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EXCURSIONS IN COLLEGE GEOGRAPHY *

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THE excursion in geography is based on two fundamental principles of education. It has long been recognized that first-hand knowledge must form the foundation on which all other knowledge of a subject rests. Nor is it questioned that in higher education training in research is more than information. Learning is not enough to make the scientific scholar; he must be trained to observe, to arrange, to compare, to draw inductions, to propose hypotheses and test them, to solve the problems of his science.

If the application of these principles has been less thorough in geography than in other sciences, it is only because of the difficulties inherent in our subjects. The phenomena with which we deal are for the most part too large to be brought to the laboratory for observation and experiment. If we study them first hand and with the technic of research it must be in the field.

The excursion, therefore, in the earth sciences has the same place as the laboratory has in other studies; it gives first-hand knowledge and definite and accurate conceptions of reality; it teaches the methods of investigation. The field has a smaller place in teaching geography than the laboratory has in other sciences; but this is not because its value is underrated, but only because it is less manageable than the laboratory as an educational instrument.

As outdoor laboratory work the excursion meets with climatic difficulties. In latitudes of severe winters it is suspended during much of the college year. Our schedules must be arranged—perhaps I should say disarranged—so as to bring the topics where field work is most needed at the beginning or at the end of the year's courses. The field work thus crowded into a few months of fall and spring

* Read at the Eighth International Geographic Congress.

is restricted further by the weather, and how serious this restriction may be, those teachers know who have experienced an October or a May of rainy Saturdays. The uncertainty of the weather makes it difficult to arrange our programs in advance, and the field meet designed to introduce or to illustrate a given subject must often be postponed until it has lost its pertinence or be given up altogether.

Nor is it easy to avoid conflicts with the other engagements of our students. In most schools the excursion cannot be assigned definite place on the college roster, and the regularly scheduled exercises of each day hold the right of way against it. The excursion cannot be limited to the hour or two allotted to other college exercises, but requires often half a day at least. Conflicts are therefore numerous where it must be foregone in favor of recitations or other scheduled exercises. It is thus usually deferred until the Saturday holiday, where it competes with athletic sports and unduly lengthens the working week both of student and instructor. In some schools the employment of student assistants permits an excursion to be scheduled on the college roster for four afternoons a week, and the student registers for field work on that afternoon of each week in which his time is free. Such a delightful comity prevails in several universities that students are excused—"cheerfully excused," one correspondent writes me—by their departments for absence on excursions, though of course the work is to be made up later. But I see no general relief in sight from these conflicts until the excursion comes to be considered as a college sport instead of an essential part of scientific education. When the field day in geography is once placed on the same plane with football, our students can be taken by the day and week hundreds of miles away and excused from all their classes meanwhile.

Certain difficulties are more or less inherent in the excursion. The number participating may make it impossible to give close supervision and direction to the individual student. Our young people, exhilarated by their unaccustomed release from sedentary tasks, tend at first to look upon the excursion as an outing and to take an attitude of mind more suited to a picnic than to serious study. As the field meet is held more often, and as students are sent out in small parties each in charge of an assistant, such difficulties diminish, and they practically disappear with thoroughly interested students and those in advanced courses. To meet these difficulties, however, requires all the qualities of the successful class room and laboratory

instructor raised to the n th power. The important problems must be set clear in view, investigation must be directed, and the attention of the class is to be held under circumstances which cannot fail to be distracting. To make the exercise to all who take part in it one of earnest intellectual effort without impairing its natural pleasure taxes a teacher's skill if not his patience, and requires a thorough knowledge of the local field, studied preparation of methods, and experience in this kind of work.

So various are the subjects studied in the field and the purposes in view, that even in elementary courses no uniform methods are adopted. Any lecture is certainly out of place. A short demonstration may be useful in closing the exercise, or such a review may be postponed to the recitation hour when the students' papers on the excursion are presented.

