Historical Approach to the Problem of Training Geologists

Claude C. Albritton, Jr.

Reprinted from FIELD & LABORATORY, June, 1952, Vol. XXI, No. 1
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Of the scientific professions, geology has probably required the least in the way of academic preparation. For example, most oil companies, until recently, were willing to hire the majority of their geologists from the ranks of those who had earned bachelor's degrees. Today preference is being given to students who have completed a year of graduate study. While the number of candidates for the doctorate appears to be increasing, the higher graduate degree is generally regarded as necessary only for those intending to teach.

Because the formal education of geologists has come to be known as a process that requires no more than four or five years, students majoring in geology tend to look upon their undergraduate program of study as being professional in character. Some departments have done much to encourage this point of view by offering vocational courses. Indeed on some campuses geology has been transferred from the colleges of liberal arts to the schools of engineering, allowing for the extreme in concentration on technical studies. Other departments, however, have preferred to maintain their connections with the colleges, probably to some extent from inertia, though undoubtedly also out of the conviction that geologists should be educated.

Thus as matters stand there are two schools of thought on the subject of undergraduate training: the liberal and the vocational or technical. That both have their devoted following was demonstrated by the course of events following the second world war. At a time when the press of veteran enrollment threatened to destroy the better part of higher education, liberal and otherwise, the various geological societies met to take stock of the matter and to search for ways of improving education in the earth sciences. The discussion that took place in the course of six conferences, held between December of 1945 and December of 1947, revealed as much as anything else the differences of opinion that had grown up within the geological fraternity itself.
In the tradition of liberal education there was McKinstry's insistence on a broad cultural background for those who would be educated persons and not technologists merely. Gilhuly's provision for a third of the undergraduate program in the social sciences and humanities, and Henbest's prescription of logic, philosophy and psychology as antidotes against scientific dogmatism. Colbert emphasized the undergraduate's need for acquaintance with the great literature of the past, and regretted the neglect of Greek and Latin on the part of students specializing in paleontology.

Others among the conferees were primarily concerned with the application of geology to problems of engineering, and these almost without exception favored a technical curriculum at the undergraduate level. For students primarily interested in the geological aspects of civil engineering, Burwell prefers an "undergraduate course patterned after that of ... mining engineering with an added dimension of geology ... substituted for the purely mining subjects." Jacob maintained that a college should be able to train in the course of four years a man able to earn his living in one or two lines of work, "at the same time ... making him polished in a sense." In what sense Mr. Jacob did not specify, but he went on to say that he could not "be led to believe that engineers are any less cultured than geologists. They generally become equally cultured after twenty years of practice and self effort." Offhand a period of twenty years seems long enough for cultural incubation. Yet it is only four years beyond the time required to complete the "ideal course" for mining geologists as put together by McKinstry on the basis of recommendations from his colleagues in this field.

Speaking of time, Landsberg felt that too much of this is given to teaching high school subjects in college.

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2. Gilhuly, James. The training of geologists. Ibid., pp. 3-4.

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kindred subjects, although it does recommend one course
each in economics, logic and composition. The second allows
for one course-year in writing and speaking.

<table>
<thead>
<tr>
<th>Year</th>
<th>I</th>
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<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Mathematics and science</td>
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<td>40</td>
<td>40</td>
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</tr>
<tr>
<td>Other than Geology</td>
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<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Mathematics and science</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
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In 1950, a committee representing The Geological Society
of America, the Association of Geology Teachers, and the
American Geological Institute, issued a report on the under-
graduate curriculum with special reference to the liberal
arts colleges. It was pointed out that so long as general
requirements call for studies in the humanities, languages,
and social sciences, it will not ordinarily be possible for
students to take all the courses in sciences and mathematics
that had been recommended. The value of liberal studies
was defended, but no effort was made to specify courses in
fields outside of science and mathematics. Requirements in
geology amount to approximately 36 semester hours, and
in physics, chemistry, mathematics and surveying to some
37 hours; the total of 72 hours representing sixty per cent
of the course work normally taken in four years of college.

There is nothing to suggest that those who debate the
issue of liberal versus vocational education are likely to
come to an agreement. Perhaps agreement is not necessary,
nor desirable. At least this seems to be the point of view
of the Committee on College Curricula of the American
Association of Petroleum Geologists.

In surveying the large number of suggestions that have been
presented to us, we find that the basic question seems to be, should a
curriculum for preparing a student for petroleum geology be of
technical engineering character or should it be broader, with more
emphasis on fundamentals and humanities and less emphasis on
technical specialisation. There are definitely two types of school, namely
the technical and liberal arts. It is our belief that there is room for
both types of training, both leading toward the same goal, one to be

1853. THE PROBLEM OF TRAINING GEOLOGISTS

offered in the technical schools, and the other in the liberal arts colleges.

To say the least this is a clear analysis of a confused
situation. It is common knowledge that students with the
most diverse academic backgrounds manage to find places
in the geological profession. On the other hand, it is hard
to believe that liberal and technical (or vocational)
approaches can literally be "leading toward the same goal."
For different types of geologic work it would seem that
one or the other preparation should be the more effective.

