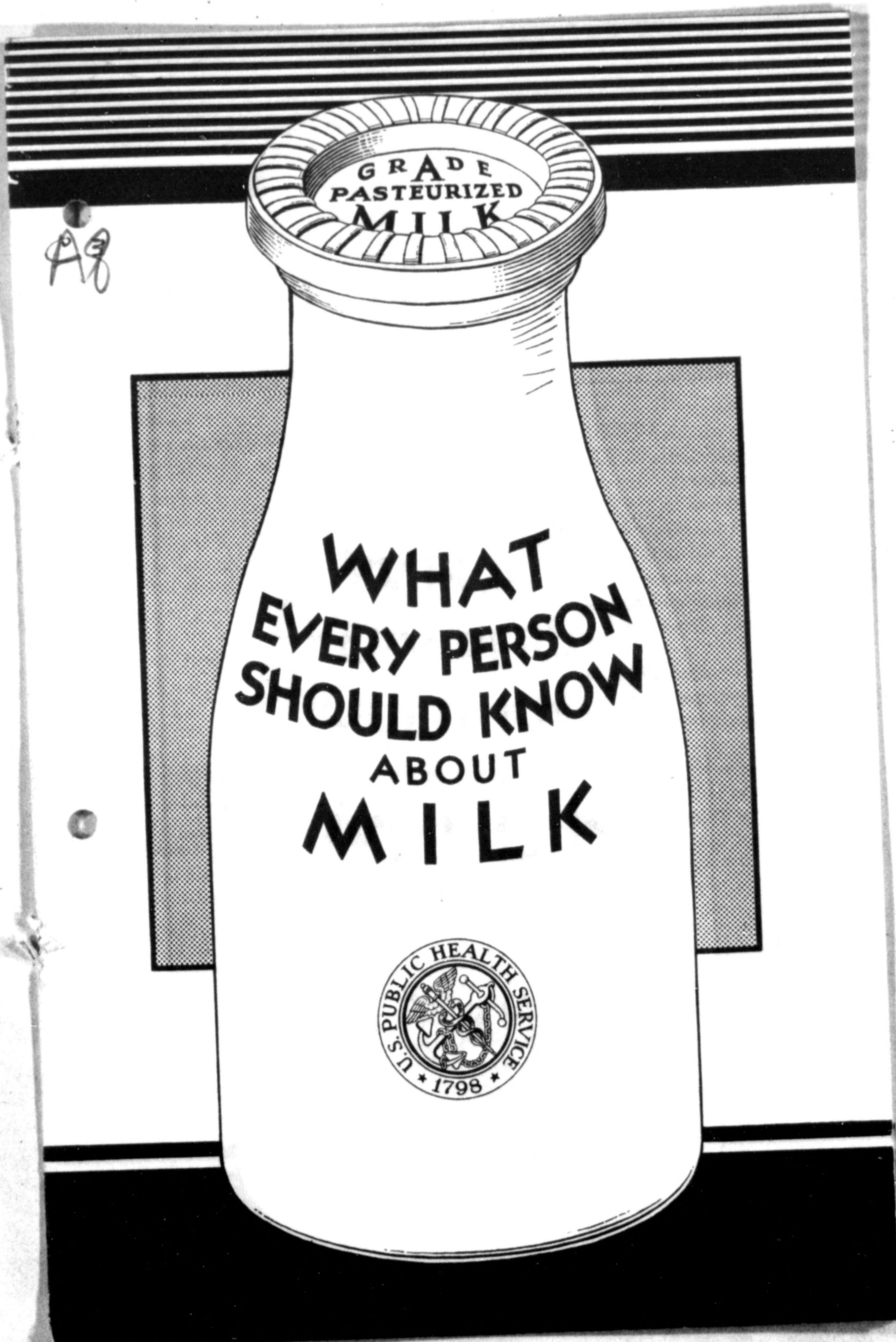
Future Expansion

The ultimate goal of public health engineering is a unified, correlated program for control of environmental sanitation in the entire state.

It is suggested that this can be accomplished by further expansion of the district and county health services to include the counties not now so served. Thus the entire state would ultimately be divided into districts, each comprising one or more counties depending upon the concentration of population and special needs, with a public health engineer on the staff of each district. His duties would be twofold. He would do all the work of a technical nature within the district and he would serve in an advisory capacity to the trained sanitarians in the several municipal and county health units. These sanitarians would be responsible for the routine inspections and enforcement of local regulations and ordinances covering matters of milk and food sanitation, housing, plumbing, private and semi-public water supplies, private and public sewage disposal, and similar items of sanitation.

Such a program is ambitious and will probably require considerable time before it is carried out in its entirety, although some areas in Iowa now are operating under substantially such procedure. It may be necessary to make changes in detail from time to time and to vary the program to best meet local needs.

This or a similar long range program must be adopted if Iowa is to have the benefits of modern public health engineering.


GRADE A PASTEURIZED MILK
WHAT EVERY PERSON SHOULD KNOW ABOUT MILK
U.S. PUBLIC HEALTH SERVICE
1798

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

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WHAT EVERY PERSON SHOULD KNOW ABOUT MILK [1]

By Leslie C. Frank, *Senior Sanitary Engineer in Charge, Sanitation Section, Division of Public Health Methods, National Institute of Health, United States Public Health Service*

Of all things of life which affect human welfare none is more important than food. Food is to man what coal is to the furnace or gasoline to the automobile. Food furnishes man with internal heat, without which even overcoats would not keep him warm. Properly selected food provides mankind with the mental and physical energy which has been the mainspring of all civilization, it repairs the structural damage which the wear and tear of life inflict upon our bodies, and it helps make us resistant to disease. On the other hand, improperly selected food is responsible for a large proportion of human ills, from a simple stomachache to the shortening of life itself. In short, food is all-important in the human economy.

Of all the kinds of food none is more important than milk, the principal food of infants and small children. There are three important questions about milk which every person should be able to answer. They are:

(1) Why is milk such an excellent food, and how much of it should be included in the diet?

(2) How can milk be safeguarded to prevent it from transmitting disease?

(3) How can consumers be certain that the milk they drink has been thus safeguarded?

(1) *Why is milk such an excellent food, and how much of it should be included in the diet?*

In the first place milk is the only food specifically prepared by nature for the young of mammals. Nearly everyone will immediately agree that a substance specifically prepared by nature for no other purpose than for food is most likely to contain the food elements needed to sustain life and justly deserves the title recently conferred upon it, namely, "the most nearly perfect food."

It is by no means sure that we know all of the attributes which the perfect food should have, but we can at least discuss some of them.

[1] Supersedes Reprint No. 1659.

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It will be obvious that one of the most important attributes which a food should possess is that it be a good source of energy, since every living thing needs a fresh supply of energy every day. Milk is such a food and, furthermore, is a cheap form of energy. The equivalent energy value in the form of certain other widely used foods is more expensive.

Milk is also a good muscle builder. It is rich in protein, which is required for muscle building. A child cannot grow and form strong muscles without protein. A full-grown adult cannot keep in health without it. A quart of milk yields more than an ounce of pure protein, that is, more than one-third of the total daily protein requirement of an adult.

Again, milk is a good tooth and bone builder, for it contains plenty of lime. Children particularly need lime, and the lime should be in a form which is easily utilized by the body. This is above all true of the lime in milk. One cup of milk contains as much lime as 3½ cups of carrots, 7 eggs, or 42 slices of bread.

Milk is a far more concentrated food from the standpoint of solids than most of us imagine. We think of milk as a liquid not much above the consistency of water; but it contains 13 percent of solids by weight, which is more than is contained in onions, beets, carrots, squash, pineapple, turnips, oysters, cabbage, radishes, cauliflower, spinach, watermelon, pumpkin, tomatoes, asparagus, celery, lettuce, or cucumbers. When we buy 1 pint or 1 pound of milk, therefore, we buy more actual dry solid food than when we buy 1 pound of any of these other foods.

Milk is also an excellent source of fat in the form of cream, which, with the milk sugar, is directly related to its fuel value.

Milk is an excellent source of vitamin A. Professor Sherman, of Columbia University, one of the outstanding diet specialists of the world, states that "milk is the most important of all foods as a source of vitamin A." The same author states, in his book on "Chemistry of Food and Nutrition": "Of the three vitamins A, B, and C, vitamin A is the factor of greatest practical importance to nutrition and health because so many of our staple foods are poor in vitamin A, and because a dietary poor in this vitamin causes such wide-spread weakening of the body and increases its susceptibility to so many infectious diseases."

In the January 1932 issue of the American Journal of Public Health, the work of Professor Mellenby and his wife on vitamin A (British Medical Journal, Oct. 3, 1931) was discussed. As a result of their work with 550 pregnant women, these authors reported a significant reduction in morbidity following the administration of a preparation containing vitamins A and D; and the authors conclude, on the experimental evidence, that the vitamin-D fraction had little to do with the results.

Milk seems also to be a good source of vitamin G. This vitamin, as the result of the renowned work of the late Surg. Joseph Goldberger, of the Public Health Service, has been found to be valuable both in preventing and in curing pellagra, a dietary deficiency disease. Since milk contains vitamin G, the consumption of milk has been stressed by Goldberger and others as one important measure for combating pellagra.

Finally, milk is one of the most digestible of foods. It is easily and completely digested by most persons. Crumbine and Tobey state that the coefficient of digestibility of milk is from 97 to 98 percent.

