erably. On the other hand, injury to plants was found to increase with an increase in viscosity of oils above 70 seconds. It becomes necessary, therefore, to select an oil with an intermediate viscosity. It has been found that oils having a viscosity range of 65 to 75 seconds are generally satisfactory when used in a limited number of applications, although certain apple varieties (such as the yellow Newtown) are susceptible to injury from oils with viscosity above 55 seconds.

The degree of refinement of the oils was found to be another important factor in avoiding injury to plants, although even the most highly refined types sometimes produced injury. Whether this injury is due to oxidation of the oil or to the inability of the plants to tolerate absorbed oil of medium to heavy viscosity within its tissues has not been definitely determined. It has, however, been determined that the carbohydrate metabolism of leaves and vegetative spurs may be adversely affected by oil sprays.

With oils refined by the sulphuric acid method, it has been found that those having an unsulfonatable residue of 85 per cent. or more are preferable for use on plants during the growing period. At the present time it appears that oils produced under the liquid sulphur dioxide process of refinement have a greater stability against later oxidation and may therefore have a greater range of safety when applied to living plants. However, further tests are necessary definitely to determine this point.

The type of dispersion of oils in emulsions used during the growing season has not been found to be important where high pressure is used in spraying. This is probably due to the modification in the emulsions produced by the high pressure through the spray guns, reducing the oil droplet size in the less stable emulsions. This probably accounts for the fact that field tests during the last three years have shown but little difference in the insecticidal value of quick-breaking and stable emulsions. Such differences, however, were found in laboratory tests when the oil emulsions were sprayed with atomizers or equipment using low pressure.

Plant injury from summer oil sprays has followed repeated applications of oils having a viscosity range of 70 to 120 seconds. This has resulted in a russeting of the fruit in many cases and in a general reduction in the size of the fruit. It was found that not over two or three applications of such oil sprays could be used if serious damage of this nature is to be avoided.

It has also been found that serious foliage and fruit injury and dropping occurs when oil sprays are applied on trees carrying unoxidated sulphur deposits. The period that must elapse after use of sulphur sprays or dusts before oil sprays can be safely used varies with weather conditions. In hot weather, it is relatively short, but in cool weather it may be as long as sixty days. The Stayman winesap apple is especially subject to this type of injury, but all varieties are affected when it is necessary to use sulphur for fungicidal purposes.

The use of oil sprays late in the summer while heavy deposits of lead arsenate remain on the fruit or the use of medium or heavy oils in combination with lead arsenate late in the summer was found to complicate seriously the problem of spray residue removal. In some cases it has been impossible to clean such fruit satisfactorily. However, where not more than two applications of oil spray are made in combination with lead arsenate for the first brood of codling-moth or where the nicotine-oil combination without lead arsenate is used for the second brood of codling-moth, the arsenical residue problem has not been seriously complicated.

R. H. ROBINSON,
D. F. FISHER,
ANTHONY SPULER, *Chairman*
Publication Committee

SCIENTIFIC APPARATUS AND LABORATORY METHODS

SEDIMENTATION TUBE FOR MECHANICAL ANALYSES[1]

IN making mechanical analyses of sediments, the dispersal of the constituents is commonly facilitated by shaking with water in bottles for several hours, and the sands are usually separated from the silts and clays by a series of decantations. In these processes, especially if the sample be sandy, it is a time-consuming operation to remove all the sand from the containers in which the sediments were dispersed and decanted. In our work the procedure has been facilitated by dispersing the sediments in glass tubes closed at both ends by rubber stoppers, and by decanting from a sedimentation tube, shown in the accompanying figure.

[1] This paper contains preliminary results of an investigation on the "Origin and Environment of Source Sediments," listed as Project 4 of American Petroleum Institute Research. Financial assistance in this work has been received from a research fund of the American Petroleum Institute donated by Mr. John D. Rockefeller. This fund is being administered by the institute with the cooperation of the central petroleum committee of the National Research Council. Manuscript received by the editor December 17, 1929.

