$100,000, largely in trust to his parents with the provision that, following their death, it be turned over to Princeton University to establish a Richard Halliburton Geological Library.

THE five million kronen collected on the occasion of the thirtieth year of the reign of King Gustaf of Sweden will be devoted to the establishment of a foundation for the study of paralytic diseases, especially poliomyelitis, and to the campaign against tuberculosis.

FORMAL exercises dedicating the Medical Building at the University of North Carolina will be held on December 4. The morning will be devoted to addresses by prominent physicians and experts in public health. The afternoon will be given over to inspection of the new building, and a banquet in the evening will conclude the program.

AN Associated Press dispatch states that further Nobel Prize awards will be withheld this year, due to the European war. The literary, physics and chemistry prizes for 1939 may be awarded next year, but the 1938 chemistry prize, postponed last year, will be permanently omitted and the prize money, about $38,769, returned to the main fund.

THE Statistical Laboratory of the Iowa State College, of which Professor G. W. Snedecor is director, has recently made an agreement with the Bureau of Agricultural Economics of the U. S. Department of Agriculture to provide for joint research in the statistics of agriculture and associated statistical theory.

DISCUSSION

VITALIZING HISTORICAL GEOLOGY THROUGH FIELD TRIPS

FIELD trips, if they are to constitute a part of a course in general geology, should make a vital contribution to the course. It frequently happens that this contribution can be made more easily when the work deals with physical geology than when it deals with historical geology. Since one or more of the geologic agents are continually at work in any given region it is not difficult to plan a field trip on which the student can observe some of the physical processes which they study in class. In some regions it is a little more difficult to plan a field trip that will make a vital contribution to the study of historical geology. In some localities only a limited geologic column is accessible to the students without the expenditure of an unreasonable amount of time and money. In such cases the field trip may resolve itself into a fossil-collecting expedition or a superficial study of the rocks of the region with little or no connection with the work of the classroom.

For several years the author has been attempting to remedy this weakness and to make the field work of his students contribute more than that to their work in general geology. An article recently published by Gwynne[1] describing his efforts to make the field trip a real teaching device, suggested to our mind that the plan we had tried this year might be interesting and helpful to other geology teachers.

It so happens that the rocks in the region around New Concord are in the Conemaugh series of the Pennsylvanian system. Most of the ridges of the region are high enough to include the lower part of the Monongahela series. Since this is the case it seemed desirable to make an effort to correlate the field trips with our class discussion of the Pennsylvanian system.

As early in the spring as weather conditions would permit field work the students were given a mimeographed schedule of observations and records that were to be made on field trips. Small groups of students were then taken into the field and together with the instructor observed and recorded a typical exposure of a succession of rocks of Pennsylvanian age found in a road cut near New Concord, Ohio. Each student contributed his observations, and the members of the group recorded the observations in their note-books. The instructor directed the activities and attention when necessary, making sure that all important points were observed.

After the group instruction in the field each student chose from a list of places previously selected by the instructor a road cut, ravine or roadside ditch near New Concord in which to observe and study a consecutive succession of rock exposures. The student was instructed to observe and describe the successive exposures and their contacts as carefully as possible and to collect whatever fossils they could find. The fossils which they collected were identified in the laboratory. Thus the field trip contributed to the work in the laboratory. When a student's observation was complete the record was presented to the instructor, who checked it for completeness and accuracy. In most cases it was necessary to send the student back over the area to make a more careful and detailed observation. All observations were to be completed and the records checked and accepted before the day on which the class discussion of the Mississippian period was finished.

On the day scheduled for the beginning of the class

[1] C. S. Gwynne, SCIENCE, November 11, 1938.

study of the Pennsylvanian period the selected sections described by the students were assembled and copied on the blackboard, and in so far as possible these sections were correlated. From these correlated sections, covering an area of about three square miles, a generalized cross section of the rocks of the New Concord region was made. This work was done largely by the students; the instructor, acting as a secretary, did the actual writing on the board.