It may be asked why milk was called "the most nearly perfect food" rather than "the perfect food." This is because, while it is the most nearly perfect food, it is not absolutely perfect, and what has been said would not be complete without reference to its shortcomings. Milk does not seem to be an entirely dependable source of certain vitamins, nor does it contain sufficient iron, and experiments have shown that infants and young animals restricted entirely to milk over considerable periods of time develop anemia.

For this reason, and also because variety in the diet stimulates the appetite, we should not try to live on milk alone. The diet of normal children should include a quart of milk daily, supplemented with a wise selection of other foods, among which should be included orange juice, cod-liver oil, and green vegetables. Normal adults may wisely include at least a pint of milk in their daily diet. Of course, abnormal adults or children should receive and follow competent medical advice.

It seems reasonable to believe that in the future public health officials will not always grade milk on the basis of its cleanliness and safety alone, but will also grade it with reference to its nutritive value. Recently it has become quite apparent that the kind of feed a cow gets affects the nutritive value of the milk she gives. Therefore it may be anticipated that some time in the future grade A milk may be required to have been produced by cows which receive at least a standard balanced ration so that their milk may possess the maximum food value for human beings.

(2) *How can milk be safeguarded to prevent it from transmitting disease?*

It seems a pity that milk can be such an excellent food and at the same time so dangerous if not properly safeguarded. But it is unfortunately true that milk is not only a good food for human beings, but also a good food for certain types of disease organisms, such as those causing typhoid fever and diphtheria. Then, again, milk may sometimes, without our knowledge, come from sick cows. In such cases their milk may at the time of milking contain large numbers of the organisms of such diseases as septic sore throat, undulant fever, and tuberculosis.

Occasionally there occur milk-borne outbreaks of appalling magnitude. Only a few years ago a milk-borne outbreak in Montreal caused over 5,100 persons to be stricken with typhoid fever, and killed over 500 of them. Fortunately most disease outbreaks caused by unsafe milk are not nearly so serious as the Montreal outbreak, but the United States Public Health Service receives reports each year of from 30 to 50 outbreaks.

This fact is tremendously significant to all of us who drink milk—*and especially to all of us who have children.*

Among the diseases which may be transmitted through milk are tuberculosis, typhoid fever, scarlet fever, diphtheria, septic sore throat, and undulant fever. Let us confine ourselves for the moment to but three of them—tuberculosis, typhoid fever, and septic sore throat.

Suppose you were a dairyman. What would you do, short of pasteurization, to make sure that none of your customers would ever contract any of these diseases by drinking your milk?

Well, in the case of tuberculosis, almost the only thing you could do would be to have your cows tested for tuberculosis and kill those that showed they had it.

Suppose you did that. Suppose you had a herd of 50 splendid, pure-bred cattle, that you had them all tested, found 3 or 4 of them to be tuberculous, had these 3 or 4 slaughtered, and then continued with your business. Would you have protected your customers from contracting bovine tuberculosis? If I were one of your customers could you give me real assurance that I would never regret having permitted my children to drink the milk from your dairy?

Certainly the four you had slaughtered would no longer be a menace. But suppose that a year later, when you came to test again, you found another cow to be tuberculous. Then you would face a very serious question. You would wonder how many months it had been tuberculous. You would be assailed by the disturbing thought that perhaps some innocent child had received through your milk supply the germs of tuberculosis, an infection which might not disclose itself until considerable time had elapsed, until, perhaps, the child and the parents had forgotten that you had ever been their dairyman.

Do not let anyone benumb your conscience into believing that this does not happen. It does happen, again and again, even at certified and grade A raw-milk dairies, and slaughtering the infected cows does not undo the damage they have already done.

Now let us pass on to typhoid fever. If you were the owner of a raw-milk dairy, what would be the most effective thing you could do, short of pasteurization, to make sure that your milk supply would not carry typhoid fever to your customers?

Of course, if one of your milkers or other helpers contracted typhoid fever, you would at once have him quarantined or sent to a hospital; and if you were prompt and careful, there would probably be very little danger. But, unfortunately, that is not usually the way epidemics of typhoid fever are caused by milk. When milk becomes infected with typhoid fever it is usually not a sick person who is at fault, but, instead, a perfectly well individual, one who had had typhoid fever perhaps years ago and who possibly did not even know that what he had was typhoid fever. Nevertheless, he has, as a result of this possibly unrecognized sickness, become what is known as a typhoid carrier. Such a man is, so far as we know, a perfectly well individual. He doesn't look sick and he doesn't feel sick. But, unfortunately, he still carries typhoid fever germs, either in his gall bladder or elsewhere, from which they are discharged with his feces or urine, and thus accidently now and then find their way to his hands, his clothing, and eventually to the dairy equipment and to the milk supply.

Of course, the typhoid-fever carrier is not aware of his condition. If he were, he would, in most cases, be honest enough to refuse to imperil the lives of his fellow beings by continuing to work at a dairy. But that is the dangerous thing about it. The typhoid carrier is usually ignorant of the fact that he is a menace, a carrier of disease and death.

Knowing these facts, then, what would you do if you were the owner of a raw-milk dairy? Possibly you would do what is required by the Public Health Service milk ordinance for grade A raw-milk employees who have at any previous time had typhoid fever. You would have everyone at your dairy send samples of their feces and urine to the health department laboratory so that it could be determined whether they contained any typhoid organisms. Fortunately scientists have discovered an excellent method of recognizing typhoid fever germs.

Now suppose you took this precaution and the laboratory reported that so far as it could determine none of the specimens of feces or urine contained the germs of typhoid fever. Could you then rest assured that none of your employees is a typhoid-fever carrier, and that none of your customers would ever contract typhoid fever from the milk you sold them?

Unfortunately, the answer must be no. Many typhoid-fever carriers do not discharge the typhoid-fever germs every day, and on the day the specimens were collected and sent to the laboratory the carrier, if there is one at your dairy, may or may not have been discharging the organisms. If he was discharging them, the chance that the laboratory would find them is excellent; but if he was not discharging them the laboratory could not, of course, find them.

There is, therefore, no way to make absolutely sure that raw milk will never contain the germs of typhoid fever; and if you knew as much about the danger as the health officer does, you, as a dairyman, would live constantly in fear lest some morning you awaken to find the newspapers pointing the finger of accusation at you and your milk supply.

We have now discussed 2 of the 3 diseases we intended to discuss. How about the third—septic sore throat? What could you, if you were a producer of high-grade raw milk, do to prevent the transmission of this disease through your milk supply to your customers?

Frankly, I do not know. A milker *may* think he has an ordinary cold, when really he has septic sore throat. He may then infect the milk supply directly, or he may infect a cow's udder during the milking process, and the milk from that cow may later be simply teeming with the organisms of the disease.

Suppose we were to examine every milker's throat every day and every cow's udder every day. Even then we would not have done away with the danger, because by the time the report came back from the laboratory some of the milk would have been consumed. Of course, I need not tell you that a daily examination would be out of the question, if for no other reason than the expense entailed.

A septic sore throat outbreak can be very serious. In Portland, Oreg., some years ago, a milker infected a cow's udder; and before the resulting epidemic was quelled, 487 persons sickened and 22 died.

To repeat, I do not know of any way in which you could guarantee that septic sore throat would not be spread through your raw-milk supply.

It seems impossible, then, to escape the conclusion that all milk should be either pasteurized or boiled to make it safe.

Should we rely upon boiling? That is what is done in many parts of Europe and South America, and, as a result, they have in those places practically no milk-borne disease. But with these people boiling milk is a matter of daily habit. In most of the areas in question, the housewife does not have ice, and milk is boiled to keep it from souring.

In this country we have to deal with two factors: First, that most families do have ice or electric refrigerators and can keep milk sweet; and second, that many people do not like the taste of boiled milk.

If health officers simply said to all of the people, "Boil your milk," they could not depend upon a sufficient number doing it to prevent epidemics. Again, the adults and children who now drink raw milk because they like its flavor would not drink so much milk if it had to be boiled, and we must, by all means, encourage people to drink enough milk. It is just as important to do this as it is to make milk safe.

There is, then, only one other thing we can do (short of putting chemicals into the milk, and nobody wants to do that), and that is to pasteurize the milk. That is why most health authorities today feel that *all* milk should be pasteurized. The most common method of pasteurizing milk commercially is to heat it to 143° F. and hold it at that temperature for 30 minutes. This treatment kills or renders harmless all disease organisms which may be transmitted through milk. Higher temperatures for shorter periods are also effective.

You need not be worried about the effect of heating milk upon its food value. The vast majority of health officers and physicians today believe that pasteurizing milk has no significant effect upon its food value, especially when it is remembered that all children should receive a supplementary diet in addition to milk.

Several years ago the Public Health Service conducted an intensive study of about 3,700 children to determine whether those who drank heated milk actually throve less well than those who drank raw milk. The results of the studies showed that the average weight of the children receiving raw milk was 33.2 pounds, whereas the average weight of the children receiving heated milk was 33.6 pounds; also the average height of the children receiving raw milk was 37.4 inches, whereas the average height of the children receiving heated milk was 37.5 inches. Furthermore, from the parents' reports it was found that the children who drank raw milk suffered with communicable diseases more frequently than did the children who drank heated milk only. The final conclusion of the study was that, taking into account the average supplementary American child diet, children who are fed pasteurized or other heated milk thrive as well as children who are fed raw milk, and contract certain communicable diseases less frequently.