In general, the end of the excursion is best met by whatever method rouses the student's interest and effort and leads him to describe accurately what he sees and to think out clearly the causes of it for himself. That field work has the greatest zest, I think, to which the student brings for solution problems which have already risen in the lecture room and laboratory. He holds in mind various hypotheses by which the facts might be explained, together with the critical phenomena which would decide in favor of one hypothesis or another, and his search for these decisive evidences can hardly fail to be diligent and fruitful.

In many cases problems cannot well be brought before the student until the field is reached, but here also they may be set forth with advantage early in the exercise rather than at its close. Facts which might seem trivial so long as they were unrelated details of observation gain dignity when they are seen to lead up to large conclusions. Thus in the study of the not uncommon sections in the middle west of the United States, where deeply decayed rock mantled with residual clay is overlain with till, the question whether the rock decay is older or younger than the deposit of the till may be raised as soon as the general relations of the section are well seen. With this problem in view the discovery of fragments of residual clay kneaded in the till becomes to the student one of the first importance, proving the clay preglacial and that a continental glacier may move over rotten rock and its residual clays and leave them disturbed but little.

Some topics may best be opened in the field without the prepara-

tion of any previous study. Investigation of a section of the drift may well begin class work on glaciers. The characteristics of loess are better learned at outcrops than from any text-book. Care is needed to advance no step beyond the facts open to observation and the inferences which may be drawn clearly from them. Least of all in the field is there place for the dictum: Thus saith the authority. If questions rise to which the facts before us give no answer, let them go unanswered for a while and trust to an awakened curiosity to continue the search. The active, investigative attitude of mind is to be encouraged, not the passive attitude, the listening ear.

Individual effort is stimulated by requiring of each student a formal report of his work. His field notes are written fully on the spot. With beginners, suggestive questions are needed at every step, and before any subject is left some notes may well be read for correction and addition by the class, while the appeal in case of disagreement can yet be made to Nature. Sketches, maps, and diagrams are prepared, and may be inspected also as far as possible, on the spot. Some pains are taken by the instructor to have the reports conform to the rules of scientific writing. The uninitiated need warning to avoid all that is subjective, to omit references to the weather, the route, and incidents of the trip, and to describe in simple phrases the things which they have studied, stating logically the inferences which they have drawn.

Even in elementary courses considerable is taught of the use of instruments—the compass, the hand level, the aneroid, the clinometer. Distances are paced, dimensions and angles of slope are estimated by the eye as well as measured afterward. Contour sketching is practiced in the field and the data taken for the preparation of maps and sections.

In more advanced courses, study, mapping, and technical description are made more systematic. Small areas are mapped with the plane table. Students are given special areas to work out independently and their final reports rise to the dignity of theses.

There is one general preparation for the excursion which I am convinced is greatly needed. If our students do not “tackle” well the problems of the field, it is probably not only because of their inexperience in outdoor study, but also because they are unaccustomed to solve problems in the class room. Lectures, library references, and text-book recitations do not encourage the investigative attitude of mind. The departure most needed in our text-books and our

teaching is the wider, freer use of problems, whose function in our inductive science will be that of the exercises of inventional geometry. If, for example, the means of discriminating contemporaneous lava flows from sills have been worked out in class room and laboratory exercises, one of the best possible preparations has been made for an excursion to some outcrop of the traps of the Newark system of the Connecticut Valley or of northern New Jersey, often visited by students.

The scope of the excursion is limited. The field accessible to the most favorably located school is far from embracing all the phenomena of earth science. All topics cannot be studied in the field, nor need any topic be studied there alone. But if the excursion secures even a little first-hand knowledge, that leaven will permeate and vivify the entire body of knowledge of our science. A little field study of land forms, sufficient to make the subject real, to develop the topographic sense, to give some few type specimens for reference, to bring into clear view the slow, sure workings of earth forces in the present and in ages past, to train in methods of research—even a little field work will lay the foundation on which the superstructure may be raised by other means.

Models and photographs are only a step removed from Nature. To study a good model, such as that by Howell of the Chattanooga district, might almost be called field geography. The photograph projected by the lantern of the glacier, the sea cliff, the lava flow, the desert dunes, or the dissected peneplain, gives almost the sense of reality of the view of the thing itself, and is to be studied by much the same methods of the excursion—as phenomena to be described, presenting problems for solution. When contour mapping has been well learned in the field, topographic maps and charts open up the land forms of a large part of the world to laboratory study.

