Mountain, near Litchfield, Connecticut''; W. A. Tarr, professor of geology, University of Missouri, ''chemical and bacteriological studies of the lead deposits of southeastern Missouri.''

MEDICAL SCIENCES

G. Howard Bailey, associate professor of immunology, School of Hygiene and Public Health, The Johns Hopkins University, ''heterophile antigens of bacteria and plant and animal tissues''; Raymond L. Garner, assistant in medicine, School of Medicine, The Johns Hopkins University, ''enzymatic liquefaction of clotted human blood''; R. W. Gerard, associate professor of physiology, University of Chicago, ''the activity of nerve tissue and the central nervous system''; Balduin Lucké, professor of pathology, School of Medicine, University of Pennsylvania, ''a neoplastic disease of the common leopard frog, *Rana pipiens*''; John R. Paul, assistant professor of medicine, and James D. Trask, associate professor of pediatrics, School of Medicine, Yale University, ''comparison of different strains of poliomyelitis virus''; Arthur H. Smith, associate professor of physiological chemistry, School of Medicine, Yale University, ''the influence of various 'inorganic' ions upon the body weight and blood changes of experimental animals.''

BIOLOGICAL SCIENCES

Ernest Anderson, professor of chemistry, University of Arizona, ''the composition of the polyuronides occurring in the wood of the Black Locust, *Robinia Pseudoacacia*''; Edward D. Crabb, associate professor of biology, University of Colorado, ''comparative spermatogenesis in four species of viviparous snails''; Arthur T. Henrici, professor of bacteriology, University of Minnesota, ''ecologic survey of bacteria in a fresh-water lake (Lake Alexander, Minnesota)''; R. R. Huestis, professor of zoology, University of Oregon, ''inheritance of color character in *Peromyscus*''; Joseph C. Ireland, professor of plant breeding, Oklahoma Agricultural and Mechanical College, ''chloroplast development in virescent kafir seedlings''; Charles P. Smith, teacher of botany and economic biology, Senior High School, San Jose, California, ''study of the lupines of the Lindley Herbarium at Cambridge, England''; Harold B. Tukey, chief in research in pomology, New York State Agricultural Experiment Station, Geneva, New York, ''artificial cultures of embryos of decidous fruits.''

ANTHROPOLOGY AND PSYCHOLOGY

Peter H. Buck, 1933–34 Bishop Museum traveling professor of anthropology, Yale University, ''the material culture of the Cook Society and Austral Island groups in the South Pacific''; Frank A. Geldard, associate professor of psychology, University of Virginia, ''the limits of palmesthetic sensibility of various skin areas''; Melville Jacobs, instructor in anthropology, University of Washington, ''the recording of Indian languages and songs in the Northwest''; Morris E. Opler, research assistant in anthropology, University of Chicago, ''the cultural relationships of Apache tribes.''

The National Research Council will be ready to consider further requests for research assistance this spring. Applications should be filed with the Committee on Grants-in-Aid before March 15, 1934. Action upon these applications will be taken about the middle of May.

ISAIAH BOWMAN,
Chairman

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A NEW CULTURE MEDIUM FOR CLADOCERANS

IN recent investigations in this laboratory it has been necessary to use numbers of cladocerans. In order to raise these animals in quantities and under controlled conditions various culture media for cladocerans have been reviewed and tested. Most of the existing media call for manure to supply the organic matter, but as manure is such a variable the substitution of materials of more constant composition was tried. Wiebe[1] has pointed out that soybean meal is superior to manure for plankton production in pond fertilization, and more recently the U. S. Bureau of Fisheries has found cotton-seed meal quite, if not more, desirable for this purpose. It seemed logical, therefore, to substitute cotton-seed meal for manure in cladoceran culture media. This was done and a very satisfactory culture medium has been produced, having several advantages over the manure infusions as suggested by Banta.[2]

Pond water was filtered through coarse filter paper and added to a mixture of fine garden soil and cotton-seed meal (commercial cotton-seed meal, as used in dairy feeds), in the proportions of 1 liter of filtered water to 90 grams of garden soil and 17 grams of cotton-seed meal. After a thorough stirring, the mixture was set aside at room temperature in large Erlenmeyer flasks for five days. During this period the mixture fermented and produced considerable gas. At the end of five days the supernatant liquid was decanted off and strained through muslin. Analyses made by the Bacteriology Department of the University of Missouri showed that the strained fluid contained an almost pure culture of *B. coli*. The strained fluid was diluted with filtered pond water before using and re-strained through muslin whenever bacterial masses developed. The pH of the final diluted product was adjusted to 7.2 by the addition of sodium carbonate.

