ried out his graduate studies at Columbia University, assistant professor.

DR. AXEL M. HJORT has been appointed a professor of pharmacology in the Dartmouth Medical School. Dr. Hjort, a graduate of the University of Illinois, received his M.D. and Ph.D. degrees from Yale University, where he taught pharmacology for five years; more recently he has been engaged in research for Parke, Davis and Company.

DR. GEORGE B. RAY and Dr. David Rapport have been promoted to be assistant professors of physiology at Western Reserve University.

PROFESSOR JOHN A. FERGUSON, head of the department of forestry at Pennsylvania State College, has been appointed visiting professor of forestry at Yale for the year 1926–27. Professor Ferguson will take over the work in forest management while Professor Herman H. Chapman is on leave of absence to participate in the government investigation in forest taxation.

LOUIS O. HOWARD has resigned as dean of the school of mines and geology of the State College of Washington. He will give, this winter, courses in metallurgy at the South Dakota School of Mines at Rapid City, taking the place of Bancroft Gore, who has gone to South America.

DR. HARRY S. LADD has returned from an extended field season in the Fiji Islands to become assistant professor of geology at the University of Virginia.

DISCUSSION AND CORRESPONDENCE

HOOKE'S LAW: A REJOINDER

PROFESSOR JOSEPH O. THOMPSON'S discussion on Hooke's law[1] reflects a view of physical laboratory instruction which, to say the least, is unusual. It appears that many years ago he performed experiments on very thin wires of brass and copper having a length of nearly twenty-three meters; in loading these wires he found what appear to be systematic departures from Hooke's law. In view of the importance of the elastic properties of steel, his data on steel would have been interesting also, as would have been the figures for brass and copper with diminishing load. It happens that the elastic properties of brass and copper are of small practical consequence. It also happens that in a wire as fine as those he used the questions of uniformity of cross-section and of homogeneous structure become very important. Having found the anomalies in wires which are not representative either in dimensions or materials of wires whose elastic properties find practical application, it is his opinion that these anomalies should be emphasized and that unless they are emphasized the instruction is harmful. This is a view which very few teachers of physics will share.

I must correct one statement in particular which Professor Thompson has made. He says that "a certain well-known scientific company is doing harm to young experimenters all over the country by publishing an elaborate instruction sheet which conveys the impression that accurate measurements should show strict proportionality between strain and stress." The reference is probably to Experiment M-27A of the "Cumulative Unit System of Laboratory Experiments in Physics," for the preparation of which the writer is responsible. This series of experiments is intended to teach that careful experimental work with suitable apparatus leads to results which demonstrate, *within the limits of experimental error,* the correctness of the laws governing certain physical relationships. The experiment in question deals with Hooke's law only incidentally, its Fig. 5 being a graph showing the experimentally determined relation between stress and strain. This graph, which is a straight line, shows that the elongation is, *within the limits of experimental error,* proportional to the stretching force. Beyond this it does not convey the impression "that accurate measurements should show strict proportionality between stress and strain." This has been read into the presentation by Professor Thompson.

It should be particularly noted that the experiments for which data are shown were performed with wire of piano steel, having diameters of approximately 0.6 and 0.7 mm, respectively, and a length of about one meter. If in steel wires of such dimensions there is in fact such lack of proportionality as Professor Thompson believes to exist, the apparatus used, although capable of accurate measurement, would fall far short of sufficient precision to show the lack of proportionality. Unless the student were to reproduce Professor Thompson's research experiments he could come to but one conclusion, namely, that *Hooke's law is a correct statement of what he has observed.*

The objection made by Professor Thompson, if valid, must for the sake of consistency apply also to the measurement of acceleration of gravity by means of the simple pendulum. Unless the angle of swing is nearly zero the time of vibration is not expressed by the simple harmonic formula; but the student must in his computations assume the formula to represent the facts. To be consistent, objection must also be made to the experimental method of studying the laws of Boyle and Charles because, unless van der

[1] SCIENCE, September 24, 1926, page 298.

Waal's equation is used, the truth is only approximated. In these various experiments we shall (granting the validity of the objection) be "doing harm to young experimenters" unless we stress the slight systematic departures from the laws which are being studied.