"But," you may say, "many people do not like the flavor of pasteurized milk, and I am one of them."

That may be quite true; but it is true only when a low grade, unclean milk is used for pasteurization or when a high grade milk is improperly pasteurized. Pasteurization will not remove the bad flavor from bad milk, and even good milk can be damaged by pasteurizing it improperly. But if high grade milk is properly pasteurized, there is no change in the flavor. To prove this, your health officer may conduct the following demonstration:

He should satisfy himself that the local pasteurization plants are strictly observing the grade A requirements and that there is no real flavor difference, such as might result from the use of a higher pasteurizing temperature than is required or from exposure of the milk to copper. Then one of the local pasteurization plants may furnish both raw and pasteurized milk in quart bottles to the Rotary and other civic luncheons, the bottles being marked with distinguishing marks unknown to the drinkers. Each member should be provided with six glasses, placed in a row in front of him. A small portion of pasteurized milk should be placed in 3 of the glasses and a small portion of raw milk in the other 3 in an order unknown to anyone but the health officer. The members should not be told how many glasses contain pasteurized milk. Then each member should be asked to tell by tasting which of the six glasses contain pasteurized milk. (It is fundamentally important that the raw and pasteurized milk be identically the same milk, except for the fact of pasteurization. This condition is accomplished best by obtaining the raw milk directly from the pasteurizer just prior to the pasteurization process, after thorough mixing, and then obtaining the pasteurized milk from the same batch of milk.)

Each guest should be provided with a small card. The glasses should be considered as being numbered from left to right and each guest should be asked to write on the card the numbers representing the glasses containing pasteurized milk. Then someone from the speaker's table should announce the true content of each of the six glasses, and all of the members who guess correctly may be awarded a prize of some sort.

If pasteurization really imparted an undesirable flavor to milk, most of the guests should give correct answers for all six glasses. If pasteurized milk really cannot be detected by flavor, most of the members should fail in reporting all six glasses correctly. In tabulating the answers, each guest who fails to report all six glasses correctly should be listed as "wrong." A very few may guess correctly just by chance. This chance is the same as that of throwing all 6 heads when pitching 6 pennies at a time, usually not more than 1 or 2 times in 100 throws ($p=0.0156$).

After this guessing contest has been tried upon at least 100 persons in the city, the results may be published in the newspapers as evidence of the fact that proper pasteurization really does not affect the flavor of milk.

Of course we should not rely upon pasteurization as a cure-all and neglect all precautions at the farm, even if the flavor problem did not exist. The pasteurization process is operated by human beings and therefore is not entirely foolproof, though it is nearly so. We should firmly insist that the milk we drink be not only properly pasteurized but also carefully produced, so that we will have the maximum practicable protection all along the line from the cow to the consumer.

(3) *How can consumers be certain that the milk they drink has been thus safeguarded?*

As above stated, milk which has been properly safeguarded must have been both carefully produced and properly pasteurized. Is the milk you buy such milk? The first thing you must know before you can be sure of this is whether the milk regulations in force in your city correctly prescribe the methods of production and pasteurization. There has been much disagreement on this point among health officers in the past, and obviously not all health officers have been correct. In some cities the milk is not carefully produced before pasteurization, and in others important pasteurization principles are ignored or faulty pasteurization machines used, and yet the milk may be sold as grade A or otherwise designated as safe.

To remedy this situation the Public Health Service has for a number of years been urging American States and cities to adopt one uniform system of effective control. The model uniform regulations are carefully reviewed annually by a National Advisory Board, composed of 16 experts in milk-control work.

Under the regulations approved by this board, grade A pasteurized milk is milk which has been both carefully produced and properly pasteurized and is as safe as any milk can be made. Grade A raw and certified milks are raw milks which are as safe as *any raw milk* can practicably be made. If you prefer to buy either of these raw grades, you can secure the added protection of pasteurization at home as follows: Heat the milk over a hot flame to 155° F., stirring constantly; then immediately place the vessel in cold water and continue stirring until cool.

If you buy grade A pasteurized milk, however, no additional home treatment is necessary.

About 875 American communities have already adopted these uniform milk regulations and are grading milk in accordance therewith. In such communities a milk distributor who is found to violate any grade A requirement is demoted or degraded by the health officer, and must remove the grade A caps and substitute lower grade caps, depending upon the nature of the violation. This attracts your attention if your milk distributor becomes careless. Finally, the health officer may revoke the permit of such a distributor if he persists in failure to safeguard the milk he sells.

You may wish to know what you should do if your municipality has not as yet adopted these nationally recommended uniform milk regulations. The best thing to do is to call on your health officer and discuss the matter with him. In most cases he will appreciate that and welcome your assistance in urging the city authorities to adopt the ordinance and provide the necessary inspectors.

However, your health officer may have already worked out a good milk ordinance of his own and he may be justly proud of the results he has accomplished. If he is in doubt as to whether the local ordinance is in all respects the equivalent of the United States Public Health Service ordinance, he may consult the State milk-control authority or the Public Health Service. Even if your local milk ordinance is a good one, however, your health officer and you may agree that there are advantages of economy and efficiency in the adoption of a standard. There is no profit in difference for mere difference sake. Of course, if your local ordinance is really better than the nationally recommended standard, your city should not drop the improvements; but it should be made quite certain that they are real improvements. If so, they should be brought to the attention of the Public Health Service, which should incorporate them in its standard.

One final doubt may still assail you. You may want to know how you can be sure that the local milk inspectors do not give a dairy a grade A rating when it does not deserve it. This is a very real problem which is taken care of by another part of the general national milk sanitation program of the United States Public Health Service. It recommends that the State milk-control authority in each State should periodically measure the excellence of the milk sanitation work done in each municipality in the State by means of a rating method devised by the Public Health Service, and award ratings. If the city milk-control work is found to rate 90 percent or more, the name of that city is included in a list published periodically by the Public Health Service. A copy of this list may be secured by addressing the Public Health Service. You and your fellow milk consumers should leave no stone unturned in helping your health officer qualify your city for inclusion in this list.

Last of all, the Public Health Service itself occasionally rates cities in the various States and thus checks the State rating work. This gives you the assurance that the ratings awarded by the State department are comparable with similar ratings in other States.

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SUMMARY

(1) Milk is an excellent food because (*a*) it is a natural food, (*b*) it is a cheap source of energy, (*c*) it is a good muscle builder, (*d*) it is a good tooth and bone builder, (*e*) it is a highly concentrated food, (*f*) it is an excellent source of vitamins A and G, and (*g*) it is highly digestible.

Normal children should consume a quart of milk a day, normal adults a pint, together with a well-balanced supplementary diet, which in the case of children should include such foods as orange juice, cod liver oil, and green vegetables. Abnormal children or adults should receive and follow competent medical advice.

(2) By careful production and proper pasteurization milk may be safeguarded so as to prevent it from transmitting such diseases as tuberculosis, typhoid fever, scarlet fever, diphtheria, septic sore throat, and undulant fever. Neither production precautions alone nor pasteurization alone are adequate. Both are necessary to assure the maximum protection from cow to consumer.

(3) Consumers may assure themselves that the milk they drink has been thus properly safeguarded by purchasing only grade A pasteurized milk as defined by the United States Public Health Service milk ordinance, or by pasteurizing at home certified or grade A raw milk as defined by this ordinance. Consumers should ascertain whether the local milk ordinance is equivalent to the uniform milk ordinance recommended by the Public Health Service, and if not, they should offer to assist the local health officer in having all of its provisions incorporated in the local milk ordinance, or, better still, in having the present ordinance repealed and the recommended uniform ordinance adopted outright.

To insure that the ordinance is strictly enforced, the local milk-control work should be rated at least biennially by the State milk-control authority, and the rating should be not less than 90 percent, based upon the standard rating method recommended by the Public Health Service. Cities with 90 percent ratings are listed periodically by the United States Public Health Service. Copies of the list and of the recommended uniform milk ordinance may be secured by addressing the Public Health Service at Washington.

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Sanitary Measures Hold Restaurant Customers*

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RECENTLY, 150 passengers of three railway trains operating out of a southern city were made violently ill from food poisoning within a few hours after eating ham and cheese sandwiches purchased from the "news butch." Among the passengers were about 100 soldiers and sailors. An investigation was made by the Public Health Service and the State Board of Health to determine the cause of the outbreak and to prevent a recurrence. It was found that the sandwiches had been prepared in an unclean sandwich shop under insanitary conditions, and kept for several hours at summer temperature. They were then delivered to the train concessionaire who kept them in a warehouse at room temperature for several hours more before placing them on the trains. By the time they were sold to the passengers in the train coaches, the sandwiches had been kept for from 6 to 12 hours without refrigeration. Laboratory examination of left-over sandwiches showed contamination with a staphylococcus organism capable of producing enterotoxin. Proper refrigeration would have prevented the rapid growth of the organisms and the development of the toxin which caused the food poisoning.

This is only one example of the reason why the U. S. Public Health Service as well as state and local health departments are so greatly interested in proper restaurant sanitation. Needless to say, the restaurant industry is even more vitally interested, because sick patrons may mean damage suits and certainly do not help a restaurant's reputation.