From the information thus collected the class then reconstructed the geologic history of the region immediately surrounding New Concord. This offered an opportunity for the students to apply the scientific method in their study of the region. With the history of our own area in mind we then turned to the textbook for a more complete picture of the Pennsylvanian as a whole, keeping in mind the idea of tying up the region we had actually studied with the Pennsylvanian system as it is found in North America and tying the geologic history of the New Concord region as we had reconstructed it from our field study of the region with the history of the Pennsylvanian of North America.

This plan of procedure is not without its weaknesses, most serious of which is the fact that before the student starts out on his own to observe the rocks and record his observations he needs more field experience than we have given him. We plan to overcome this difficulty by beginning to observe and describe the rocks during the first semester in addition to the observation of the physical phenomena which heretofore has constituted most of our field work during the first semester. It is quite possible, too, that we will be able to find time for more than one conducted field trip early in the second semester field season before sending the student into the field on his own.

On the other hand, this procedure has several desirable features. The student develops a realistic idea of the Pennsylvanian and, indeed, the whole of the geologic column and of geologic history by actually studying, recording and interpreting his observations of a part of the rocks of the Pennsylvanian system. He arrives at a better appreciation of the work of the geologist through his own experience in working as the geologist works. His interest in geology is increased through active participation. He has had the experience of observing and recording evidence and in drawing inferences from the evidence. Thus he has actually had a concrete experience with the scientific method.

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ENDOGONE AS ANIMAL FOOD

ALTHOUGH the genus Endogone has received comprehensive taxonomic treatment little is recorded of the rôle which species of these hypogeous fungi may play in the economy of nature. It is to be expected that the small, truffle-like fructifications of *Endogone* might be eaten by some animals, but accounts of their use as food seem strangely lacking. It seems in order, therefore, to place on record certain instances where such materials have been found in stomach contents of shrews and mice.

Dr. W. J. Hamilton in August, 1938, sent to the U. S. Biological Survey specimens from Ithaca, N. Y., with the observation that "the small black objects . . . were often, but not invariably associated with earthworms in stomach contents" of *Blorina brevicauda*. The "small black objects" referred to the writer for identification proved to be zygospores with the abundant hyphal network characteristic of *E. macrospora* Tul. It was suggested that the black zygospores which often measured ¼ mm (250 μ) in diameter might have been ingested first by the earthworms and secondarily by the shrew. On consultation with Mr. H. C. Gauss, of Washington, who has had a vast experience in cultivating earthworms, the information was elicited that earthworms would have difficulty in swallowing refractory objects of that diameter and that he doubted the ability of any North American earthworms to ingest such material. It is, of course, likely that the shrew had developed a taste for this fungus as a condiment with the pièce de résistance.

Dr. Hamilton in correspondence, furthermore, reported the finding of these black bodies in stomach contents of two other shrews (*Sorex fumeus* and *S. cinereus*) as well as of three woodland mice (*Peromyscus leucopus novoboracensis, Clethrionomys gaperi* and *Synaptomys cooperi*) and pointed out that these findings in the small rodents which very seldom feed on earthworms supported the assumption that the shrews and mice may well have eaten the *Endogone* directly.

In this connection it is pertinent to note an older record of such fungi in stomach contents of a mouse (*Synaptomys cooperi gossi*) as attested by preserved microscopic preparations on file in the Mycological Collections of the Bureau of Plant Industry. These slides show zygospores of a distinctly different species of *Endogone* as yet undetermined specifically. The specimens studied and recognized as *Endogone* in 1926 by Miss V. K. Charles was collected by T. E. White in Douglas County, Kansas, in October, 1925, and examined first by C. C. Sperry, of the Biological Survey, who found the total stomach contents to be *Endogone* 5 per cent. and finely chewed vegetation, probably grass, 95 per cent. This latter information has been most kindly furnished by Dr. Clarence Cottam, of the Survey. In this case it is also notable that there is no reference to any accompanying earthworms.

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