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Teaching the Earth Sciences

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TEACHING THE EARTH SCIENCES

NEIL A. MINER

The "earth sciences", geology and geography, represent the "patriarch" and the "youth" in their life span as fields of knowledge. Geography is an old science while geology is a relatively new arrival on the scene of learning. Geography dates back to the ancients while modern geology appeared only a little over a century ago, yet they are destined to walk one with the other. The geographer is interested primarily in the surface of the earth and its inhabitants while the geologist is concerned mainly with the earth as a whole. Still the one is dependent upon the other and man is dependent upon both because an adequate interpretation of the surface of the earth cannot be made without a knowledge of its interior and the earth processes.

The events of the past four years have reminded people everywhere how woefully lacking they are in their knowledge of the geography of the surface of our planet and its make-up or geology. We are desperately in need of a knowledge of the world's natural resources and their geographic distribution if we are to adequately evaluate and understand the needs and desires of the nations of the world. Perhaps there are still those who believe we as a United States could live unto ourselves yet the truth is we could not build a single modern automobile without access to natural resources, mineral particularly, not to be found within our own borders. We live on and from the earth yet relatively few people are ever exposed to a course in the science of geology. Practically the entire income of the middle-west is derived from the soil which is a direct descendant of the rocks and still only a few in this region ever considered earth study even casually. Why is this the case? Certainly not because the layman is not interested, quite the contrary, it is largely because the geologist, interested in developing his own field in a strictly scientific sense, has neglected to extol the other virtues of his profession. Too long has geology been a science set apart, with knowledge of the earth denied those who do not enter the field as a profession. The cultural value of geology has been touched upon but little. Probably no other science brings one as close to an understanding of the magnitude of time and space and the origin and development of life.

The methods of presenting geography as a science, have made vast strides in the last two decades. Certainly the modern approach to geography, with its human relationships and its connection with the geological parenthod of the surficial features of the earth, is a far cry from the old "place-name" method of teaching the subject so characteristic of its earlier days. There is still room for improvement if we make more use of the outdoors as a classroom and laboratory.

Geologists have not been quite so alert. To be sure great strides have been made in the field as a science, but it has not reached as

many individuals as it should. This is due in a measure to the indifference of teachers of geology to the cultural opportunities which the field presents.

Geology is a subject which is rarely taught below the college level. A few of the western high schools have courses and these are usually to be found in school systems in the states which derive a large measure of their wealth from mines. There is a general interest.

The fact that students do not come in contact with geology in the secondary schools is probably in a large measure responsible for the limited number who elect a course at the college level. The writer also suspects that the method of presenting the geological phase of earth science in the college has frequently tended to discourage students from electing the study after listening to tales of those who have pursued a course. Geologists have been too interested in training geologists, in presenting facts, to develop the cultural aspects of the field.

The late Dean George F. Kay of the State University of Iowa, one of the leading geologists of his day and certainly one of the greatest teachers in the science often said, "Facts are absurd things until you link them up with something." Needless to say his classes were always interesting, beneficial, and inspiring to the laymen.

The teacher of geology is faced with three types of students in every introductory class in geology; those who may ultimately become professional geologists; those who wish to know something of the earth on which they live but have elected another profession; and those who have elected geology to satisfy a requirement in the field of science. It is a large order for the instructor to satisfy the needs of all of these in the same class and do it well. The tone of the course will differ somewhat if it is being given in a professional school or in a liberal arts college. The writer has experimented from year to year with various approaches and while the perfection desired will probably never be attained, it has been his experience that some measure of the technical side can be slighted in order to create and hold the interest of the other two groups. The professionally bent student can be interested outside the class to fill in the gaps. Additional technical background may easily be developed later in advanced courses without serious handicap.

Geology is an outdoor science. More geology can be taught and scientific curiosity aroused in one well organized field excursion than in a week of indoor lectures. Classes should be conducted out-of-doors, on the campus or elsewhere, as often as possible where the subject of discussion may be seen as it exists and not as a textbook illustration or word description. Visual aids are invaluable. The writer has used Kodochrome slides in the course of discussion of all phases of geology such as work of streams, glaciers, oceans, etc., and at the close of each unit of study a movie is used to further fix in the mind of the student how a feature looks and how it was created. It is extremely difficult to describe the Grand Canyon, for instance, to one who has never seen it. Slides and movies do an

excellent job of augmenting the word picture. There are many film agencies that offer an excellent selection of films adaptable to this purpose.

Laboratories always have been and shall continue to be an important implement in developing an adequate knowledge of our earth. Again, whenever possible laboratories should be conducted out-of-doors. Rock decomposition can be observed in almost any locality. The exposures of indurated rocks in the midwest are often limited but nearly every locality has some nearby quarry. Maps are frequently best understood by going in the field with one and locating the features portrayed. A rock on the table in the laboratory can be a rather dull companion to many students but when it is accompanied by a group of minerals, some of which are to be seen in the rock, together with some of the weathered products and other variables, it often takes on new interest. This is especially true if the manual or work book questions are interestingly phrased and if you always try to "link them up with something."

Last, but not least, the enthusiasm and interest of the student will be in direct proportion to that evidenced by the instructor and in accordance with his ability to demonstrate that the study of a rock and its recognition is not just "busy work," but can be actually "linked up with something." A teaching program should be flexible within the framework of a general plan. It should be so organized as to take advantage of the spontaniety of such geologic forces as storms, floods, volcanic outbreaks and other phenomena that appear in the current news and are in the minds of the students. In a phrase "make geology live"; demonstrate the connection with everyday happenings. The teacher of geology and geography has the opportunity to present one of the most exciting, useful and colorful sciences in our body of knowledge if he will take the pains to make it live.

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