Outbreaks of the kind just described occur more frequently than one might imagine. They average one for nearly every day of the year. Each year the Public Health Service compiles reports of disease outbreaks submitted by state and city health departments. The number of epidemics from food is far greater than from water and milk combined. Thus, in 1942, 53 outbreaks were traced to water, 45 to milk and milk products, and 245 to other foods. These outbreaks involved several different diseases, but by far the commonest were gastroenteritis and food poisoning. The number of cases per epidemic ranged from a few to many hundred. The total number of cases reported traced to other foods in 1942 was 11,420 but there is no doubt that the reported cases represent only a fraction of those actually occurring.

A considerable portion of the outbreaks and the cases was traced to public or semi-public eating and drinking establishments. There can be no question, therefore, that we are faced with a serious threat to the public health from insanitary food establishments. Since the beginning of the war, each succeeding year has witnessed an increasing number of food-borne outbreaks and cases. The hazard of eating out is not confined alone to the civilian public; it is shared by the workers in war industries and by the men in uniform who are on furlough. It is a matter that affects the war effort now as well as the peace effort to follow, and none of us can afford to sit back

* Presented at National Restaurant Ass'n Convention, Chicago, Illinois, October 12, 1944.

and blame these conditions on the other fellow or on the war.

Of course, we all recognize that the problem has been made more acute by wartime conditions. There is a shortage of good food. It has been difficult to get the equipment you need. The labor problem is a tremendous headache, with trained help as scarce as hens' teeth, and with the labor turnover at an unheard-of level. But these factors do not plague you alone; they affect your competitors as well. The fact that many of you can and are operating sanitary establishments in spite of wartime difficulties is a fairly good indication of what all can do, provided they really want to.

The U. S. Public Health Service is doing all in its power toward a solution of the problem. It has no legal jurisdiction in the enforcement of restaurant sanitation in any state or in any city; that is a function of the state and local agencies. The Public Health Service does, however, serve as advisor and consultant to state and local health officers. It has developed recommended sanitary standards for food establishments, and has promoted the voluntary adoption of such standards and their proper enforcement by state and municipal health departments.

The sanitary standards are contained in Public Health Bulletin No. 280, the Ordinance and Code Regulating Eating and Drinking Establishments. These are recommended for adoption as state regulations and city ordinances in order to encourage a greater uniformity and a higher level of excellence in the sanitary control of eating and drinking establishments. The recommended ordinance is only a few pages in length. The interpretative code which accompanies it gives in detail the public health reason for each item of the ordinance and details of satisfactory compliance. The code serves to unify the interpretation of the ordinance, and therefore, to minimize enforcement misunderstandings. While it represents the best information available on restaurant sanitation, it should be considered subject to change as a result of research and experience. Suggestions for improvement are invited and given careful consideration by the Sanitation Advisory Board before new editions are prepared. Many proposals submitted by health officers, members of the industry, and your own Association are now being studied. Copies may be purchased from the Superintendent of Documents in Washington at 20c each.

This ordinance, or one based thereon, is in effect in all entire states and the District of Columbia, as well as in 108 counties and 178 municipalities located in 25 other states. It has been adopted as state regulations in 22 states. It has been our experience that the adoption of adequate standards is supported by the most enlightened members of the industry.

The mere adoption of such standards does not, however, guarantee proper enforcement. Much depends on the activity and intelligence of the enforcing agency and its inspectors. Accordingly, the Public Health Service has promoted the organization of an adequate restaurant sanitation program in the State Health Departments, with trained sanitarians qualified to exercise leadership and offer guidance to local inspectors. Advisory assistance is available to the states from the Public Health Service at Washington and the District Offices throughout the country. A training program for state and city inspectors is offered through field contacts and through regional restaurant sanitation seminars. During the past year, ten seminars of this kind were held throughout the country, with a total attendance of 1,067 inspectors. One of the features of these seminars is the presentation of a course of instruction for foodhandlers so that inspectors may be in a position to inaugurate such courses in their own communities. Such a training program is particularly useful during wartime when many experienced inspectors have left for military duty. The Public Health Service has also developed a rating system whereby the state agency may measure the status of restaurant sanitation in any community. In addition, mobile trailer laboratories assist the health departments in examining restaurant utensils for bacteriological cleanliness. During the past year over 40,000 utensils from 4,000 establishments in 76 cities were examined by these laboratories. You will be interested to know that only 32 percent of the spoons, cups, and glasses examined complied with the standard of not more than 100 bacteria per utensil; and beer glasses were the worst offenders, with only 15 percent coming within the standard.

But the portion of our program to which we have devoted the greatest attention during the past year is that concerned with the education of food handlers. We believe that most food handlers will improve their methods and acquire sanitary habits if taught how; and that legal methods of enforcement may be reserved for the recalcitrant minority. The inspector who employs the educational rather than the policeman type of approach is the one who achieves the most permanent results.

Among the educational materials developed by the Public Health Service on restaurant sanitation are the following:

1. An outline of six lectures for use at food handlers schools.

2. More than 175 lantern slides, with descriptions of each.

3. A pocket size manual of instructions for food handlers entitled "From Hand to Mouth." Because of its simple language, its humorous illustrations, and its emphasis on the importance of the food handler's job, this booklet has achieved wide popularity. It may be purchased from the Superintendent of Documents in Washington at ten cents per copy, or six cents in lots of 100 or more. Many restaurants and cafeterias have furnished copies to all of their employees.

4. A series of four film strips entitled "Our Health Is in Your Hands." One of these, subtitled "Health Habits for Safe Service," was shown here yesterday morning, at which time a brief description of the others was also given. They are intended for use by health departments and the industry in the training of food handlers, and are accompanied by voice recordings. The entire series will probably be available in a few months for purchase from a commercial source at a reasonable price.

5. An article on "Dishwashing" for the guidance of inspectors and the industry. It is now available in mimeographed form, but also appeared recently in Public Health Reports, and will soon be purchaseable as Reprint No. 2574 from the Superintendent of Documents at five cents.

6. A series of six posters entitled "For Our Patrons' Health," intended for display in restaurant kitchens and washrooms. They teach food handlers a few of the important aspects of food sanitation. They may be purchased from the Superintendent of Documents at 25 cents per set of six, with 25 percent discount for 100 sets or more. I shall return to a discussion of these shortly.

Some of these materials are available for free distribution, as long as they last, in exhibit booth 19 downstairs. They have been used at the food handlers schools conducted by the Public Health Service throughout the country in cooperation with local and state health departments, Chambers of Commerce, and local restaurant associations. Needless to say, much preliminary work is needed for successful schools, including advance meetings with restaurant operators to explain the purpose and secure their support. The schools consist of two or three sessions of one and one-half to two hours each, repeated as often as may be necessary. During the past year, the Public Health Service held 41 schools, with a total attendance of 36,000 employees. These schools serve as demonstrations to state and city health officials.

At the suggestion of your educational director, Miss Macfarlane, I shall devote the remaining few minutes of my time to a discussion of the six posters which I hope are visible to all of you.

1. *"Wash your hands often."* Fingers and hands touch numerous objects in the ordinary routine of the day's work—nose, mouth, handkerchief, body discharges, sores, soiled napkins, dirty dishes, mouthed silverware and glasses, etc. The fingers and hands may thus become contaminated with germs of various diseases of respiratory or intestinal origin. Many of you perhaps know that the organisms of dysentery and other diseases have been recovered with ease from the fingers and under the nails of known cases and carriers. These germs will in turn be transferred to everything that is touched, including food, clean dishes, clean tableware. Frequent handwashing is therefore essential for all food handlers, especially after each visit to the rest room. Forming this habit will help protect the health of the employee as well as of the customer. Besides, no patron likes to be served by a waitress with dirty hands or fingernails. This poster in the rest room will be a constant reminder to your employees.

But employees cannot be expected to wash their hands often unless adequate, convenient, and attractive lavatory facilities are furnished by the management. Facilities should include hot and cold running water, soap, and individual clean paper or cloth towels.

2. *"Use a fork—don't be a butter-finger."* Frequent handwashing will greatly reduce the germ population of hands and fingers, but a waitress cannot stop to wash her hands every time she handles food or utensils. It is obvious, therefore, that manual contact with food and drink should be avoided insofar as is possible. This poster is intended to drive home that lesson. Pick up sliced butter with a fork. Handle cracked ice with a scoop. Keep the thumb out of the soup. Use a spatula or knife to serve pie on a plate. Your customers will appreciate such service.

3. *"Keep these cold."* Lack of prompt and adequate refrigeration is the major cause of staphylococcus food poisoning. This is the most frequent disease involved in food-borne outbreaks. Some people still call it "ptomaine poisoning," but that is a misnomer. Staphylococci are the organisms found in boils and infected sores and wounds. It is difficult to keep them out of foods. Many strains, when allowed to multiply at room temperature, produce an enterotoxin or poison which is the cause of food poisoning. Of the 245 food-borne disease outbreaks compiled by the Public Health Service for 1942, 210 or 86 percent were reported as food poisoning or gastroenteritis, with a total of 10,566 cases.

Usually bacteria in food are harmless, and if this were always true there would be no reason to refrigerate food except to prevent spoilage. There is, however, no way to be sure that pathogenic bacteria have *not* entered the food, even though sanitary practices will greatly reduce this likelihood. The chances of contracting disease may be increased when the food contains large numbers of disease-producing organisms or their toxins. For this reason, perishable foods should be kept cold so that any small number of such organisms that *may* have entered will not be permitted to multiply. It should be recalled that bacteria are microscopic plants and that most plants do not grow in cold weather.