In fact it should be possible to determine the relative
strengths and weaknesses of the two educational formulas
by analyzing the professional records of graduates from
the liberal arts colleges and comparing these with similar
records from the technical schools. To be sure it would be necessary to have a large sampling of both
classes, and the labor involved in gathering and analyzing
the data would be considerable. Yet how else can we hope
to get to the heart of the issue.

What is involved in gathering information for such a
project as this, we recently learned in the course of a survey
of graduates in geology from Southern Methodist Univer-
sity. The purpose of this was to prepare a directory in honor
of Dr. Ellis W. Shuler, who founded the department in 1915
and who was retiring in 1952. Working with lists of names
supplied by the Registrar, and using addresses in alumni
records and professional directories, it was possible to locate
226 out of the total of 240 persons involved. Questionnaires
asking for the kind of information given in biographical
directories such as American Men of Science were mailed,
and 222 replies were received. Owing to the migratory
nature of geologists and to the difficulty of getting mail
delivered to some of the out-of-the-way places they fre-
quently, it was a year before all the information could be
assembled. Because this department in certain respects may
be typical of small departments in liberal arts colleges, some
of the results of the survey are given in tables and figures.

Table I compares the undergraduate curriculum at Southern
Methodist University with three others, of which one
would be classed as liberal and the other two technical.
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<td>32.50</td>
<td>44</td>
<td>25.36</td>
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<tr>
<td>Mathematics and physics</td>
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<td>37</td>
<td>20.66</td>
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<tr>
<td>Other than Geology</td>
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<td>38.35</td>
<td>9</td>
<td>5.17</td>
</tr>
<tr>
<td>Required in addition to above</td>
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<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Basic requirements for Geology</td>
<td>20</td>
<td>16.39</td>
<td>42</td>
<td>25.36</td>
</tr>
<tr>
<td>Foreign languages</td>
<td>17</td>
<td>14.15</td>
<td>4</td>
<td>2.50</td>
</tr>
<tr>
<td>English</td>
<td>10</td>
<td>8.97</td>
<td>4</td>
<td>2.50</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>56.39</td>
<td>42</td>
<td>25.36</td>
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In 1960, a committee representing The Geological Society of America, the Association of Geology Teachers, and the American Geological Institute, issued a report on the undergraduate curriculum with special reference to the liberal arts colleges. It was pointed out that as long as general requirements call for studies in the humanities, languages, and social sciences, it will not ordinarily be possible for students to take all the courses in sciences and mathematics that had been recommended. The value of liberal studies was defended, but no effort was made to specify courses in fields outside of science and mathematics. Requirements in geology amount to approximately 36 semester hours, and in physics, chemistry, mathematics and surveying to some 37 hours; the total of 72 hours representing sixty per cent of the course work normally taken in four years of college.

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Figure 1 shows the distribution of graduates by years. Each of the students had essentially the same sequence of undergraduate courses in geology: general physical and historical geology, mineralogy, petrology, structural geology, geomorphology, invertebrate paleontology, stratigraphy, and field geology. Although the degree requirements relating to work in other sciences have changed somewhat over the years, most graduates have taken a year each of physics, chemistry, biology and mathematics, and in addition a second or third year in one of these fields.

Figure 2 shows that, so far as the 228 persons accounted for are concerned, two out of five have taken or are taking graduate work. One out of four has earned a graduate degree. The large diagram in the figure shows the present classification of the entire group of two hundred and forty. Three-fourths are professionally engaged in geological, geographical, geophysical or engineering work. Graduate students and students on tours of military duty may raise this figure to around 85% within the next few years. Included in occupations not related to geology are six housewives who were engaged in geological work prior to marriage.

Nearly all those classified as geologists are working in the field of petroleum geology. Although no courses in this subject are taught, many of the oil companies in Dallas provide students with part-time and summer jobs, and both the Dallas Geological Society and the Dallas Geophysical Society generously bring their lectures to the campus in order that the students may attend. In the following table the 126 petroleum geologists for whom biographical data are at hand are divided into three classes according to time elapsed since graduation. The majority of those who have been out of school for less than ten years are ranked by their companies as geologists. The majority of those who have been graduated more than ten years are in the admin-

![Figure 1: Degrees in geology awarded at Southern Methodist University, by years.](image1)

![Figure 2: Upper diagram shows classification of graduates in geology from Southern Methodist University, as of October 1935. Diagram at lower right shows status of 228 graduates with respect to graduate studies. Diagram at lower left shows professional fields of 142 graduates who are classified as geologists.](image2)
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istrative grades, or else have become independent petroleum geologists or consultants. The same pattern of advancement with age appears in the case of the 23 geophysicists. Of the six who have been graduated more than ten years, all are administrators and two are presidents of their companies. Of the eighteen that have been out of school for less than ten years, none has advanced beyond the rank of party chief and only four have attained that rank.

For anyone concerned with geological education, this case history will hold a certain amount of interest. Comparisons of many such analyses for departments ranging from the most liberal to the most technical and scattered over the different provinces of the country might settle some issues that are now being argued largely on the basis of sentiment and prejudice.