means of transmission of this disease should be extended. In fact, however, suggestions of this kind are not helpful, because a prolonged and special training is necessary before any scientific worker can address himself usefully to the study of epidemic encephalitis. All those who possess the necessary qualifications are at present engaged in one or other of the branches of research which have a bearing on the prevention, causation or treatment of the disease. The public has a duty to see that the work now being carried on is not hampered by any lack of resources, but beyond the discharge of that duty it can not properly intervene. It can, however, and should, insist that the after-care of the victims of the disease shall be undertaken by those best qualified to conduct it. Provision for the care of mental deficiency arising as a consequence of epidemic encephalitis is still woefully inadequate. Moreover, the means are not always available to afford persons convalescent from the disease the prolonged and careful attention which they require. The London County Council deserves all praise for its effort to provide treatment of partially recovered cases, an effort which has already yielded valuable additions to the knowledge about the disease; but this isolated example of public spirit is not enough. As Dr. A. F. Tredgold, speaking on behalf of the People's League of Health, pointed out to the Home Secretary two years ago, it is an urgent necessity to provide an institution where all child victims of epidemic encephalitis, whose minds have been unbalanced, may receive continuous and special treatment. The same idea without doubt informed the statement of the medical officer of Brixton Prison in his report for the year ended March 31, 1925, that "we have had one or two post-encephalitic delinquents who resemble congenital defectives in their mental characteristics. Those cases are, apparently, hopeless, and it is feared that their number will increase unless some method of curing or protecting against (the disease) is discovered."—*The London Times.*

SCIENTIFIC BOOKS

Neuzeitliche Bekämpfung tierischer Schädlinge. By K. ESCHERICH. Berlin. Julius Springer, 1927.

To Dr. K. Escherich, of the University of Munich, more than to any other individual is probably due the revival of interest in economic entomology in Germany and its present high standing. Under the Carnegie grant, and while he still taught forest entomology at the well-known Forest School at Tharandt, he visited the United States in 1911 and made the studies described in his book "Die angewandte Entomologie in den Vereinigten Staaten." On his return to Germany, he was instrumental in founding the German Society for Applied Entomology and was its first president. His entomological work was largely interrupted by the war, as he was brought into the medical service of the army, but on its conclusion he was transferred to the University of Munich and has been promoting actively the purposes of the new society and furthering the cause of economic entomology in every possible way.

He, with some of the other members of the society, started two admirable journals. He has written many papers and delivered many addresses but none of broader scope and more convincingly phrased than the present one which was delivered before the eighty-ninth meeting of the great German Association of Naturalists and Physicians at Düsseldorf in September, 1926, and which has been reprinted the present year from *Die Naturwissenschaft.*

He gives the great war the credit of showing the German people, thrown practically entirely on their own productive resources, that crops are not gathered in proportion to what has been sown and cultivated, but to what has been left over by the insect pests. This is his own expression. Could it be more perfectly put?

As a forest entomologist, it is natural that his illustrations should be drawn from the forest, but the generalizations which he makes apply in many cases to other cultures. While in America he became much interested in the subject of natural control, and he dwelt upon the features of this aspect of economic entomology in his book on his American experiences. Naturally, as a skilled and broad forester, he thinks of the forest as an entity—as a biocoenosis—and considers philosophically the necessary interrelations of the multitudinous organisms that constitute forest life. He draws from these considerations the inevitable conclusion that change of a mixed forest into a one-type forest can not fail to have a most disastrous effect upon certain of the very important elements of the forest's existence; and in working this out he considers especially the interrelations between the destructive insects and their parasites, following out the idea that many of the most important parasites of destructive insects are not specific to one host but have several hosts of differing food plants. Thus, the presence of a certain variety of trees is necessary to insure the supply of some of the most important parasites. The reestablishment of mixed forests to replace monocultures is therefore desirable.

