be equally well represented in 1926, and, in order to enable this to be done with as little difficulty as possible, I have arranged again to collect and forward American work intended for the scientific section.

This work should consist of prints showing the use of photography for scientific purposes and its application to spectroscopy, astronomy, radiography, biology, etc. Photographs should reach me not later than Saturday, June 12th. They should be mounted but not framed. There are no fees.

I should be glad if any worker who is able to send photographs will communicate with me as soon as possible so that I may arrange for the receiving and entry of the exhibit.

A. J. NEWTON

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REQUEST FOR DATA ON THE TWILIGHT SONG OF THE WOOD PEWEE

THE wood pewee, one of the commonest birds of the eastern United States and Canada, sings a long, complex musical composition known as the twilight song. It is named "twilight song" because it is sung regularly at dawn, rarely at sunset, and never at any other time of day. The song lasts continuously for a very long time, even as long as forty minutes; but it contains only three different phrases, which I shall speak of as phrases 1, 2 and 3, and which are readily distinguishable from each other, thus affording a basis of exact analysis. A brief, preliminary description of the song can be found in the current (April) number of *The Auk*. Although there are only three different phrases, their order of succession is remarkably complex, and individual variations are so great that apparently each individual wood pewee sings a composition of his own. A thorough study of these compositions will be sure to yield results of great interest. I request that scientists and also non-scientific persons (if only they are accurate) will make records of the song for me. To make the record, you simply write the number of each phrase, 1, 2 or 3, as the case may be, while the bird is singing. This can be done by any person who is careful and reliable and has a sufficiently good ear to follow a tune. The only difficulty is that you need to rise and go out before daylight on one of the long days of early summer, in order to get a complete record. Few persons have the time to spare and the necessary interest and enthusiasm to do this. If you can take the time to make one complete record, it will be a valuable contribution. Please write to the undersigned for a copy of the directions for making a record.

WALLACE CRAIG

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SCIENTIFIC BOOKS

Manual of Injurious Insects. By GLENN W. HERRICK. New York, Henry Holt & Co., 1925, 474 pp., 458 illustrations.

ONE of the reasons why entomologists until comparatively recent years were so numerous in Europe and so scarce in America was the lack of books over here which would enable collectors to identify species. The lack of this kind of books still exists, although to a much lesser degree, in the United States. But during the past dozen years a number of good books have been published in this country on the subject of applied entomology, and of these books Professor Herrick's volume is the latest and in many respects the best. It is worthy of note that most of these books have been written by teachers, and their aim has been not only to tell everybody about injurious insects and how to combat them but to place before students a compendium of economic entomology in this country down to the date of writing. I have never taught applied entomology, but it seems to me that, if I were to try to teach, this book would be the one I should use before any as yet published.

Herrick's volume must be praised very highly. It has many good points. The illustrations are competent, and the majority of them are new. And the author has introduced several new features which are excellent. For example, wherever possible he has introduced with the consideration of each one of the principal crop pests a small outline map of the United States indicating the geographic distribution of the insect. It has not been possible to do this in all cases, on account of lack of records, but where it has been possible it can not fail to be of very great use. It shows at a glance conditions which it would take many lines of print to describe.

Another point which makes the book very useful is the introduction of synopses of the chief insects affecting the different crops. For example, after the consideration of insects injurious to apple, there is a synopsis of the chief insects injurious to this fruit in the United States, arranged according to the character of their work as well as to their general appearance in all stages; and this is done in popular language so that the apple grower will be able to find out immediately just what insect is damaging his trees, and he can do it without sending specimens to some distant economic entomologist.

Then too, Herrick has been careful to indicate in his legends to the illustrations the actual size of the insect, an important point neglected by some recent popular writers on insects, thus causing serious misconceptions. His proofreaders, unfortunately, overlooked this in a few instances, as in the case of the

woolly root-louse (Figure 59) and that of the Japanese beetle grub (Figure 62).

