

Where roads are good, or a larger crew is required for initial attack, 1½-ton trucks are used. These trucks carry 5 to 10 men, and tools for twice as many. They transport 100 gallons of water or more, a power pump and hose, saws for felling snags, a plow, food, mess equipment, and blankets. A type used in the national forests of the Lake States, and by the State of Minnesota, has compartments in both sides of the body, to separate such unmixable articles as axes, emergency rations, and gasoline. The trucks are customarily painted a bright red like city fire trucks.

Speed of Attack All-Important

Speed of attack is all-important and good roads enable fire fighters to reach many fires while they are still small enough to be easily controlled. But motors afford power, as well as speed. Where water is plentiful motor-driven pumps often do work impossible for men with hand tools.

An especially promising unit for checking fires is the tractor and plow. Even in heavy going, where several men must clear out fallen trees to let the tractor through, this unit will still build control line faster and better than the same number of men could with mattocks and shovels.

Fire control is greatly facilitated by previously prepared fire breaks, cleared to mineral soil. Where such breaks are parallel to roads the discarded cigarettes of careless drivers fall where there is little or no inflammable vegetation. By using powerful tractors and graders the cost of building such fire breaks is reduced below that of work done with plow and disk.

These developments probably presage many others which will gradually be substituted for hand labor in the struggle for more adequate fire control.

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FLIES Aid Surgeons in Combating a Persistent Bone Disease of Man

The common blowflies have generally been regarded as pests, or at best only as scavengers. Recently, however, they were made to serve a useful pur-

pose when the late Wm. S. Baer, a noted bone surgeon connected with Johns Hopkins University, introduced the blowfly maggot into surgery.

The story of how Doctor Baer began to use maggots in the treatment of osteomyelitis, a grave bone disease from which about 10,000 Americans are suffering, is exceedingly interesting. During the World War, Doctor Baer, who was a surgeon with the expeditionary forces, noted the condition of two soldiers who had been severely wounded and had lain on the battle field for nearly a week. The wounds of these soldiers were full of maggots, but when they were cleaned out the surgeons were impressed with the freedom of the wounds from infection. The men recovered with unexpected rapidity despite their long exposure and harrowing experiences. On the other hand, high mortality occurred among other men, suffering from similar wounds, who were promptly admitted to the hospital and given the best surgical treatment then known. About 10 years later Doctor Baer decided to try putting his findings into practice. Some cases were chosen which were not healing well after operation and a number of

common blowfly maggots were introduced. The results were very encouraging. Doctor Baer soon decided that he must make sure that the larvæ used in wounds were free from dangerous germs. He also found difficulty in having an abundant supply of larvæ available at all times, especially during the winter.

Entomologists Aid in Producing Aseptic Maggots

The suggestions of entomologists were of value in the early developments, and later a number of entomological problems were undertaken by the Bureau of Entomology in cooperation with Doctor Baer, his associate Miss E. Knight, and other surgeons who had adopted this method of treating osteomyelitis. As a result of this work a very satisfactory method has been developed for producing maggots that are free from disease organisms. This method involves soaking the fly eggs in a disinfectant which will kill the germs but will not prevent the normal hatching of the eggs. The larvæ are reared on sterile food in sterile containers. The food chosen is not very nutritious and therefore keeps the larvæ healthy without causing them to grow much. In this way they may be kept for several days and then, while still small, be transferred to a wound. (Fig. 54.) In the meantime, to determine whether any germs have escaped the sterilizing process, a culture is made from each lot of larvæ and any lot which shows contamination is discarded and therefore never reaches the surgeon. As an additional safeguard against dangerous organisms, the flies that lay the eggs are themselves reared from sterile eggs and are fed sterile water and clean food and kept under reasonably aseptic conditions.

The effect of this artificial type of food on productivity and vitality of the subsequent generations is being studied. Investigations are also being conducted to determine what foods are best for the larvæ, the sunshine requirements of the flies, and the conditions of temperature and moisture which give best results. In this work, quite contrary to usual desires with reference to insect pests, high productivity and maximum vitality are sought.

Another problem with which the entomologist, as well as the surgeon, is concerned, is the manner in which the beneficial results are brought about by the maggots. The present indications are that the maggots not only eat away the dead and diseased tissue, leaving the healthy tissue, but also in some way check the multiplication of the

