crustacea, rotifers and protozoa, which they capture by means of the expanded spoon-shaped peristome. Although discovered by Greeff in 1870 in Europe, the animal has been collected only occasionally since that time and consequently practically no experimental work has been done upon it. Recently, chiefly through the work of Westblad,[1] the sexual reproduction has been studied, and the extremely interesting observation made that the sex cells are of endodermal origin with the ovaries and testes projecting into the enteric cavity. Only two species are known, *P. leuckarti* Greeff and *P. caulleryi* Dawydoff.

The second animal, *Protodrilus leuckarti* Hatcheck, was collected by Mr. D. J. Zinn, of the Osborn Zoological Laboratory, from intertidae sand near Branford, Conn. Although some eleven species of this archiannelid genus have been reported from Europe, thus far none has been found in North America, chiefly, it is believed, because of failure to collect from its habitat. As is the case with *Protohydra,* little experimental work has been performed upon this form because of its comparative rarity. Very likely large numbers of European invertebrate genera are present here and will be discovered when our coasts are studied more intensively.

Both *Protohydra* and *Protodrilus,* it is believed, offer excellent possibilities for experimental work if they can be collected in more abundance and maintained in culture.

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SCIENTIFIC BOOKS

THE TEACHERS OF PHYSICS

WE have probably all listened to a teacher explain in glowing colors his way of teaching physics and have had the feeling that we should rush home and introduce his system into our classrooms. Closer thought, however, shows us that we have been listening to a happy, competent, enthusiastic teacher who has successfully fitted his teaching to his school, his students and his own personality. This same system forced on an overworked, less competent and unsympathetic teacher or a group of students of different training and point of view might well fail even worse than the system now being used. It seems that the same reasoning must be applied to text-books.

Probably most teachers are a bit dissatisfied with the text they are using. If only we could inject into the first-year student some of the enthusiasm of many graduate students, then our work would be made more easy. The advanced student is out on the front of new advances and new discoveries. Then should not these same "newest" ideas be made the theme of elementary texts? Some writers of text-books think so.

Smyth and Ufford (S & U)[1] is a text with this theme of "newness." The whole treatment is novel and new. The writers have not omitted the fundamental laws but rather have caused them to be brightened by the light of the advances of recent years. They are among the first writers of general texts to introduce and use the long recommended K.M.S. system of units with the Newton ($=10^7$ dynes) as the unit of force. This factor alone will doubtless influence some teachers in favor and some against this text. It would hardly be possible for the teacher to cling to the C.G.S. system and use this text.

In the hands of an experienced teacher who can keep in mind that good foundations are still necessary for safe construction and who nevertheless is willing to follow the spirit of the book S & U should be a real experience to the beginning college student. On the other hand, the inexperienced teacher who permits enthusiasm for the new to cause him to forget the necessary fundamentals or the teacher who puts this text into the hands of his student and then tries to teach in the conventional manner will produce neither good physicists nor clear thinkers.

Housman and Slack (H & S)[2] have avoided some of these dangers by writing a more conventional text with the material arranged as we are accustomed to find it, and yet they have included nearly every bit of new physics that S & U have used and some besides. A text which includes the "fission of uranium" and "non-reflecting glass," as does the H & S text, can hardly be called old-fashioned, yet these authors have kept their emphasis on teaching the fundamentals to the beginning student, to whom all physics is new. In their greater emphasis on fundamentals they have taken particular care to get the subject of units clear and straight in the student's minds. Also they have been careful to keep fundamental statements and definitions from becoming lost within long paragraphs of explanation.

There was some criticism on the part of teachers using H & S that the first edition showed a lack of care in the latter chapters compared to the earlier ones, as if the authors had been hurried to finish their task. This defect seems to have been eliminated completely in this second edition.

Both of these texts recognize that too many college students are poorly prepared in the art of working

[1] E. Westblad, *Arkiv för Zoologi,* 21A, No. 23.

[1] Smyth and Ufford, "Matter, Motion and Electricity." McGraw-Hill Book Co. $3.75.

[2] Housman and Slack, "Physics." Second edition. D. Van Nostrand Co. $4.00.

numerical problems and getting correct numerical answers. Hence they include a considerable number of carefully and completely worked-out numerical problems.

