matics contains an article on this subject by the members of the Cooperative Committee on Science Teaching. The report presents the situation as it exists in nearly all but the largest high schools. It points out that in the great majority of these schools a teacher of a science subject must be prepared to handle one, two, three or four other subjects. Under existing conditions many such teachers are not well prepared to handle all the subjects and in some cases they are not thoroughly prepared to teach any of them. Both the college and the state certification authority must often accept some of the responsibility for the lack of preparation of these teachers.

A questionnaire sent to two hundred colleges reveals that in some of the schools definite special programs for the preparation of science teachers have been set up. But in far too many no definite attempt has been made to correct the serious lack of preparation.

The committee recommends that approximately one half of the prospective science teacher's program for the four years of college be devoted to courses in science. This will permit of sufficient work in three sciences to give fairly adequate preparation and leaves ample time for the general education required. This will result in much better preparation for the science teaching demanded and will also give the student adequate preparation for good graduate work.

The difference between the sciences is often completely overlooked. Even the North Central Association of Colleges and Secondary Schools considers science as a single subject and requires but fifteen hours preparation. A teacher may actually be assigned to teach a science subject and never have had any college work in it.

To correct these defects the committee proposes that as a minimum policy teachers of science be prepared in at least three sciences and that a total of sixty semester hours be required for this area. This will permit a teacher to take at least eighteen hours in each science and twenty-four hours in biology, including courses in both botany and zoology.

The committee is composed of members representing the four national science teacher organizations of biology, chemistry, mathematics and physics and the national science teaching group. A copy of the Preliminary Report of the Cooperative Committee on Science Teaching will be sent free to any one who writes for it to the chairman, Robert J. Havighurst, The University of Chicago.

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SCIENTIFIC BOOKS

THE AFRICAN MOSQUITOES

Mosquitoes of the Ethiopian Region. III. Culicine adults and pupae. By F. W. EDWARDS. British Museum, 1941. 499 pp.

THE discoveries made in comparatively recent years, proving that mosquitoes are the carriers of the organisms producing malaria, yellow fever and other diseases, have led to intensive studies of these insects. I can well remember that when I was working in Washington, Ross sent over some slides in support of his ideas concerning malaria, and how these were examined with much curiosity not unmixed with scepticism. Since that time very numerous research workers in various parts of the world have intensively studied not only the medical aspects of the subject, but also the classification of the mosquitoes themselves. The African mosquitoes, which had been known only by a few species, mostly inadequately described, now number 346 species, of which 301 are unknown outside of Africa, and about a dozen more may be added if we include Madagascar and the Mascarene Islands. The species of the Mediterranean region of Africa, belonging to the Palearctic province, are not included. Even this large number does not include the whole fauna, as is proved by the new species turning up in almost every collection received. India, Burma and Ceylon have 293 species, but their structural diversity appears to be much greater, with 40 subgenera against 29 (only three endemic) in Africa. The first great contribution to the knowledge of African mosquitoes was made by F. V. Theobald, whose great monograph of the Culicidae was published by the British Museum. Theobald described 114 new species from Africa, but later took up other entomological work, particularly aphides. It was very fortunate that F. W. Edwards was able to continue the work, since he was probably the most competent student of Diptera living, and collectors all over Africa were delighted to send in their material, knowing that it would be well handled and reported on. The result was precisely that cooperation between the museum and the man in the field which is most productive of results. To the very great regret of all entomologists, Edwards died on November 15, 1940, just as his volume on the Culicine Mosquitoes of the Ethiopian Region was about to go to press. The work was, however, completed, so far as the materials available permitted, and was published during the following year. Its 499 pages include descriptions of all the species, many illustrations and very interesting comments on species and varie-

ties, geographical distribution and other broad topics with regard to distribution. Edwards based his discussion on that of J. P. Chapin, whose volume on "The Birds of the Belgian Congo," published in 1932, is now regarded as a classic. The birds have this in common with the mosquitoes, that they have been much studied and are comparatively well known. This might also be said of the butterflies, but they have not been treated in a sufficiently comprehensive manner.