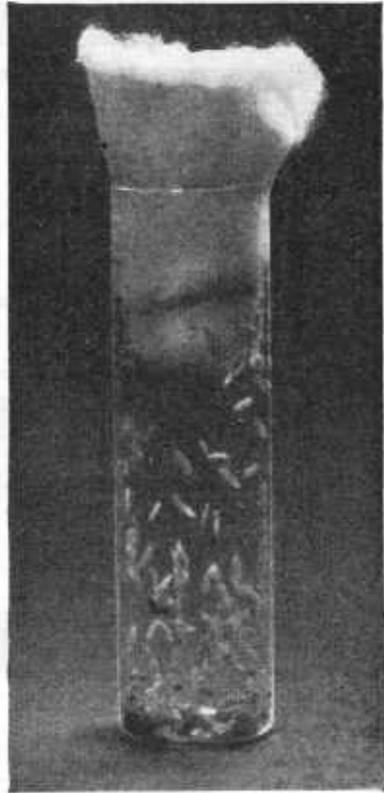


FIGURE 54.—A mass of sterile maggots in a sterile bottle, ready to be removed and placed in wound by the surgeon

disease germs in the tissues and permit normal healing. To aid in clearing up this problem a more complete knowledge of the physiology of the maggots is being obtained. It is barely possible that this information can be used in the production of a substance which can be applied to the wounds and that we can thus avoid introducing the live maggots.

The work thus far done indicates that any one of several species of our common blowflies may be used in the treatment of osteomyelitis. Those most commonly employed now are the black blowfly and one of

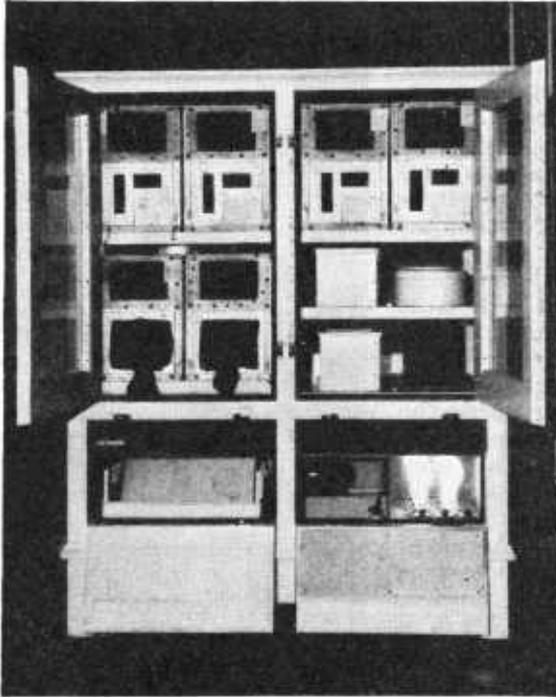


FIGURE 55.—A type of cabinet used in rearing flies and larvæ under controlled temperature and humidity. The doors are opened to show cages and containers. In the lower compartments the heat is supplied by electric-light bulbs at the right; the warmed air is circulated by means of the fan in the middle and is blown over the moist cloths in a pan of water at the left.

the green-bottle flies, known scientifically as *Phormia regina* Meigen and *Lucilia sericata* Meigen, respectively. These species are sometimes pests of livestock, as they infest soiled wool on sheep. Just what species of blowfly will be most effective has not been determined, but the ease with which the green-bottle fly can be reared and handled makes it a favorite in most laboratories.

The facts that the larvæ of a certain species of blowfly, the serew-worm fly (*Cochliomyia macellaria* Fab.), is a destructive pest of livestock in the Southwest and that numerous cases are on record in which it has attacked man have led many people to

fear the maggot treatment of osteomyelitis. There is no danger of such destructive effects, however, if the screw-worm fly is carefully avoided.

For the production of larvæ for the surgeon, the flies are confined in cages in cabinets in which the temperature is kept fairly constant at about 80° F. and the humidity at about 50 per cent. (Fig. 55.) The air is circulated by means of a small fan. The flies are fed sterile sugar water and ripe banana, or a mixture of honey, yeast, egg, and water, although considerable range in diet is possible. At frequent intervals a small piece of clean lean beef is supplied and on this the flies lay their eggs. (Fig. 56.) These eggs are removed and treated with a disinfectant as described, if they are to be used by the surgeon. If they are to produce breeding stock they are put on a piece of meat and kept in a warm ventilated cabinet until mature. The maggots reach full

growth in about five days and crawl away from the food to pupate. The maggot container is then put in a larger one containing sand or sawdust, and in this the larvæ pupate. The adult flies emerge in about a week and are put in the gauze-covered cages for further use.

Maggots Thoroughly Clean Out the Wound

In following Doctor Baer's method the surgeon performs an operation just as heretofore. A large incision is made, the dead and diseased bone is removed as thoroughly as possible, and a dressing is applied. A few days later, when bleeding has ceased, this dressing is removed and a number of maggots are introduced. (Fig. 57.)