In the course of his address he brings out a number of very interesting points. Under the head of parasites, he suggests the desirability of keeping on hand large quantities of strongly polyphagous species which may be reared easily in large numbers. He

states that Haase has been rearing an egg-parasite of the genus Trichogramma in Petri dishes, where it can readily be secured in very large numbers. It may be mentioned incidentally that the same idea has occurred to American workers and that insects of the same genus are now being reared in this way in California for use against the codling moth, especially in the walnut groves. He treats of the control of insects by diseases, and mentions good results obtained by Schwangart with fungi that destroy the larvae of Cochylis. He also treats of resistant plants and of the desirable qualities of insecticides in general. It is interesting to note that, even before the war, a German forest warden named Zimmerman obtained a patent in Germany on the process of combating insects by means of airplanes, a method which has been developed in this country since the war and which is entering into a promising commercial phase.

The address closes with a strong plea to his audience, which he stated comprised the largest forum of German scientists, to turn their attention toward applied entomology and to assist in manifold ways in the work against injurious insects.

It is a strong paper and quite worthy of Escherich. He realizes that the insect problem is a world problem, and is trying to prove this to the scientific men of Germany.

L. O. HOWARD

PALEONTOLOGICAL AND GEOLOGICAL INVESTIGATIONS IN THE JOHN DAY REGION OF EASTERN OREGON

A COORDINATED program of research, rather unique in the range and the detailed nature of the studies included in it, is being conducted in the John Day region of eastern Oregon. Through investigations in vertebrate and invertebrate paleontology, paleobotany and physical geology, an attempt is being made to construct as completely as possible the history of the development of animal and plant life and of geologic and climatic changes in this part of the northwest in the later eras of geologic time.

President John C. Merriam, of the Carnegie Institution of Washington, is both directing the project and participating actively in the field and laboratory investigations. The studies are an extension of researches initiated in this region by Dr. Merriam more than twenty-five years ago. The program is being prosecuted under the auspices of the Carnegie Institution of Washington; other institutions which have been cooperating are the University of California, the University of Oregon and the California Institute of Technology.

Mammalian fossil remains in important quantities have been collected in the John Day Basin from three formations, of Oligocene, Miocene and Pliocene age. In the thirty-five years beginning in the late sixties quite large collections were made and studied by Condon, Marsh, Cope, Scott, Merriam and Sinclair. In the last quarter-century many others have contributed to our knowledge of these faunas, largely through study of materials gathered in the field during the earlier period. As part of the present program of research notable additions have been made to the fossil material through further collecting; these furnish an adequate basis for a revision of the faunas from the John Day formation and for a better understanding of the mammalian assemblages from the Miocene and the Pliocene Rattlesnake deposits. These faunas are being studied by Dr. Merriam and by Dr. Chester Stock of the California Institute of Technology, and several preliminary reports are either in preparation or have already appeared. In addition to indicating the age and correlation of the formations and aiding in determining the climatic and topographic conditions under which the rocks were deposited, these rather large collections give a vivid picture of the animal life which existed in this region during certain periods of the Cenozoic era.

The paleobotany of the region is being investigated by Dr. R. W. Chaney, research associate of the Carnegie Institution. Large collections of fossil plants have been made and studied, representing the forests and smaller associated plant life of Clarno, John Day, and Mascall time. Results already published contribute to the taxonomy of Tertiary fossil plants, and the ecology of the floras. Important interpretations of the fossil plant assemblages have been made on the basis of the ecologic relationships of certain modern floras. Significant facts regarding the age and the climatic and other conditions of deposition of the formations which contain them have been brought to light.

The invertebrate paleontology of eastern Oregon, especially of the older horizons lying beneath the Tertiary continental deposits, is being studied by Dr. E. L. Packard, of the University of Oregon, who has secured excellent collections of cephalopods and other marine invertebrates. Numerous new forms have been recognized in these faunas, and are being described. The last invasion of the sea into eastern Oregon occurred apparently in Chico Cretaceous time, and Dr. Packard is attempting to ascertain from these isolated strata—the only Pacific Cretaceous exposed east of the Cascades—something of the position of the Cretaceous shorelines and the topography and climate of the adjacent land masses. Pre-Cretaceous horizons bearing faunas probably not recognized here-