It is an interesting thing to see how different people go at practically the same thing in different ways. When Dr. H. T. Fernald five years ago wrote his "Applied Entomology, an Introductory Textbook of Insects in their Relation to Man," he filled an interesting volume of nearly four hundred pages with economic facts about insects and he arranged his material according to the zoological grouping of the insects. This was also the method used by Herbert Osborn in his admirable "Agricultural Entomology" published in 1916. In 1921 a somewhat larger work by Sanderson and Peairs was published, but here the material was arranged according to the crops affected by the injurious insects or by the classification of the other damage that they do. This method reflects the organization of the federal Bureau of Entomology, which has divided its work largely on ecological lines.

In the present book Professor Herrick has in the main adopted the method of treatment used by the latter authors. The title of the Sanderson and Peairs book is "Insect Pests of Farm, Garden and Orchard," whereas that of Herrick is "Manual of Injurious Insects." The latter title, while short and to the point, is a bit misleading, since the title itself has no geographical limitation and the insects treated are solely those of the United States. Moreover, in the book there is no consideration of the insects that damage forests and shade trees (with the exception of a short appendix on the gipsy and brown-tail moths), and one looking, possibly with some confidence, in the books for shade-tree pests or forest pests will be disappointed.

It is interesting to note that nearly a third of the volume is devoted to the consideration of insects injurious to fruits, large and small, whereas the space devoted to insects affecting cereal and forage crops covers less than half that, and the space devoted to insects affecting vegetables is also about half as great as that devoted to fruits. This does not necessarily mean that Professor Herrick considers the fruit industry more important than the real food crops of man and animals, but, as it happens, there seem to be more different kinds of insects that attack fruits.

The book is dedicated to the memory of Ezra Cornell, and in the dedication a sentence is quoted from Cornell's address at the founding of Cornell University in which he brought out strikingly the necessity for the study of economic entomology. The dedicatory words would lead one to think that work in this direction must have been started immediately after the university opened its doors, but as a matter of fact it was not started until about six years later, when J. H. Comstock appeared on the scene. The reading of this dedicatory note has given me a surprise. I knew Ezra Cornell when I was a boy in Ithaca. I had the honor of being driven out of his orchard once by the old gentleman himself. His tall hat and his heavy cane were enough to frighten any small boy. He never told me on this and other occasions that he was interested in economic entomology, but now I know that perhaps he was indirectly responsible for my own method of getting a livelihood.

Professor Herrick succeeded Professor Comstock in a part of his important work in building up a great department of entomology at Cornell, and in this book he has shown his sure competence.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD OF DEMONSTRATING THE EMBRYONIC MEMBRANES OF THE CHICK

IT is of considerable advantage to the teacher of embryology to be able to show the relations of developing fetal membranes by demonstration of the actual material rather than by use of the customary diagrams alone. The method described here gives excellent results for the membranes of the incubating chick and depends upon the absorption of a one per cent. solution of trypan blue (vital stain) by the allantois. A similar technique is being used in this laboratory for the study of fetal absorption.

The incubating egg (White Leghorn) is candled and the position of the allantoic cavity, which shows as a comparatively clear area surrounding the shadow of the chick, noted. The allantoic position may be detected as early as the beginning of the fifth day, although at this early stage the allantois does not completely cover the embryo. A small hole is made through the shell into the allantoic cavity by means of a sharp dissecting needle. A slightly larger hole is made through the shell at the top of the air sac to relieve the pressure caused by injection into the allantoic cavity.

The dye is made up fresh in distilled water and does not need to be warmed to body temperature. It is injected with a hypodermic syringe equipped with a twenty-seven gauge needle. The amount injected depends upon the stage of development and may easily be determined by holding the egg before the candle during the process of injection. During the fifth and sixth days of incubation a few drops of dye are sufficient. In the later stages not more than one half cc is required. The needle holes are sealed each with a drop of wax (Clark's method)[1] and returned to the

[1] Clark, Eliot R., SCIENCE, 1920, li, 1319.