When these maggots become full grown they are washed out and, either immediately or a day later, another lot of maggots is put in. This treatment is continued until the wound is

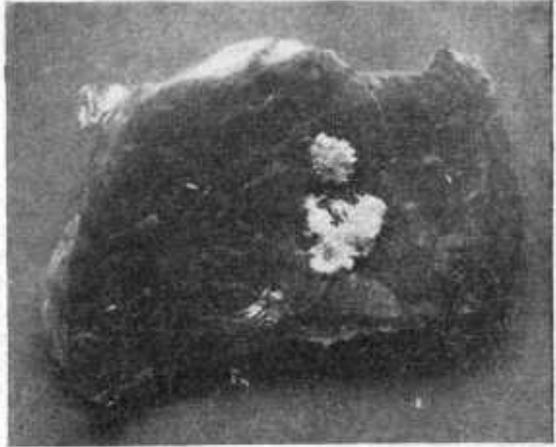


FIGURE 56.—Clusters of eggs laid on a piece of meat. The eggs are ready to be removed and sterilized

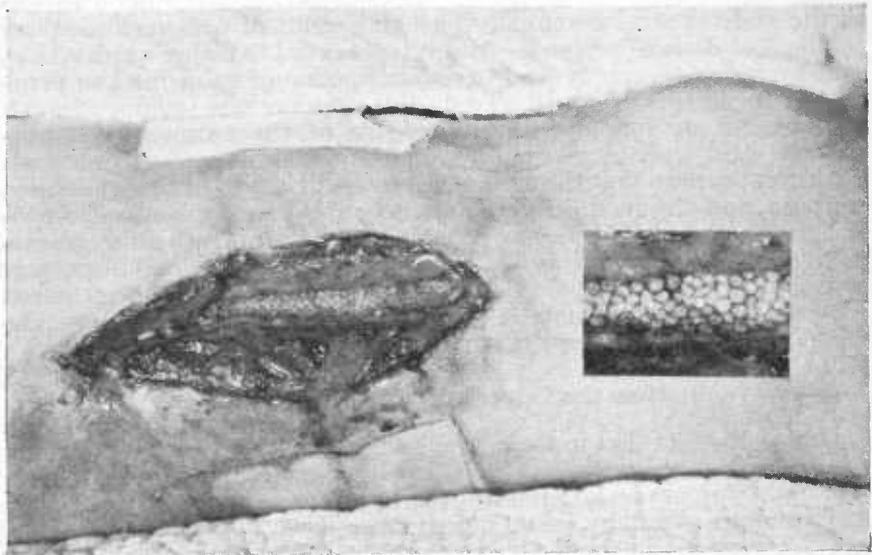


FIGURE 57.—An open wound in upper leg, showing maggots feeding upon the dead bone deep in the wound. The inset is an enlarged portion of the wound and shows the maggots, about life size, closely packed together and feeding with heads downward. This is typical of their manner of feeding in deep wounds

nearly healed. After the larvæ are introduced a cage with sponge-cork sides and a screen top is usually applied with adhesive tape to keep the larvæ from escaping. They must have air and not too much fluid in

the wound. This means that the wound must be kept open and the surplus discharge drained off. When the larvæ are first introduced the wound is swarming with germs, which, however, decrease rapidly in the presence of the maggots. The healing is accomplished usually in a few weeks, and the scars remaining are much less conspicuous than those caused by other methods of treatment.

Recurrences of osteomyelitis are ordinarily very common. Some patients suffer for years and many operations are necessary. The maggots, however, appear to clean out the wound so thoroughly as largely to prevent recurrences.

Despite its repulsive features, the Baer method is being widely adopted. At the present time more than a score of hospitals in various parts of the country are using it with satisfaction.

Although osteomyelitis is the only disease in which this treatment has been thoroughly tried, there are indications that it may serve a useful purpose in the treatment of other suppurating lesions in both man and animals and perhaps may benefit cases of tuberculosis of the bone, if complicated with other infections. When we think that thousands of patients are affected by osteomyelitis and that a large percentage of them are children, we must conclude that the blowfly is a real benefactor of man.

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FOOD and Drugs Act's Requirements Apply to U. S. Government's Buying Few people think of Uncle Sam as a buyer of foods. It is true, however, that the Army, Navy, Veterans' Administration, and other branches of the Federal service annually feed thousands of persons and spend millions of dollars for food. And it is essential to assure a clean, safe, and proper food supply and to obtain maximum value for the enormous expenditure of funds. To do this requires rare judgment and a background of fundamental knowledge of the various foods purchased—and their number is legion. Specifications must be drawn with great care so that the food purchased will be suited to its intended purpose, and the food delivered must be rigidly examined as to conformity to the specifications. The Department of Agriculture assists in this purchasing work, acting in an advisory capacity and inspecting samples. During the past fiscal year 4,426 samples of Government food supplies were examined in the Washington laboratories of the Food and Drug Administration.

How the Government Selects its Food

Due to the fact that in the official family there is a diversity of class, occupation, and geographical location, it is necessary to provide different types and grades of food in order that they may be suited to the purpose for which they are intended. A prisoner, for example, will not get the same food as a disabled veteran. The essential qualifications and requirements are fully set forth in specifications drafted by a committee appointed for the purpose. Copies of the specifications are forwarded to brokers and manufacturers throughout the country and they are invited to submit bids and also samples of the products they propose to deliver in fulfillment of a possible contract. The samples are judged on the basis of the specification requirements, and the con-