Although Africa has 65 species of *Anopheles,* during my travels in central and south Africa in 1931, I did not find any, nor did any of our party suffer from malaria. This seems to have been due to the fact that we timed our visit so as to be in the dry season. In Siam, it was quite otherwise, and *Anopheles* swarmed everywhere. Edwards discusses the relation of the Culicine mosquitoes to disease. He points out that before 1928 *Aedes Aegypti* (also called *Stegomyia*) was supposed to be the only transmitting agent of the yellow fever virus. But since that time, it has been proved that several other species may be involved. Filariasis, caused by the worm *Filaria bancrofti,* is communicated in the main by two species of *Anopheles.*

The discussion of species and varieties shows how species which as adults appear almost exactly alike may differ strikingly in the male genitalia or else in the early stages or in habits. Races of *Anopheles* are in some cases distinguished mainly by features of the eggs. It is possible that hybrids may exist in nature, but of this we have no information.

Students of any group of insects may study Edwards's book with profit as an example of good taxonomy, and because the problems encountered are more or less similar in all groups of organisms.

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THE APPALACHIAN VALLEY OF VIRGINIA

Geology of the Appalachian Valley of Virginia. By CHARLES BUTTS. Bulletin 52. Virginia Geological Survey, Charlottesville, Virginia. Part I, "Geologic Text and Illustrations" (stratigraphy, structure and geological history. 568 pp., 63 plates); Part II, "Fossil Plates (72 full pages) and Explanations," totaling 270 pp.). Price, Parts I and II, $1.50. Part II available separately at 50 cents.

THE Appalachian Valley of Virginia is a land of plenty and good living; its history has been one of romance and hard-fought battles; but its rocks offer so many problems that an adequate description of its geology has long been delayed.

The rock structures of the Virginia Valley are complex, since the area lies between the open folding of the Cumberland Valley of Pennsylvania and the shingle blocks of the Valley of East Tennessee and Alabama. Its structures show illustrations of domes, anticlines and synclines, overthrust blocks, fensters and klippen, outliers and inliers and many areas of multiple shingle blocks.

Along its trend there are many faults of more than a hundred miles in length; one, traced beyond its area, has been followed for three hundred miles. The area exhibits many great overturned fault blocks; one ten miles across shows evidence of having been heaved and moved horizontally as much as twenty miles.

Even more difficult than its structure is the unraveling of its stratigraphy. Fossils are not abundant; in fact, they are lacking in many hundreds of feet of its beds; nor are these fossils well known; many are yet to be described. The sediments from which the rocks were formed were laid down in narrow embayed seas subject to varying currents and to frequent changes in the character of the materials brought in from the lands.

The two volumes by Charles Butts are epoch-making in the study of Appalachian stratigraphy. They are the summary statements, the synthetic views of Dr. Butts, who has devoted a lifetime to the study of this and adjacent areas. Not since the publication of the Rogers' reports in 1835–41 has there been issued a comprehensive report covering the whole valley, and fittingly the volumes are dedicated to this great pioneer geologist.

Volume I includes an introductory discussion of the topography, relief and physiographic history of the area; the stratigraphy of its rocks, from the Cambrian through the Pennsylvanian series; a discussion of the structural features of the valley and adjacent plateaus; and a comprehensive geological history of the area.

Part II is of priceless value to all students of Appalachian stratigraphy, since it brings together and illustrates in one volume more than 700 of the diagnostic and characteristic fossils, many new, of the various horizons. It gives to all workers criteria for correlations, which heretofore have been based largely on the judgment of individual "authorities."

Since Dr. Butts has furnished a large-scale geologic map of the area in his Virgnia Survey Bulletin 42, the most important method of his presentation in Volume I is by means of typical geologic sections, giving their lithology, thickness and fossil lists. His well-worded descriptions of locality outcrops and measured sections will be invaluable to all future students in the area.

In his stratigraphic interpretations, Dr. Butts has recognized, as he words it, "that the kind and character of the sediments of any area depend almost