cumulating in the caves underwent bacterial decomposition with the formation of nitric acid which reacted with the limestone to form calcium nitrate. The calcium nitrate was leached from the cave earth with water, and the resulting solution allowed to percolate through wood-ashes where a reaction took place between the calcium nitrate and potassium carbonate with the formation of potassium nitrate. During the first World War, Thomas L. Bailey explored the caves in the eastern part of Middle Tennessee for the State Geological Survey in order again to determine the value of the caves as possible sources of niter.[3]

The "niter beds" visited by LeConte are also referred to as "niter plantations" and "nitriaries." The largest nitriary, according to Colonel St. John, was located at Columbia, S. C., with 45,000 square feet of surface under cover of open sheds. Here, 122 laborers were employed with 12 horses and 13 mules.[4]

Beds of manure and other nitrogenous animal refuse, loosely piled in contact with wood-ashes derived from oak trees, were periodically moistened with urine. The sheds protected the beds from rain while permitting ready access of air. Decomposition resulted in the formation of ammonia, which, through oxidation, was converted into nitric acid. The nitric acid in turn reacted with the potassium carbonate of the wood-ashes to yield potassium nitrate. The important role played by bacteria in this process for the formation of nitric acid was not discovered until several years after the close of the war. One group of bacteria brings about the formation of ammonia from organic matter, a second group oxidizes the ammonia to form nitrous acid, and a third group oxidizes the nitrous acid to nitric acid.

Some nitrate was also obtained from the earth under tobacco barns, smoke houses and other buildings.

The importance of the nitriaries is evidenced by the fact that the applications of officers of the Niter and Mining Bureau for transfer to field service were denied and by the fact that conscript labor was used to supplement the work of slave and volunteer labor.

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## THE EFFECT OF DEHYDRATION UPON THE VITAMIN A CONTENT OF EGGS[1]

TREMENDOUS quantities of fresh eggs are being dried for shipment to our armed forces and to our allies under the Lend-Lease Program. It is vitally important to know whether or not the nutritive value of eggs has been lowered during the dehydration process. Since vitamin A is one of the most labile food factors, a study was made to determine the effect of the dehydration process upon the vitamin A value of dried eggs.

The samples of fresh liquid and dried eggs were collected at a commercial plant which employed a Mojonnier spray drier. In order to minimize sampling error, samples were collected every half hour during a six-hour period from large batches of mixed eggs as the homogenized eggs entered the drier and from the dried eggs a few minutes later. From the samples collected on the hour, definite quantities of each sample were taken and made into one composite sample of liquid eggs and one composite sample of dried eggs. Similarly, the samples collected on the half hour were made into composite samples. In order to test the uniformity of sampling, spectroscopic examinations were made upon the two series of composite samples of liquid and dried eggs as well as upon the individual samples.

For spectroscopic observations, samples were saponified and extracted with ether. Determinations of absorption were made at 3,240 A to indicate changes in vitamin A content and at 4,370 A to indicate changes in total carotenoid content. The characteristic absorption curves of extracts from fresh homogenized and dried eggs were identical in the visible region and very similar in the ultraviolet. The drying process caused less than 2 per cent. loss of carotenoid and ca. 5 per cent. loss of absorption in the ultraviolet. These losses are comparable to the sampling errors, which were small. Losses during storage of both liquid and dried eggs at $-18°$ C. for 14 weeks were no greater than those caused by drying.

For the biological assays, the composite samples of liquid eggs were broken down into weighed portions of 25 grams each which were stored at $-18°$ C. until needed when they were diluted to 500 ml with one per cent. saline solution. The samples were assayed by the usual rat-growth method, using U.S.P. Reference Oil as a standard. The results of the biological assays indicated that little or no deterioration of the vitamin A took place during the dehydration. These samples compared very favorably on a moisture-free basis, with potencies of approximately 44 I.U. per gram.

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## THE PREPARATION OF HIGH-SCHOOL SCIENCE TEACHERS

THE October number of *School Science and Mathe-*

[3] Report on the Caves of the Eastern Highland Rim and Cumberland Mountains, "The Resources of Tennessee," VIII, 85–138, 1918.

[4] Official Records of the Union and Confederate Armies, Ser. IV, Vol. 3, p. 698–9.

[1] Journal Paper No. 52 of the Purdue University Agricultural Experiment Station.

*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-