able that we should be looked to to take a leading part in this work. The particular confidence and regard with which we are held by the public impose a fearless seeking after truth on our part wherever it may result to their advantage; and because of that confidence, probably nothing would do more to convince the people at large of the truth of evolution than an open declaration of some sort by the profession of our acceptance of its principles and of our firm belief in the advantages to be gained by its further study.

DUDLEY J. MORTON

YALE UNIVERSITY

FIELD TRIPS IN GEOLOGY

A NOTE in SCIENCE for June 18th last, contributed by W. C. Morse under the above caption, reminds the writer of another "traveling field course" which provides a close parallel to the western trip of the Summer School of Geology and Natural Resources conducted by Princeton University during the present season.

Eleven years ago Columbia University offered a summer course in physiographic geology under the direction of the writer and two assistants. The party numbered twenty-eight (or thirty-two, counting those who joined for part time only), and spent two months on a trip to the Pacific Coast. We had a special car part of the time and a suitable equipment, including portable blackboard and wall maps, as well as topographic quadrangles and published reports for areas to be specially studied. Lectures and examinations supplemented and checked the field studies, and full university credit was allowed for work satisfactorily completed. Among the places visited were the Yellowstone National Park, Glacier National Park, the Grand Coulee and the Columbia River Gorge, Lake Chelan, Crater Lake National Park, the Klamath Lake block mountains, the San Francisco earthquake rift, Yosemite National Park, Lassen Peak volcano and the Cinder Cone, Lake Bonneville shorelines and the Wasatch fault north and south of Salt Lake City, the Hagerman Pass region of alpine glaciation, Pike's Peak and the Garden of the Gods, the foothills regions of Morrison Park, Golden and Canyon City, the Rocky Mountain peneplane west of Palmer Lake, the Royal Gorge of the Arkansas River, the Petrified Forest at Adamana, and the Grand Canyon of the Colorado (the last two on a side-trip taken by some members only). Special opportunities for seeing the country were afforded through the hospitality extended by chambers of commerce and other organizations which placed automobiles at the service of the party at a number of points along the route. Still more valuable was the expert guidance enjoyed in the San Francisco region, where we joined a party under the direction of Professor Lawson, in the Lassen Peak district, where Dr. Diller was our host for several days, and in other areas where those best acquainted with the local geological features generously placed their special knowledge at our service.

For a number of years Columbia University has offered each summer several physiographic field excursions, varying from twelve days to three weeks in duration and commonly attended by from twenty to thirty persons.[1] One of these, offered jointly with the University of Wisconsin, usually covers, among other points, the Pike's Peak, Estes Park, Yellowstone Park, and Glacier Park regions; another traverses the Highlands and parts of the Catskill, Adirondack Mountains, White Mountains, and New England coast regions; and a third, introduced more recently, crosses the Atlantic Coastal Plain, Piedmont, Blue Ridge, Great Valley and Folded Appalachians to the Appalachian Plateau region of Virginia and West Virginia. These excursions are in addition to others on which other phases of geology are emphasized, and have been under the direction of Professor A. K. Lobeck (for the first two) and Professor F. J. Wright.

In this connection it may not be out of place to call attention to an experiment in field work for elementary students in geology now being tried at Columbia University, although no claim to novelty is made. Building operations in and about New York City, while involving temporary excavations most useful to students of the local geology, progressively restrict access to many of the exposures formerly utilized for purposes of field instruction. An increasingly larger proportion of the field period must be spent on subway or other transit lines, for classes are forced to go farther and farther afield to make satisfactory observations. The change in this respect since the writer attended field classes in geology at Columbia some twenty-five years ago is very marked, and the task of providing a series of interesting field excursions of proper educational value has become more difficult each year. To meet this situation the department of geology last year offered a three days' excursion by motor bus across the Triassic Lowland of New Jersey with its trap ridges; over the crystalline highlands where the Schooley peneplane finds its typical development; down the Great Valley past the Crystal Cave near Kutztown, the end of the highland