The foods causing most illness are those which make good mediums for the growth of organisms, i.e., those of animal origin such as meat, fish, and dairy products. Outbreaks often occur when such foods undergo considerable handling in the preparation following the initial cooking and are left at room temperature for several hours. Sliced, boned, hashed, or other cooked meats, especially ham and fowl, and pastries containing cream or custard filling are the most frequent offenders. They should be promptly cooled to well below 50° F.

The importance of prompt refrigeration of such foods in the prevention of food poisoning cannot be overemphasized. Food heavily contaminated with staphylococci is not likely to be toxic if refrigerated, but may become toxic if left at room temperature for a few hours. That is what happened to the sandwiches involved in the outbreak mentioned at the beginning of my talk. The management must provide adequate refrigeration facilities and see to it that the types of food previously discussed are promptly placed therein. One more thing—I have seen food refrigerators presumably at 50° F. or less which, when tested with a thermometer, were found to register over 60° F. It is a good plan to have a thermometer in every refrigerator and to watch it often.

4. *"Keep these under cover."* All food and drink should be so stored or displayed as to be protected from dust, flies, vermin, unnecessary handling, droplet infection from coughing and sneezing, and other contamination. Customers do not enjoy sharing their food with flies and roaches. Food should not be stored or prepared beneath overhead sewer or drain pipes unless such pipes are provided with suitable means to carry off possible leakage or condensation. Nor should it be stored on floors which are subject to flooding from sewage backflow. All rat harborages should be removed, and all openings in walls, floors and ceilings should be closed with rat proof materials. Every means should be used to keep out flies, roaches, and rodents, and to eliminate those that gain entrance. They may infect your food. All unwrapped or unenclosed food on display should be protected by glass front and top from public handling.

5. *"Handle with care."* It is of little use to clean utensils carefully if they are later stored and handled so as to be again contaminated. Containers and utensils should, therefore, not be handled by the surfaces which come in contact with food or drink or the lips of the user. Fingers should not touch the rims or inner surfaces of glasses and cups, the food surfaces of dishes, nor the bowls of spoons, the tines of forks, or the blades of knives. Do not imagine for a moment that your customers are not repelled by such practices.

6. *"Wash every piece carefully."* Everyone realizes the importance of proper dishwashing. According to various investigators, eating and drinking utensils may be responsible for the transmission of a number of respiratory and intestinal diseases. The organisms may be coughed or sneezed on food, dishes, and utensils; they may be left on glasses, cups, spoons, and forks by mouthing; they may reach the dishwater from washers or handlers or indirectly from dishes infected by users. But in addition to the public health aspect, there are esthetic considerations which attract or repel patrons. Who has not seen the irate customer rave about the lipstick on his glass or the egg on his fork?

These posters are intended for small establishments where dishes are washed by hand as well as large ones where dishwashing is done by machine. The fact that manual dishwashing methods are illustrated in the poster does not imply that they are superior to machine washing. It was easier for the artist to indicate the proper steps of sink washing than of machine washing. In either case, the same essentials apply: (1) scraping or prerinsing, (2) washing in warm water to which a good detergent has been added and which is changed frequently, (3) rinsing to remove the film of food and detergent particles, and (4) the final bactericidal bath in hot water at 170° F. or more, or in an approved chemical solution of sufficient strength. Manufacturers of dishwashing machines realize that improvements are needed; and the food equipment industry is many years behind the milk equipment industry in the production of easily cleanable equipment. Perhaps the greatest failure in dishwashing is the lack of an adequate supply of sufficiently hot water. The next most common failure is not having a large enough supply of glasses, dishes, and silverware to avoid rushing them through the dishwashing process at meal time. These are responsibilities of the management.

So much for the posters. In closing, let me again call attention to the fact that sanitation of food establishments is of vital concern to health officers, to the public, and to the industry. The health officer wants your cooperation. If he gets it, everyone will gain. If he doesn't, his job will be more difficult, but it is his duty to protect the public health. I urge you, each in your own community, to work in harmony with your health department. Unless you are short-sighted, indeed, you will find it to be good business.

A-8

IOWA PUBLIC HEALTH BULLETIN

Brucellosis in Iowa

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FOREWORD

When the first case of brucellosis (undulant fever) was reported by an Iowa physician ten years ago, it was regarded as a comparatively rare disease. Since then, more than one thousand cases have been reported in Iowa. During this period, several investigators connected with the Iowa State Department of Health have contributed valuable facts to the present knowledge of the disease, brucellosis, particularly as to the three closely related varieties of brucella organisms occurring in different animal hosts and the methods of spread to the human person.

The significance of direct contact with live stock affected with the disease has been fully established, so that brucellosis may now be regarded as one of the industrial hazards of this state.

The high incidence or occurrence of brucellosis in Iowa and its being limited largely to the porcine type of infection, makes the control of this disease one of the most important public health problems in Iowa at the present time.

Walter L. Bierring

Commissioner.

IOWA PUBLIC HEALTH BULLETIN

PUBLISHED QUARTERLY BY THE IOWA STATE DEPARTMENT OF HEALTH

WALTER L. BIERRING, M. D., Commissioner..................Editor

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* BRUCELLOSIS IN IOWA

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I. HISTORICAL HIGHLIGHTS

*** Brucellosis has assumed first place among the communicable or infectious diseases which are transmissible from animals to human beings. This disease probably existed on the Island of Malta and the Mediterranean region for many years prior to its careful study by Hughes and other surgeons of the British Army during the years 1890-1896.**

In 1887, David Bruce, an English physician discovered the brucella germ in the blood of one of his patients. In 1905, it was demonstrated conclusively that the form of brucellosis or undulant fever affecting human beings in the region of Malta, had its source in goats which were infected with the disease known as infectious or contagious abortion. In 1911; cases of brucellosis (undulant fever) in man were reported from Texas, these cases were likewise traced to infection in goats. Dr. Bang, an investigator in the field of veterinary medicine, discovered in 1896 the germ which causes infectious or contagious abortion in cows. A com-

* Note. The term Malta fever, often used in this country to designate the disease under consideration is undesirable from several standpoints. Obviously, the people of Malta desire to avoid unfavorable publicity on account of a disease, formerly widely prevalent in that part of the world, but long since, well under control. Furthermore, as the disease is now known to be world-wide in distribution, the name Malta fever is no longer satisfactory. The term undulant fever is derived from the appearance of the patient's fever chart, which in some instances resembles waves or undulations. The undulating type of fever is present in some, but not nearly all of the cases and for this reason, undulant fever is not an accurate term. The name *brucellosis* has been suggested by Ward Giltner, Dean, Division of Veterinary Medicine, Michigan State College. The first two syllables of the term are derived from brucella, the scientific name for the causative germ; the last two syllables are the same as in the well known term "tubercul-osis."

mon name for this condition in cattle is Bang's disease. That the brucella germ is often present in the milk of infected cows, was first shown by two research workers, Schroeder and Cotton, in 1911. Hogs are also subject to infectious abortion, the germ having been isolated by Traum in 1914.

Alice Evans, M. D., working in the laboratory of the United States Public Health Service in Washington, D. C., made a most important contribution in 1918. Through microscopic and other studies with the brucella germ from a human patient and with the contagious abortion germ from a cow, she found the two were strikingly similar. Miss Evans suggested, moreover, that cases of illness might occur among human beings due to brucella infection in animals. The first case of

Figure 1. Cows and Hogs Keep Company on Iowa Farm

brucellosis (undulant fever) in the United States, traceable to infection in cattle or swine, was reported in 1922; two cases were reported in 1924, 8 in 1925 and 42 in 1926.

L. R. Woodward, M. D., of Mason City, was the first physician to recognize and report a case of brucellosis or undulant fever in Iowa[1]. This was in December, 1926. A blood specimen from Dr. Woodward's patient was tested in the State Hygienic Laboratories at Iowa City, under the direction of A. V. Hardy, M. D.[2] The agglutination test for this disease was thereafter carried out routinely by Dr. Hardy and his associates, on all blood specimens from fever patients. As a result of the report of the first case in 1926, 41 cases were reported in Iowa the following year, 118 cases in 1928, and an increasing number in the years which have since intervened. In 1929, Walter L. Bierring, M. D., reported on the symptoms, diagnosis and treatment of brucellosis (undulant fever), after a thorough study of 150 cases of the disease which had been under observation in Iowa up to that time[3].

The world-wide distribution of brucellosis is indicated by the fact that cases have been reported, not alone from the Mediterranean region, but in such other countries as North and South America, England, Denmark, Sweden, Germany and other European countries, South Africa, India and Australia.

II. BRUCELLA MICROBES AND BRUCELLOSIS IN ANIMALS

Infectious or contagious abortion may exist in goats, cattle and swine. The germs, though closely related, are slightly different in the three kinds of animals. Meyer and Shaw in 1920, suggested the term Brucella for this group of bacteria[4]. The name Brucella is in honor of Bruce, who was first to discover the germ in man.

Figure 2. Hogs Typify Rural Areas in Iowa

A. Brucella Germs

The germs of the brucella group may be shown as follows in their relation to animals and man:

Infected Animal	Type of Germ	Man
Goat	Brucella melitensis (caprine strain)	Brucellosis
Cow	Brucella abortus (bovine strain)	Brucellosis
Hog	Brucella suis (porcine strain)	Brucellosis

In Iowa, infected cows and hogs are the usual sources of infection in cases of brucellosis in man. With the exception of hogs, which are known to be infected only with the porcine strain, animals may be infected with any of the three closely related types of brucella germs.