The dispersing tubes are thirty-five millimeters in diameter and twenty-two centimeters long, and are closed by No. 7 solid rubber stoppers. Their capacity is about 160 cubic centimeters, which permits eighty cubic centimeters of water to be used in dispersing. The sedimentation tube consists of a glass tube which fits into a glass cup by a ground joint. The cup is three centimeters high and the tube nineteen centimeters, and both are made from forty-millimeter tubing. The ground joint is fifteen millimeters in length, and if the tube is twisted firmly into the cup the apparatus will not leak, even after standing full of water for several days. A hole in a wood block is used for a support, but the cup can be made with a base so that it will stand of itself.

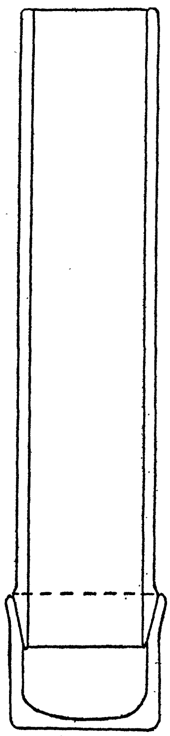

FIG. 1

The sediments are transferred from the dispersing tube to the sedimentation tube by removing one rubber stopper, inserting the dispersing tube into the inverted sedimentation tube, righting the whole apparatus, removing the other rubber stopper and washing with a stream of water. The silts and clays are decanted from the sedimentation tube, the cup in which the sands have collected is removed from the tube and the sands are readily washed out from the cup with a jet from a water bottle. The whole process is simple and very rapid. In fact, other processes involving decantation could probably be facilitated by a sedimentation tube of this type.

PARKER D. TRASK

PRINCETON UNIVERSITY

STOCK CULTURES OF AMEBA

IN the course of experiments in this laboratory it has been necessary to maintain cultures of *Ameba proteus* in stock. The writer endeavored to find a medium that made requisite a minimum amount of attention. The effort in this direction met with considerable success, as appears below. In view of the wide use of *Ameba* of the *proteus* type in biological research and elementary instruction in biology, a culture medium that is simple, reproducible and extremely reliable will be of general interest. The medium used is as follows:

$NaCl$	0.1 gr.
KCl	0.004 gr.
$CaCl_2$	0.006 gr.
H_2O	1000 cc (glass distilled)

Two hundred to 250 cc of this solution is put into a finger-bowl or glass crystallizing dish of 8 or 10 cm diameter and to each of such dishes is added 4 or 5 grains of polished rice (any brand carried at the corner grocery is suitable). The cultures thus prepared are immediately seeded with fifty to one hundred amebas, covered with glass plates to prevent evaporation and entry of dust and then left, best in a dark cool place, to develop. Such cultures will produce a fine crop in from two to four weeks and so far in some thirty or forty cultures the writer has had only one or two failures. There are at present on the shelves of the laboratory, out of five that were set up as a test, three cultures one year old that have ample numbers of amebas; the other two died out in eleven months.

These five cultures during their existence have been deliberately neglected. No detritus was removed. Rice was added only when it was noticed that none was apparent in the culture. Water too has been added to compensate for evaporation with no attempt at regularity, say, on the average once a month. The temperature variation has been from 19 to 28° C.

In other words, the cultures have been subjected to as careless handling as if in the hands of a somewhat below par student assistant, but they have survived.

H. W. CHALKLEY

HYGIENIC LABORATORY,
U. S. PUBLIC HEALTH SERVICE

SPECIAL ARTICLES

THE CHEMICAL CONTROL OF SPLENIC CONTRACTION

THE behavior of the spleen in responding to different physiological requirements and the fact that this response occurs only when its nerve supply is intact[1] suggests control by some center. At times when there is an emergency call for hemoglobin, as in asphyxia, hemorrhage or severe muscular exercise, contraction of the spleen throws into circulation a large number of red blood cells, as many as one third the total number in the body.[2] When the period of stress is over the spleen relaxes and the excess red blood cells are withdrawn from circulation. The

1 E. A. Schäfer and B. Moore, *Journ. Physiol.*, 20 (1): 1–50, 1896.

2 E. H. Starling, "Principles of Human Physiology," fifth edition, p. 820, 1930.