

The one experiment described by MacKay which would indicate that the thoracic spiracles serve equally well for inhalation and exhalation, does not seem to be conclusive. In this the head and thorax of a grasshopper were placed under water and the abdomen left out. The bubbles of air which came from around the thorax may have escaped through the injured valve of a spiracle or may have been carried under the water adhering to the waxy chitin. I have made such tests repeatedly on grasshoppers, cockroaches, walking sticks and representatives of every other family of Orthoptera, and have never seen air pumped out of the thoracic spiracles of normal animals. Sometimes when the head and thorax of the insect are thrust under water some air is held around the head and legs. This air may collect as bubbles and float to the surface, and might seem to have come from the spiracles. Also, if the spiracular valves are held or torn open, air bubbles may escape at each contraction of the abdomen. In such an experiment with the head and thorax submerged, the abdominal spiracles which normally open during the collapse and close during the expansion of the abdomen, remain open continuously, evidently serving both for inspiration and expiration. It is true that in such a case the respiratory movements go on and complete asphyxia does not occur. There is, however, some evidence of partial anoxemia in the lessened irritability of the animal.

A few other data bearing on the question might be reviewed briefly. The movements of the valves of the spiracles indicate clearly their actions in inspiration and expiration. The valves of the anterior four pairs of spiracles very plainly open during the inspiratory phase of the cycle (enlargement of the abdominal cavity) and close during the expiratory phase (collapse of the abdomen). The thin, membranous portions of the neck and thorax may be seen to bulge out during each expiration, and this does not occur if the valves of any thoracic spiracles be held open. Further, if the valves of the thoracic spiracles are held open while under water, air bubbles escape at each contraction of the abdomen.

That the abdominal spiracles do not function normally as inspiratory orifices is indicated by the fact that with the abdomen submerged in water, bubbles of air appear over the spiracles and become noticeably larger at each contraction of the abdomen.

The size of the bubble is not noticeably decreased during the expansion of the abdomen, as must surely occur if the abdominal spiracles acted as inspiratory orifices.

MILTON O. LEE

THE OHIO STATE UNIVERSITY

FUNDAMENTALISM IN PHARMACY

PROFESSOR GRIER's letter in a recent issue of *SCIENCE* has acquainted the scientific public with the change that has occurred in the management of Des Moines University. The issue of *The Gospel Witness* (a publication in the interest of the American Baptist Bible Union) for July 21 contains an account of the investigation of the faculty of the department of pharmacy at the university as follows:

Two excellent gentlemen were in charge of the college, but the head was a Unitarian. After meeting him we were not surprised to learn that he was very popular with the students. He is a delightful man, whom we all coveted for the Lord Jesus Christ, but, under the circumstances, it became necessary for the faculty to find a new head for the institution.

HENRY LEFFMANN

QUOTATIONS

EPIDEMIC ENCEPHALITIS IN ENGLAND

THE Minister of Health stated the other day, in a written answer to a question, that during the past five years nearly 5,000 persons have died in England and Wales of epidemic encephalitis, the so-called sleepy sickness. During the same period 11,420 cases of the disease have been notified, so that the melancholy fact emerges that nearly half of all those stricken by epidemic encephalitis in this country have succumbed. The fate of those who have escaped death was not referred to by Mr. Neville Chamberlain, but a long series of researches, extending over the known "history" of the disease, suggests that recovery, in the true meaning of that word, is the exception rather than the rule. Epidemic encephalitis leaves behind it, in the majority of instances, damage to body or to brain of a more or less severe kind. As is well known, it possesses the power of transforming character, and this transformation is nearly always from good to bad. It possesses also the power of inducing that form of paralysis known as "Parkinsonism." So grave a malady merits, without doubt, the close attention of the public, especially since it seems to have become established in this country. The Minister of Health pointed out that there were 2,267 fresh notifications of epidemic encephalitis in 1926, 2,635 fresh notifications in 1925, 5,039 fresh notifications in 1924, 1,025 fresh notifications in 1923, and 454 fresh notifications in 1922. The epidemic wave, which reached its highest point in 1924, has therefore by no means subsided, though it has been reduced in magnitude.

It is a temptation in these circumstances to urge that research work on the unknown origins and

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