B. Brucellosis or Infectious (Contagious) Abortion in Animals

The disease in animals manifests itself in brief as follows:

1. Goats—Infected animals are apt to have abortions (lose their young prematurely). The placenta or afterbirth is apt to be

retained; sterility often results. There is inflammation of the udder and brucella germs may be discharged in the milk. Inflammation may occur elsewhere as in the eyes, joints, lungs or reproductive organs.

2. Cows—Abortions occur frequently because of inflammation of the genital passages. Placental retention and sterility are commonly associated with the disease. The udder may be the seat of inflammation (mastitis). The common name is Bang's disease.

3. Hogs—In these animals, according to Huddleson, a veterinary research worker and authority in this field,[4] abortion or premature birth of the young with placental retention and resultant sterility, occurs less frequently than in cows. Infection causes enlargement of the spleen and lymph glands. Careful study of the porcine type of brucella germ in the tissues of swine in packing houses, has been made by McNutt.[5]

Dogs, chickens and horses have been known to become infected with the germ of infectious (contagious) abortion.

III THE NATURE OF BRUCELLOSIS (Undulant fever) IN MAN

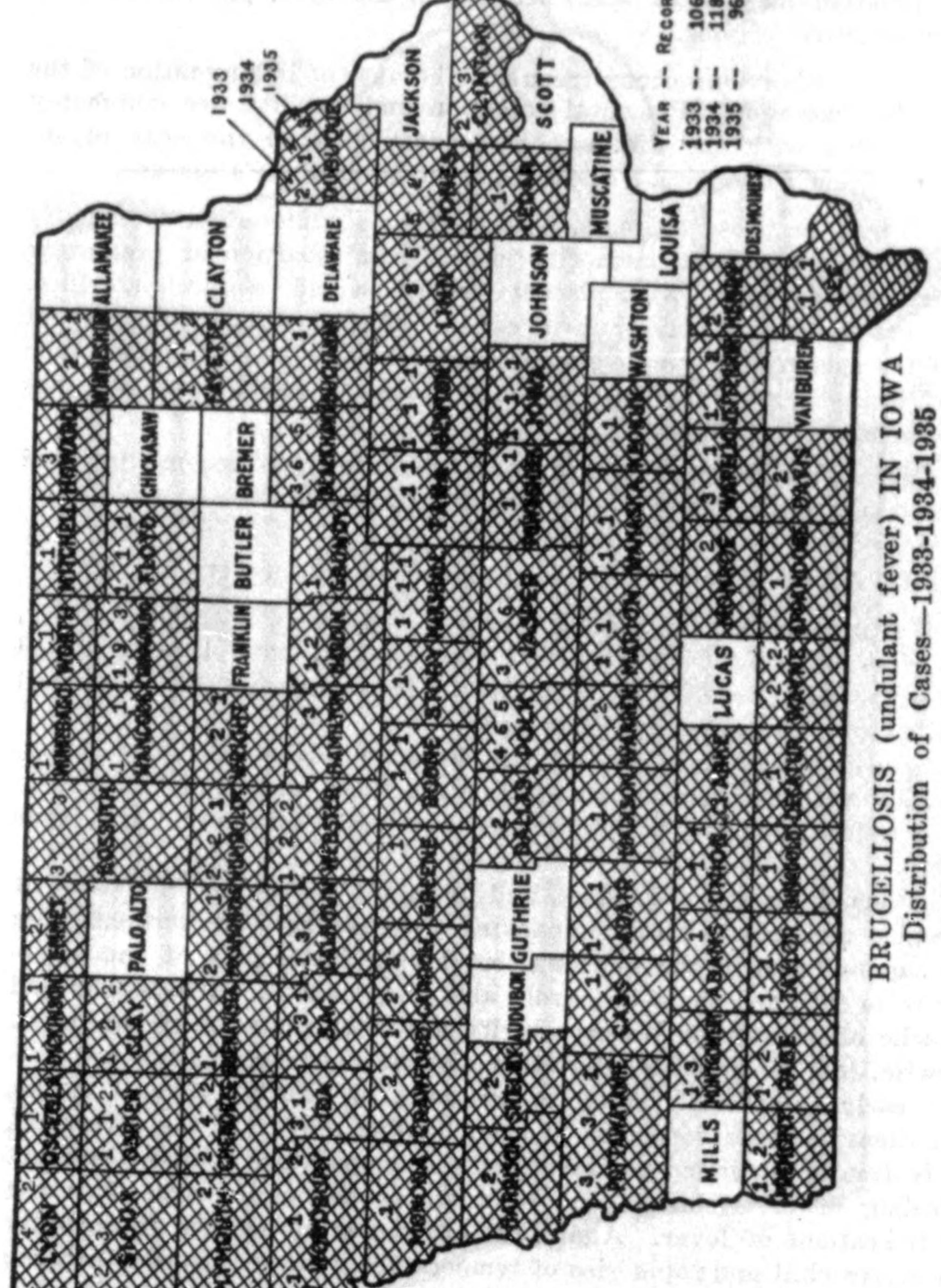
The symptoms of brucellosis, such as weakness, sweating, fever, chills, loss of weight and aching or discomfort, have been reported by a great many attending physicians. The symptoms are described as follows, in an article by Dr. Bierring[2]:

"Emphasis should be placed on the character of the onset, the rigors, the chills with profuse sweating, the muscular and joint pains, the loss of weight, and the continued and persistent character of the fever curve.

"The usual onset is gradual and insidious in the development of noticeable weakness with accompanying tired feeling. The patient often seems quite fresh in the morning, but by the latter part of the afternoon is so fatigued as to be hardly able to get about. A headache and backache of greater or lesser severity are often features of the onset. Likewise, loss of appetite, digestive distress and constipation are frequent early symptoms. After a few days, or possibly several weeks, the patient becomes conscious of a hot feeling mostly in the afternoon, and is usually surprised to learn that the temperature is above normal. A feeling of feverishness, and light rigors and chills, are often the first indications of fever. Again, the onset may be ushered in abruptly by a severe chill and rapid rise of temperature, followed by very profuse sweating, and this, with the general muscular pains, gives the impression of a profound infection."

Regarding the outlook for recovery and the duration of illness, Dr. Bierring states: "There were three deaths in this series of 150 cases, or 2 per cent, indicating a low mortality. * * * * The duration in this series ranged from three weeks to one year."

Treatment of brucellosis consists largely in relieving symptoms of discomfort. Medicinal preparations are available, the purpose of which is to shorten the duration of illness. Treatment is most satis-



BRUCELLOSIS (undulant fever) IN IOWA
Distribution of Cases—1933-1934-1935
(Figure 3)

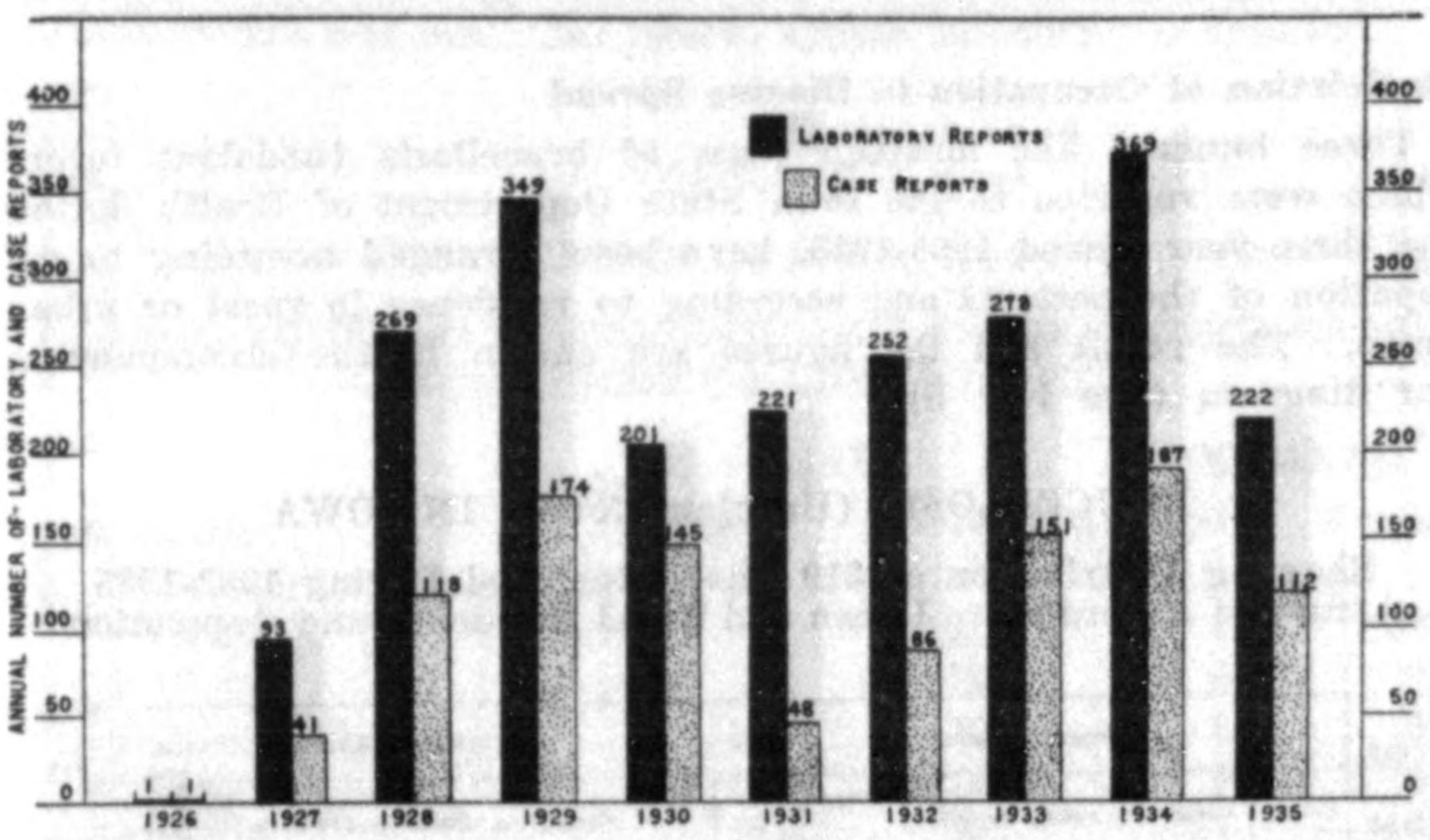
factory when administered early in the course of the disease. Prompt recognition of the nature of the condition and competent medical and good nursing care, are factors favoring early recovery.