Both of these texts are of a difficulty which suggests their successful use only in the school where the students are rather above the average in ability and preparation. For the less capable students the older, well-tried and now rewritten Stewart[3] is in point of view much like H & S but with more qualitative description, less difficult mathematical discussion and, in general, of a lower level of difficulty but still a college text and not at all a glorified high-school text.

This reviewer feels at one disadvantage in writing of these texts. While these must be classed as among the best of the present texts, there are others which are completely comparable with these and which a teacher should also examine before deciding on the text for his classes.

Since the teaching of second-year electricity has escaped from the domination of Starling's "Electricity and Magnetism," whose red cover cast its controlling influence over this field for so many years, there have appeared a number of electrical texts. One of the newest is "Fundamentals of Electricity and Magnetism," by Loeb.[4]

This book was, according to the author, written to supply a text to accompany a course of twenty-six one-hour demonstration lectures. Hence the material was much influenced by the apparatus and conditions of those lectures. The students were to have had differential calculus before starting electricity and to be taking integral calculus concurrently with their electricity. Hence the first integral sign appears on page 87, following an unusually long historical introduction. The mathematical developments are rather less difficult than is common in such texts.

The author has followed the old convention of starting his development with the concept of a magnetic pole, which in spite of much criticism does seem to have its advantages. Similarly his treatment of B & H is quite conventional and no mention is made of the difficulties which have arisen in this field nor of the dicta of the International Electro-Technical Commission.

In his preface he states that he has found that "the greatest difficulty encountered by the student is the confusion in the definition and relation of the many electrical entities occurring in such a treatment." His definitions of field strength at a point as "the force exerted on a unit North pole at that point" (page 64) and potential difference as the "work to move unit quantity of electricity between those points," hardly agree with the criteria given by Worthing.[5]

There are a number of other minor criticisms which may be mentioned such as an unusual use of the expression "most efficient" on page 167 where it is used to mean "most current"; a strange diagram on page 328 where a damped sine function is plotted by straight lines: the failure to make clear the effect of line resistance in the self-induction experiment.

Where instructors wish a text which lies midway between the electricity of the conventional first year of college physics and the standard senior college course, Loeb's text will be found quite satisfactory and will fill a need in this field where few other texts are available.

A very different book is "The Fundamentals of Electro-Magnetism" by Cullwick.[6]

Professor Cullwick, recognizing that there has been a lack of clear thinking in many elementary texts, has attempted to put clarity and rigor into an elementary text. Mostly he has succeeded but some of his failures help to emphasize the difficulty of his undertaking. He has not produced a senior college text-book but he has produced a book which all teachers in this field should read both for its clarity and also for its confusion.

An elementary physics book[7] has been written by physicists and as nearly without mathematics as possible. No attempt has been made to "jazz up" the subject. Not at all a high-school text but, as the name implies, it is a survey for college students who can't or won't use simple mathematics.

"Mechanics for Engineering Students,"[8] is a text-book containing a very great number of carefully discussed mechanics problems, using only simple calculus. d'Alembert is mentioned, but not Lagrange nor Hamilton. Vectors are treated only by their components and no direct vector notation is used.

"Introduction to Laboratory Technique,"[9] is a book that will be found useful in any laboratory where work is being done. There are formulas and instructions for a great many things which a laboratory or shop man frequently needs to use. Aside from some English trade names and an occasional shop use of a word which will confuse a chemist or physicist, the instructions seem to be very clear and definite.

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[3] O. M. Stewart, "Physics. A Text Book for Colleges." Third edition. Ginn and Company. $4.00. (First edition, 1924.)

[4] Loeb, "Fundamentals of Electricity and Magnetism." John Wiley and Sons. $4.00.

[5] A. G. Worthing, *American Physics Teacher*, 6: 59, 1938.

[6] Cullwick, "The Fundamentals of Electro-Magnetism." Macmillan, $4.50.

[7] Arthur E. Hass and Ira M. Freeman, "Elementary Survey of Physics." E. P. Dutton Company. $1.90.

[8] John E. Younger, "Mechanics for Engineering Students." International Textbook Company. $3.50.

[9] A. J. Ansley, "Introduction to Laboratory Technique." London: Macmillan and Company. $4.50.