tives, corroborees, the method of hunting suros, and the manufacture of utensils from the wood of the bean tree (*Erythrina vespertilio*). Altogether, approximately 273 official photographs were taken, and about 1,000 feet of large track (35 mm) cinema film, and 2,200 feet of small track (16 mm) cinema film, 200 feet being in color. In addition, individual members obtained a large number of photographs illustrating native life and the natural features of the country.

Observations and notes were made upon a series of corroborees which arose spontaneously during the expedition's visit. Notes were collected of the customs and behavior of the natives; a vocabulary of approximately three hundred words was obtained. The native names for various identified trees and shrubs were also collected. Only two or three cat's cradles were known by these natives. About a dozen phonograph records of songs were obtained.

J. B. CLELAND

SCIENTIFIC APPARATUS AND LABORATORY METHODS

CONCENTRATING PARAMECIUM AND ROTIFERS WITHOUT CENTRIFUGING

THE following methods have been developed and observations made while experimenting with a pure line of *Paramecium multimicronucleatum*. Rotifers will respond to the same concentrating methods in a similar manner, and it may well be that other protozoans and small metazoans will do likewise.

Infusions are prepared by boiling one gram of hay in 700 cc of distilled water for ten minutes. Such infusions are seeded with Paramecium on the second day, and are allowed to stand until a reasonably dense population of animals has developed. Usually this requires ten or more days.

Such cultures are then redistributed among glass containers of any size which have the approximate surface-to-volume ratio of an ordinary quart jar. No container should be more than half full of the infusion. Containers which have straight sides, while not necessary, are more desirable for this stage of the operation. To each of these containers is added an amount equal to the quantity of culture present of cooled infusion freshly made according to the formula given above.

The populations of these new infusions will be forced to congregate at the surfaces in bands on the sides of the containers during the next two or three days. From time to time they may be picked up with a fine pointed pipette and transferred to concentration tubes. The tubes used in these experiments were 30 centimeters long and had an internal bore of eight millimeters. Although the tubes used were of the dimensions indicated, it is probable that a considerable variation would not affect the result. While the collecting is in progress, excessive concentration in any one tube must be avoided, if all the animals collected are to remain alive. Each tube should have an air space of at least five centimeters at the top.

Final aggregation is brought about by shaking the concentrations in the tubes violently in such a manner that the bubble of air is forced to pass back and forth through the columns of infusions. If the tubes are then set aside in a vertical position, the organisms will settle to the bottom. The infusion above the aggregation of animals may be removed with a capillary pipette if a dense mass of protoplasm is desired, or it may be poured off if so complete a concentration is not needed.

The above method is efficient to the point that we have collected a volume of seven cubic centimeters of living Paramecium from five containers, each of two gallons capacity. The instructor who desires to concentrate a few thousand animals for laboratory demonstration will find that two quart jars will supply an ample crop for the most wasteful freshman laboratory.

There are several short cuts by which a concentration may be obtained more quickly if cultures in the proper condition are at hand. For example, the population of an old Paramecium culture can be forced to the surface by the addition of fresh infusion to it. This would save at least ten days. Again, if a middle-aged culture in which the animals have settled to the bottom of the culture is at hand, the animals can be concentrated by repeatedly drawing a long fine-pointed pipette through the débris on the bottom and emptying the material secured into concentration tubes. The hay settles to the bottom. The Paramecium will be forced out of it, and upward, until they reach the surface, if the tubes are allowed to stand undisturbed in a vertical position over night.

Usually an adequately concentrated supply of Paramecium for one or two laboratories can be secured directly from a culture by one of the methods described above, without the use of tubes. Such material can be very nicely kept in syracuse dishes. However, if one desires to supply a series of laboratories, it is advisable to use the tubes, as the Paramecium can be fed daily by shaking to force them to the bottom, pouring off the old infusion, and adding new.

EDGAR P. JONES

ZOOLOGICAL LABORATORY,
UNIVERSITY OF PITTSBURGH