a loophole to escape the conclusions of the mechanistic philosophy of classical science. But have you or I any power of free choice? I turn either to the right or to the left—certainly I do not turn both ways at once. If you tell me that I can turn only to the right, I may refute you by turning to the left, but then your assertion has become a factor determining the direction which I take.

LEIGH PAGE

SCIENTIFIC APPARATUS AND LABORATORY METHODS

PRACTICAL HINTS IN THE LABORATORY STUDIES OF PROTOZOA AND EARTHWORM

As far as the writer is aware no laboratory manuals have given the following time-saving devices for the studies of Protozoa and the earthworm.

PROTOZOA

In the study of Protozoa, ordinary cultures will show more free-swimming than sedentary forms. The latter are not difficult to study if a sufficiently high magnification is used, but the former are exceedingly hard to keep in the field. To try to keep track of the swimmers by moving the stage of the microscope is at best an unsatisfactory method. Students are prone to exclaim, "It is impossible to watch these wriggling beasts closely"; "I wish I could tie a string around one of them." The first statement is quite true; the wish is quite impossible.

Several methods have been suggested to reduce the difficulty: the use of cherry-tree gum, of potassium-iodide or, as is highly recommended by some workers, quince-seed solution. The writer is much in favor of the less complicated lens-paper method which is more easily cleaned and shows the animals in comparatively more natural conditions. The lens-paper method: Lay a piece of lens paper (smaller than the cover glass) on a clean slide; place a drop of the infusion from the top of the culture; then place a thin cover slip over the top surface and the preparation is ready for examination. Some of the infusorians and other protozoans will be imprisoned between the fibers of the paper, but their usual activities and metabolism will continue.

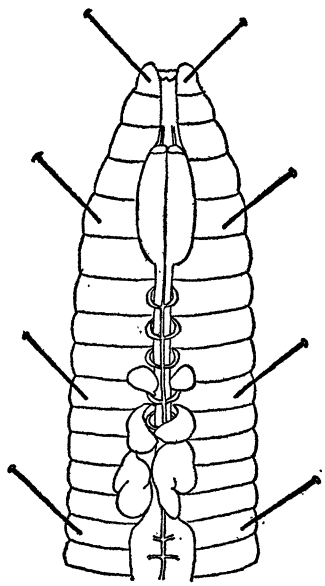

FIG. 1. One way of pinning the earthworm.

There are several distinct advantages of this method:

(1) The animals are kept from active movements and can therefore be closely watched. (2) When a glass slip is dropped on small animals like Protozoa, it is very apt to crush them. In order that they may move about, means must be provided to support the slip at a short distance above the slide. Lens paper again fulfils the requirement and is less complicated than the making of a cement cell or the use of broken fragments of glass, as some workers suggest. (3) This method also serves well in the measurement of these protozoans. Measurement is necessary in the identification. (4) There is still another advantage. Some infusorians, Paramecium for example, will double and twist between the fibers, showing the flexibility of their bodies.

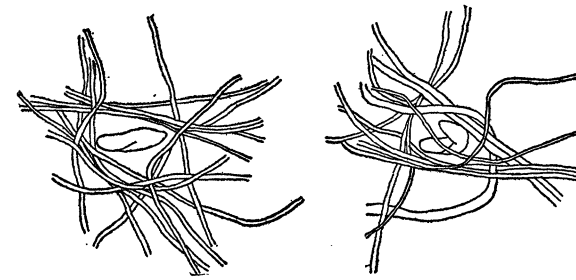

FIG. 2. Paramecia imprisoned between the fibers of lens paper.

EARTHWORM

In the laboratory study of the earthworm much time is wasted in counting segments in order to figure out the positions of the different organs. This trouble can be much reduced if, after proceeding in the usual manner to cut the body wall along the median dorsal line, the pins are placed on the first, the fifth, the tenth and the fifteenth segments, etc. Thus there is a definite system of pinning and the number of segments can be counted by fives and some time is saved.

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