IV. PREVALENCE OF BRUCELLOSIS (Undulant fever) IN IOWA

This disease has been recognized in Iowa for a period of nearly a decade. During these years, one or more cases have been reported from all counties in the state. The accompanying map (Fig. 3) indicates the 79 counties from which the disease was reported during the three-year period 1933-1935, together with the number of cases for each of these years.

The bar diagram (Fig. 4) shows the total number of positive blood tests reported from the State Hygienic Laboratories at Iowa City during each of the 10 years from 1926-1935. The grand total of these labora-

BRUCELLOSIS IN IOWA (1926-1935)



(Figure 4)

tory reports (including some duplicate reports or repeat specimens), is 2,254. The stippled bars represent brucellosis cases officially reported to the state department of health and for which detailed case records are available; these reports total 1,063.

V. TRANSMISSION OF THE BRUCELLA GERM

A. How the disease is taken

How is brucellosis acquired by people who live on the farm or whose home is in the city? Individuals may acquire the disease (1) as the result of direct contact with infected animals or (2) following the use of raw dairy products from infected dairy cows. If the disease is due to contact with infected animals or their tissues, the germ usually gains entrance to the human body through the skin.

Persons who live on farms are more subject to brucellosis than those who live in cities. On farms, the disease affects more farmers than farm wives. This doubtless is due to the fact that men on the farm come in contact with hogs and cows to a much greater extent than do farm women. Farmers have direct contact with animals during loading or unloading for market. They hold struggling animals at different times, for example when "ringing" pigs. The handling of infected cows or sows and of the young at time of birth, represent hazardous types of contact. Cuts, abrasions and friction (as in holding a struggling animal), favor entrance of the germ through the skin and into the human body. Spread of infection by a patient to other members of the household is not known to occur.

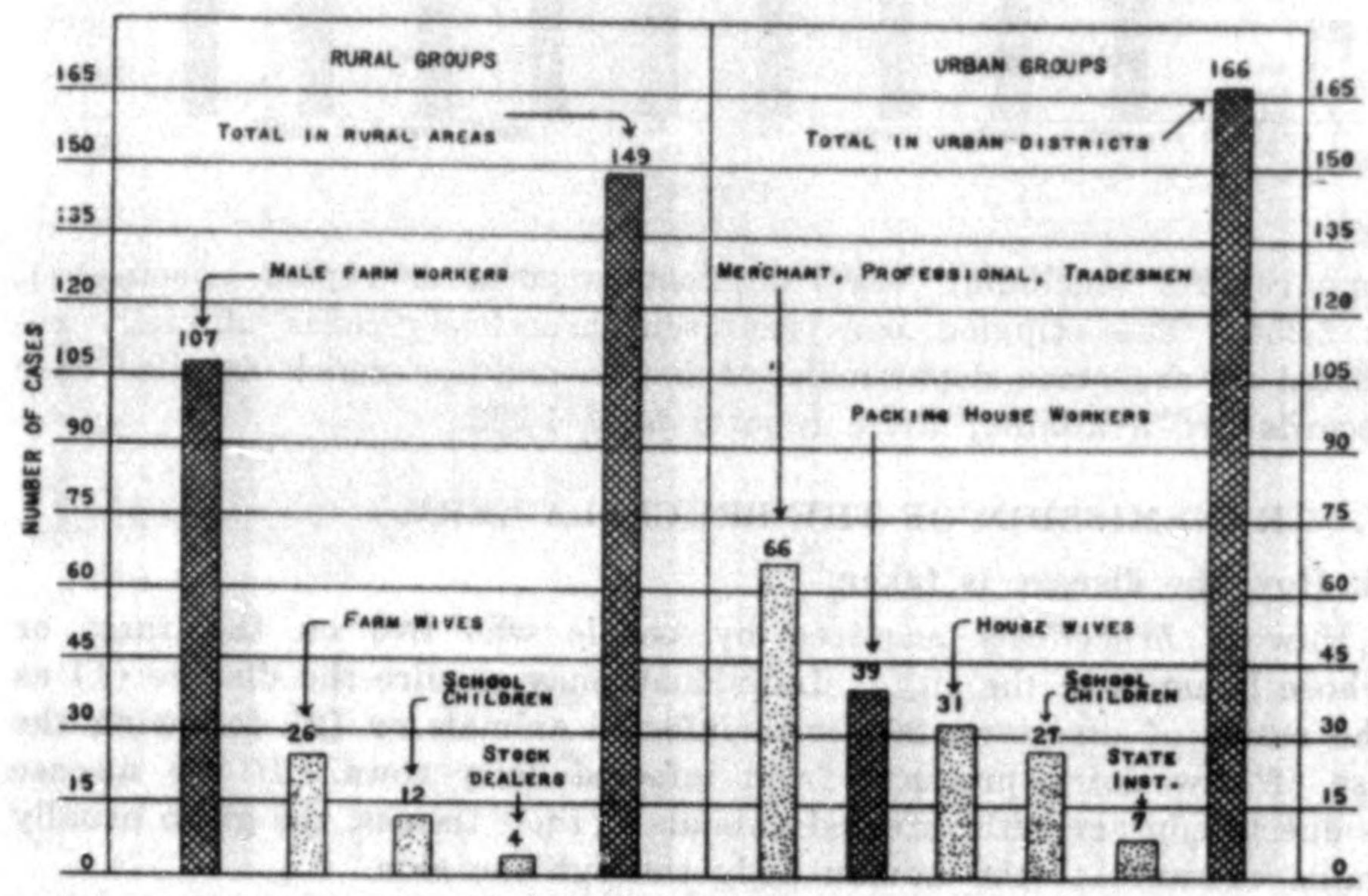
Urban residents, with the noted exception of packing house workers, have little or no occasion to come in contact with infected animals. Brucellosis, acquired in city or town is due, as a rule, to the use of milk, cream and butter which lack certain safeguards, chief of which is pasteurization.

B. Relation of Occupation to Disease Spread

Three hundred and nineteen cases of brucellosis (undulant fever) which were reported to the Iowa State Department of Health during the three-year period 1933-1935, have been arranged according to occupation of the patients and according to residence in rural or urban areas. The result and the figures are shown in the accompanying bar diagram (See Fig. 5).

BRUCELLOSIS (Undulant fever) IN IOWA

Showing Distribution of 319 Cases Reported During 1933-1935 Arranged According to Urban and Rural Residence and Occupation



(Figure 5)

In urban districts, cases of brucellosis occur quite frequently in packing house workers. In these persons the disease is probably not related to dairy products, since 65 per cent of a group of 247 employees in a certain packing plant, used pasteurized milk, 9 per cent used both raw and pasteurized products, 7 used no milk and only 19 per cent used raw milk. Eating of inadequately cooked meat is not a significant factor in transmitting the germ, because only 14, or 6 per cent of 244 such workers gave a history of eating raw or rare cooked meat. It is apparent, therefore, that in the case of packing house employees, direct contact with infected animals or with surfaces contaminated with animal discharges, is a chief means of spread of infection from animal to man.