[1] In the summer of 1926 both the number of excursions offered and the number of registrations have for special reasons been temporarily reduced.

prong at Reading, the iron mines of Cornwall, and the type locality of the Harrisburg peneplane; up the Susquehanna through the water gaps into a typical portion of the folded Appalachians; and finally southward past the tip of the Carlisle prong of the Blue Ridge to the Battlefield of Gettysburg, where the influence of topography upon military operations could be studied to unusual advantage. This excursion, covering a week-end in term time, was acceptable as a substitute for the required local field trips; and although the cost was more than thirty dollars per capita, forty-eight men out of a class of sixty elected to take it in the fall semester, fifty-five out of a class of seventy-five in the spring semester. So successful were the results achieved that despite the expense (registration and field expenses make for the course a total fee of $67.50) it has been decided to eliminate the local field trips and to require the New Jersey-Pennsylvania excursion of all college students wishing credit for a laboratory (or field) course in elementary geology.

The problem of handling fifty or more elementary students on a somewhat extended geological field trip, when they have studied the subject but a few weeks, presents special difficulties. A large number of wholly novel conceptions must be presented to the men in a very short space of time. To this end there has been prepared a brochure of some thirty quarto pages, containing:

(1) An explanation of topographic maps, and directions for using sets of these maps, provided for the purpose with route of the excursion marked upon them.
(2) An outline of the major events in the geological history of the northeastern United States.
(3) A brief description of the physiographic provinces crossed by the excursion.
(4) A complete itinerary of the excursion, with discussion of the detailed geological features studied en route.

Block diagrams are much employed to convey most effectively the relation of geological structure to surface form; cross-section diagrams illustrate the physical evolution of the region traversed, while photographs add an interesting element to the presentation. Special stress is laid upon major geological conceptions and principles, rather than upon technical details; for the object of the excursion is not to make a geologist out of the student (that may come later for the exceptional few) but to awaken interest in what for him is a new field of thought, and to start him thinking in new directions and in new dimensions.

A substantial contribution to this end has been secured through the courtesy of Dr. Ashley, state geologist of Pennsylvania, who has each time the party passed through Harrisburg generously taken time to meet the men and discuss with them interesting phases of Pennsylvania geology and geological work in general.

Experience seems to show that for most of the men the interest of the features observed is sufficient to secure a proper attention to the objects of the trip; but additional assurance against any tendency to turn the trip into a "joy ride" is obtained by requiring of each member a detailed written report which must conform to specifications and answer questions set forth in the booklet above mentioned. In grading the reports particular weight is given to individuality and originality of composition and illustration; and an unsatisfactory report means loss of credit for the course, in so far as fulfilling college requirements for a certain number of laboratory (or field) courses is concerned.

It is as yet too early to say how satisfactory will prove the substitution of a long and comparatively expensive field excursion as an absolute requirement in place of shorter and cheaper local trips and indoor laboratory work. It can be said, however, that the interest of the men in the science of geology appears to be greatly increased under the new arrangement; that they learn very much more during the three days spent in seeing geological features developed on a grand scale, in collecting rocks of great variety over a large area, and in making constant practical use of topographic and geologic maps, than they formerly did with six or eight short field trips and as many indoor laboratory exercises on rock specimens and maps; and that the general effect on the elementary teaching in geology has been so good as to justify temporary withdrawal of the local field and laboratory work and the substitution of the three days' excursion as a regular requirement. Whether time and events will justify the procedure remains to be seen.

DOUGLAS JOHNSON
COLUMBIA UNIVERSITY

SCIENTIFIC EVENTS

THE RECENTLY DISCOVERED GIBRALTAR SKULL

AT the Oxford meeting of the British Association the first authoritative account of the discovery by Miss D. A. E. Garrod of a human skull associated with Mousterian implements at the Devil's Tower, Gibraltar, was given in a session of the Anthropological Section.

Miss Garrod, who undertook the excavation of the site at the suggestion of the Abbé Breuil, found that