Every college teacher knows how greatly the excursion is still needed even in its elementary exercises. Our students have not seen things nor have they learned to see things. Only a small per cent of college students, at least in the western states, have done field work in secondary schools. The attention of most of our students has never been called to the phenomena of our science. Of course they have not seen them, any more than they have seen the structures of leaves and flowers, unless they have studied leaves and flowers in botany. The training which students have received in other studies is not our training and cannot take its place. As one's memory for

faces is not strengthened by committing vocabularies, so a critical observation of Greek accents, or of organic tissues under the microscope, does not make the student ready to read the lessons of the sky line and the profiles of hills and valleys. On the whole the conceptions of the college student in our science as he comes to us are faint and hazy—undertimed, under developed, and unfixed negatives—and are derived largely from words and not from things. His education has been largely bookish. The study of nature in the field throws the average student into a new element where the support of authority is wanting, and he is decidedly uncomfortable until he has learned to swim. Our students crowd about the instructor to obtain some authoritative word for their field notes far more eagerly than they turn to investigate a section for themselves. The conception derived from books of what they ought to see blurs the impression on the retina of the thing itself. Thus students standing in the dry channel of a little brook have told me that the pebbles were well water worn and rounded, while in fact they were subangular stones washed from the adjacent bank of drift. The university student who, on a field trip to an interesting Ordovician shale, packed with fossils, flat lying, and hardly altered from the sea mud it once was, cried out after the instructor's demonstration, "But, Professor, where is the volcano which threw out all this stuff?" is an exceptional case, but I infer that she was studying volcanoes at the time.

From communications from many American colleges and universities giving in detail the field work done in earth science, I am assured that the excursion holds an increasingly large and valued place. In a number of elementary courses outdoor laboratory work counts one-third. In general our best higher schools can say in the words of one of my correspondents, "We have all the excursions we can get in."

It is in the University Summer School, or Summer Quarter, where the students' entire time is at command, that the excursion has developed to its best. Field courses are offered by a number of our schools, in which small parties of advanced students spend five weeks or more of the summer in camp in the serious study of some area. Among the regions where such investigations were in progress in the summer of 1904 were eastern New York, central Wisconsin, the Lake Superior region, The valley of the Mississippi bordering Illinois, the Black Hills, the Big Horn Mountains, the Colorado Rockies, the Great Basin ranges of Nevada, the Grand Canyon of the Colorado

River, and the Hawaiian Islands. An equally thorough training for the cadets of our science is afforded where, as at least in four states of the Union, the State Geological Survey is so closely connected with a university that capable students are employed on the field work of the survey during the summer vacation.

It is from these university field courses and from work on the United States geological survey, the geological survey of Canada, and the various state surveys that young American geographers are now graduated.

RESPONSE TO SURROUNDINGS—A GEOGRAPHIC PRINCIPLE

BY R. H. WHITBECK

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PROFESSOR DAVIS, giving a modernized extension of Ritter's view, says: "The essential in geography is the relation between the elements of terrestrial environment and the items of organic response." He would not confine geography to the study of the earth as the home of *man*, but would carry the inquiry so far as to include the relations between the earth and all living things.

It does not require a scientist to note how prevalent is the principle that living things—plant or animal—are singularly adapted to their environment. It is, however, a relatively modern view to look upon all organic forms as a response to that environment. Once men thought, and not unnaturally, that all living creatures are made *for* their particular surroundings. We now see that they are as truly made *by* those surroundings; nor does this view exclude the operation of a divine intelligence in nature.

Modern geography, when dealing with the science maturely, is seeking to trace and establish the relations which exist between living things and their physical surroundings. As man is the most important and most interesting of earth's inhabitants, he is naturally the center of interest in the study of geography. But, owing to man's superior intelligence and his power over his surroundings, it is not always easy to determine how far his activities are governed by his earth surroundings and how far he has subjected them to himself. The oceans and the mountains were once very serious barriers to