As Professor Thompson points out, the instruction sheet which is doing the harm is in good company. It can even boast of companionship with classic works such as Poynting and Thomson's "Properties of Matter" and with the "Dictionary of Applied Physics." The question can therefore in all fairness be asked whether we should not be doing greater harm by diverting the student's attention from the fundamentally important law than we are doing in ignoring departures from the law which have no practical significance.

PAUL E. KLOPSTEG
DEVELOPMENT LABORATORY,
CENTRAL SCIENTIFIC COMPANY

A HERMAPHRODITIC VIVIPAROUS OYSTER OF THE ATLANTIC COAST OF NORTH AMERICA

WHILE engaged in scallop studies at the U. S. Bureau of Fisheries Laboratory, Beaufort, N. C., in 1925, my attention was drawn to a small oyster which became so numerous on the scallops of one particular shoal as to be a scallop pest, if not a scallop enemy. Its general external appearance was not sufficiently different from that of the common oyster of commerce [*Ostrea virginica* Gmelin (= *elongata* Solander)] to suggest specific distinctions and it was at first assumed to be that form. Therefore, my surprise may be imagined when on October 6 I saw an individual throwing out large numbers of minute, active specks which were shell-bearing bivalves suggestive of oyster larvæ. Soon others were found to be doing the same. Numerous individuals were then secured and placed in separate dishes for observation. In the course of a few days nearly all these threw out shelled larvæ, some of which were kept alive for many days and made moderate growth for a time. The larvæ bore considerable resemblance to those of the oviparous *Ostrea virginica* but were larger for a corresponding stage of development, as judged by shell shape.

That these small oysters were not *Ostrea virginica*, having been thus demonstrated, an effort was made to identify them. The range limits as given by Dall (U. S. National Museum, Bulletin 37) eliminated all but the common oyster and *Ostrea equestris* Say and thus indicated the latter species to be the one under observation.

The specimens were found to correspond well with Say's description and in one important respect with his figure. Later specimens were identified by W. H. Dall as *Ostrea equestris* Say.

Specimens, generally fixed in picro-aceto-formal, were secured at intervals through the fall, winter and spring and were imbedded, sectioned, stained and studied. The study is being continued.

In the meantime a few words as to conditions found and indications arising therefrom may not be out of place. Notes from examinations of sectioned specimens are as follows: October 6, embryos in the mantle cavity, in the gonad a few mature or nearly mature eggs and vast numbers of sperms; January 12, well-developed "ovarian" eggs and a few sperms; February 12, a narrow zone of germ cells, the sex of which has not been made out; February 16, sperms fully developed (spermatozoa) and very abundant small eggs fairly numerous; April 2 (two specimens), eggs immature and not very numerous; April 13, small eggs and larger eggs fairly numerous; April 29 (two specimens), large eggs fairly numerous, small ones not numerous, vacated areas present, sperms in various stages fairly numerous. On June 5 a specimen was found with objects in the mantle cavity which appeared to be eggs surrounded by sperms. On June 9 two apparently uninjured oysters cast out great numbers of larvæ, apparently till empty of them. One of these and the individual examined June 5 have been preserved for future study. The other is being kept in the hope that its condition may be determined at a later date.

I take these data to indicate an alternating hermaphroditism with overlapping similar to that described for the European *Ostrea edulis*, another viviparous oyster. Because summer specimens have not been examined, it is impossible to say whether spawning, for the species or "colony," is long drawn out or occurs at clearly separated intervals but more than once a year. A multiple cycle of eggs and sperm production per year per individual does not seem out of the question.

J. S. GUTSELL
BUREAU OF FISHERIES,
WASHINGTON, D. C.

SCABLAND MOUNDS OF EASTERN WASHINGTON

ON the channeled scablands of eastern Washington are found thousands of nearly circular mounds composed of different material than would be formed from the weathering of the basalt that is the chief bedrock of this region. The mounds only occur on top of the bare basaltic rock of the Columbia Plateau. They never occur on granite, schists or quartzite that occasionally outcrops. Neither do they occur on the