In strong concentrations of this medium bacterial

[1] A. H. Wiebe, *Bull. U. S. Bur. Fisheries*, 46: 137, 1930.

[2] A. M. Banta, SCIENCE, 53: 557, 1921.

masses formed which interfered with the free movement of the daphnia and often resulted in their death, but by a dilution of 1 part of the strained fluid as decanted from the original mixture with 100 parts of filtered pond water a medium was obtained which remained quite clear and in which daphnia grew rapidly and produced normal clones. It has been found desirable to renew the media in which the cultures of animals are growing from time to time, *i.e.*, at periods of a week or more, but the addition of more bacteria to the cotton-seed-meal medium, as suggested for manure infusions by Stuart and Banta,[3] has not been found necessary. Fresh stock supplies of the cotton seed mixture have been prepared each week, a small amount of an old mixture being added each time to insure inoculation with the original bacteria.

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A CULTURE METHOD FOR DAPHNIA

SOME months ago, Professor E. G. Martin, of Stanford University, was kind enough to inform me that he had had considerable success in raising the phyllopod *Artemia* on commercial dried yeast which was dropped into the aquarium in small quantities from time to time. Ordinary Fleischmann's yeast (in cakes) being more readily obtained by me, I tried it on *Artemia* with excellent results.

The same yeast has been fed, for some two months, to a mass culture of *Daphnia magna* with striking results, reproduction and growth being markedly more rapid, and population more dense than with any of the usual media.

About one quarter of a fresh yeast cake is mixed into a uniform suspension with from 50 to 100 cc of water, and poured into the aquarium, which contains from 60 to 70 liters of water. The feeding is repeated every fifth or sixth day. It is necessary to have a stream of air bubbling through the medium at all times, or the yeast may prove lethal, probably by giving off CO_2.

The method has not been tried on other species of cladocera, nor has it been tried with few animals in small containers, but it is so successful in the mass culture, that it seems wise to make the food material known. It should be particularly useful in physiological work, in which the usual manure-infusion may be a source of large quantities of unknown solutes. It should also be valuable in raising *Daphnia* in large numbers as food for other organisms.

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[3] C. A. Stuart and A. M. Banta, *Physiol. Zool.*, 4: 72, 1931.

A SCHEME FOR DILUTIONS IN THE LABORATORY

FOR many years the writer has been using a simple and convenient scheme for calculating the amounts of solution and solvent to be used in making up a series of solutions of various concentrations from one or more stock solutions. This scheme has the merits of accuracy and adaptability to any situation, even to the mixing of two solutions to obtain one of intermediate concentration, provided the concentrations are given in terms of molar or normal solutions. In view of the space which many authors give to the problem of preparing solutions of correct concentration, it would appear that many research workers could save time and effort through knowledge of a reliable method of dilution.

The scheme can best be described and remembered by the following chart:

conc. of stock sol.		desired conc.—conc. of diluting agent = parts by vol. of stock sol.
	desired conc. of solution	
conc. of diluting agent		conc. of stock sol.—desired conc. = parts by vol. of diluting agent

In practise the three items at the left are written down in their correct positions and the concentration of the diluting agent is usually zero, because water (or other pure solvent) is commonly used. The other two items are calculated by subtraction, which, of course, involves only one operation when pure solvent is used, because the upper right-hand item is identical with the center one when the lower left-hand item is zero.

The following example will show how easily the desired results are obtained. If the stock solution is .450 M, the desired concentration is .125 M and the diluting agent is water, the completed procedure becomes

.450		.125
	.125	
0		.325

This indicates the use of stock solution and water in the ratios of .125 to .325 parts by volume. The exact amounts to be used can be 12.5 to 32.5, 5 to 13, 3.75 to 9.75 or any other combination obtained by multiplying both right-hand items of the chart by the same number.

This same scheme could be stated as a formula, but it is actually easier to use and to remember in the form just given. Students of different capacities seem to use it with almost equal facility, and the accuracy varies only with the care used in measuring the parts by volume.

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