C. Relation of Age and Sex to Disease Spread

Three hundred and eighteen cases of brucellosis (undulant fever) reported in Iowa during 1933, 1934 and 1935, have been arranged according to age and sex. The figures appear in Table I as follows:

TABLE I

BRUCELLOSIS IN IOWA, 1933-1935

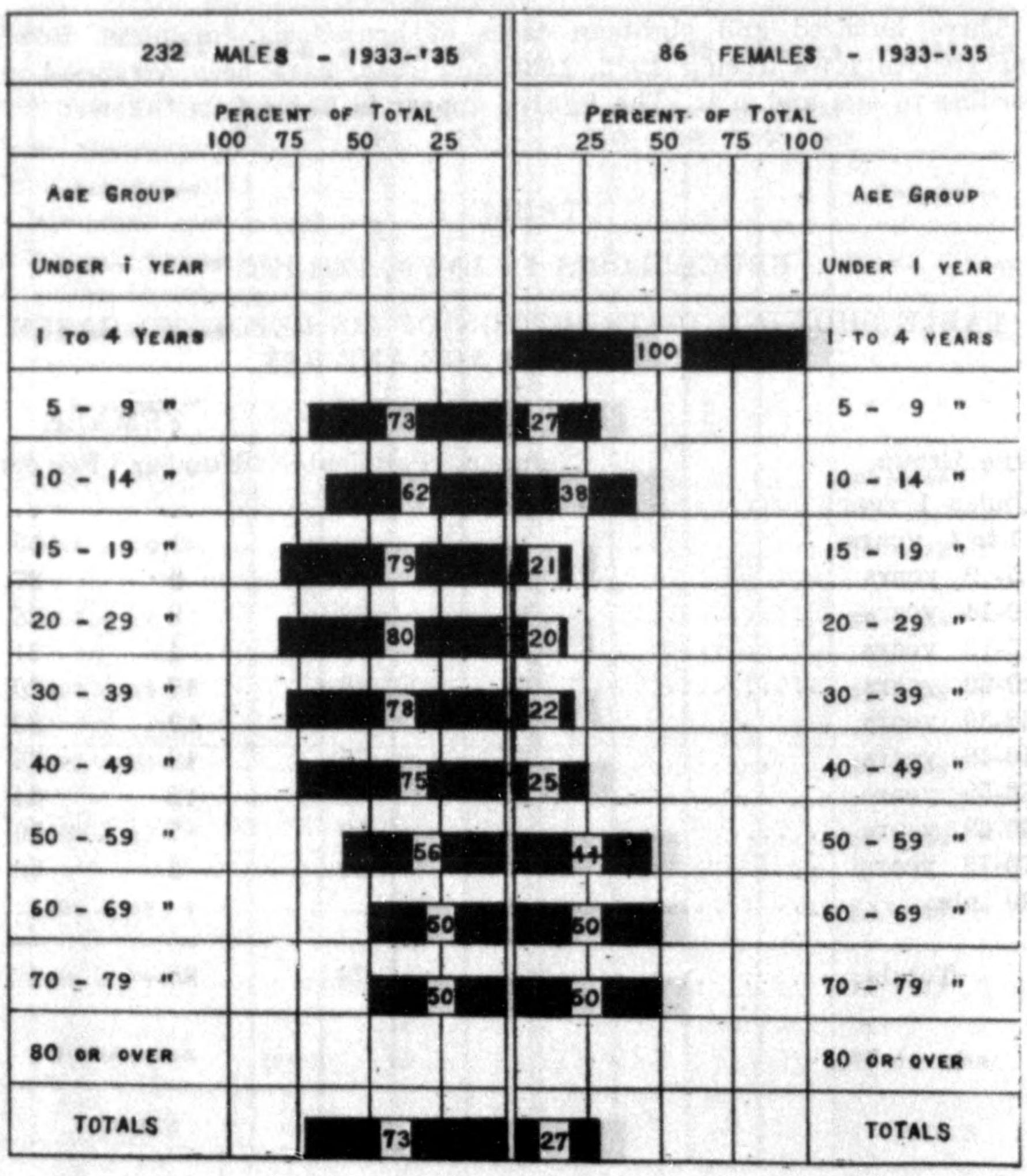
TABLE SHOWING DISTRIBUTION OF 318 REPORTED CASES ACCORDING TO AGE AND SEX

	MALE		FEMALE	
Age Group	Number	Per Cent	Number	Per cent
Under 1 year	..	..	..	..
1 to 4 years	..	..	1	100
5- 9 years	8	73	3	27
10-14 years	13	62	8	38
15-19 years	15	79	4	21
20-29 years	66	80	17	20
30-39 years	67	78	19	22
40-49 years	39	75	13	25
50-59 years	15	56	12	44
60-69 years	7	50	7	50
70-79 years	2	50	2	50
80 plus	..	..	..	..
Totals	232	73	86	27

The accompanying diagram (Fig. 6) presents the same information as in Table I, in graphic form. In young children and in elderly persons, brucellosis occurs as frequently among females as among males. However, in the age groups from 5 to 60 years, the disease occurs more frequently in males. The diagram shows that 73 per cent, or nearly three-fourths of the total number of cases affected males. These figures are further indication of the fact that in Iowa most cases of brucellosis (undulant fever) are the result of contact with infected animals, their tissues or discharges.

BAR DIAGRAM BASED ON 318 CASES IN IOWA, 1933-1935

Showing Relative Proportion of Males and Females in Various Age Groups



(Figure 6)

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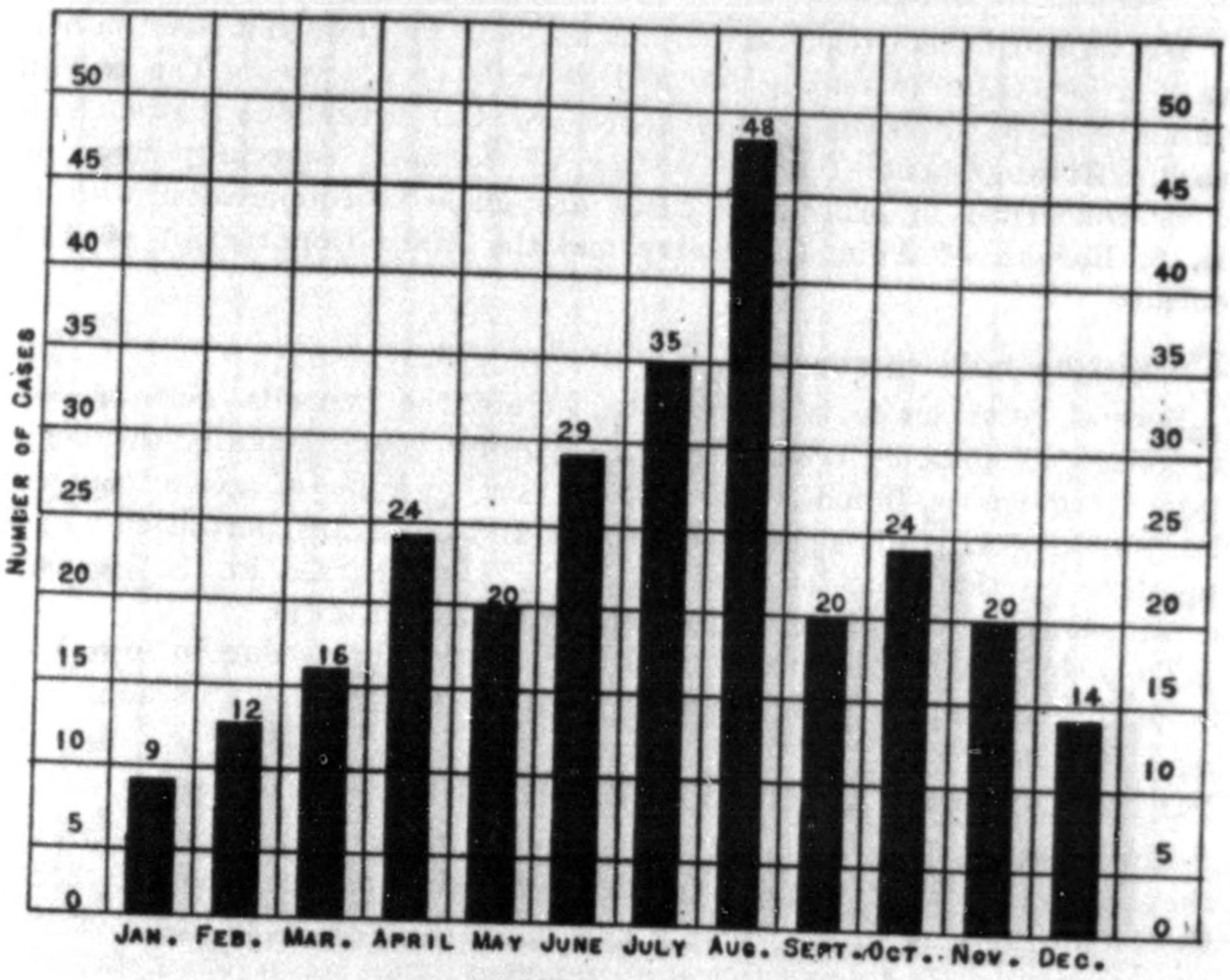
D. Relation of Season to Disease Spread

That more cases of brucellosis (undulant fever) are reported through the summer months than during the cold season is evident in the accompanying bar diagram (Fig. 7). The unusual prevalence of the disease during the warm months may be accounted for on the basis of increase (1) in discharges from infected animals following calving and farrowing, (2) in types of contact with infected animals and (3) in raw dairy products containing brucella or brucellosis germs.

BRUCELLOSIS IN IOWA—1933-1935
Bar Diagram Showing 271 Recorded Cases Arranged According to Month of Report.



(Figure 7)

VI. TRACING BRUCELLOSIS TO ANIMAL SOURCE

A. Various Laboratory Tests

Tracing a case of brucellosis to its source or origin in infected animals, involves special tests. These tests are very often carried out in a public health laboratory. The work requires the services of an expert bacteriologist, together with highly trained and experienced assistants.

1. The agglutination test

The agglutination test, carried out on a specimen of blood serum, helps to confirm the attending physician's diagnosis of brucellosis. When positive, the patient's serum causes a suspension of killed brucella germs to clump together or agglutinate. Occasionally, active cases