

BUREAU OF ECONOMIC GEOLOGY

Geological
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History of Geology at The University of Texas

By
KEITH YOUNG

*Special Issue
For Geology Building Dedication*

November 16-17, 1967



The University of Texas at Austin
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Errata

Page 9, figure 2 -- W. B. Phillips was Director of the Bureau of Economic Geology from 1909 to 1915 and not B. F. Hill as shown.

Page 9, figure 2 -- J. T. Lonsdale was not with the Bureau between 1935 and 1945. The line showing continuous service is erroneous.

Page 17, column 1, line 3 -- "problem" should read "program."

Page 37, reference 241 -- Line 7 should be deleted.

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The Old Main Building, about 1901. In Robert T. Hill's time the Department of Geology occupied the west end of the top floor. By 1900 the Department occupied the west end of the third floor. This is a view of the south front of the structure, and the picture was probably taken by William Battle Phillips.

THIS HISTORY OF GEOLOGY at The University of Texas was prepared for the dedication of the new Geology Building, November 1967. It is a brief history; many details have been omitted. The names of most graduates and some faculty will not be found. The mission was to summarize some important landmarks in Geology at The University of Texas and to describe the personalities and personal relationships that explain many of the decisions that have brought us to the present. I propose a toast to those who have made us what we are.

KEITH YOUNG

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Geology at The University of Texas

Keith Young

His work for the last half century is written in the annals of our times; and it is written in the hearts of men. He is with us not the vigorous man I knew in 1880. He sits among us, not rich in world's goods and chattels, but a millionaire in deeds well done, in discoveries for the richness of Texas, and an Edison in contribution to Texas' geologic lore.

Engineering Dean T. U. TAYLOR
at a dinner in 1934 in honor of R. T. HILL

Young Robert T. (for trouble) Hill came to The University of Texas in 1888 (1). At the invitation of the Regents he was to establish and administer a School of Geology. Hill arrived on the campus with the misgivings of John Wesley Powell, the blessings of Cornell's President, Andrew W. White, and the blessings of Hill's own great ego. In Hill's time it was customary for new faculty members of any rank to face the awesome experience of presenting

an inaugural address before what was a small but august audience of the Faculty of The University. On October 26, 1888, Robert Hill lectured the Faculty of The University of Texas on the subject "Some Recent Aspects of Scientific Education, Especially as Influenced by the Study of the Natural Sciences." In setting up a School of Geology one of Hill's basic philosophies sounds very modern. I quote from the above address (2),

I hope it is not departing from my subject if I say here that the sole need of our South-land is not so much foreign capital, is not foreign immigration, but is foreign methods, *is technical education for young men and women . . .*

This philosophy has been a major tenet of southern educators right down to and including the establishment of the Graduate Research Center of the Southwest.

Robert T. Hill and The University of Texas

Geology as a State function had inauspicious beginnings in Texas. The Shumard Survey (The [first] Agricultural and Geological Survey of Texas) (3) had been embroiled in politics and then abruptly ended by the entrance of Texas into the War Between the States (4, 5). The Glenn-Buckley Survey (The [second] Agricultural and Geological Survey of Texas) (3) covered, according to Hill, "such a scope of country the field work consisted of little more than a jaunt in an ambulance, rarely deviating from the main road" (4). Young Hill was convinced that such should not be the heritage of his régime.

Robert T. Hill had been orphaned in his early teens in Nashville, Tennessee. He worked his way to Waco, and with 75¢ and a pocketknife, he headed for Comanche where his brother ran the *Comanche Chief*. He became a printer's devil and having somehow or other wangled a copy of Dana's "Geology," he studied rocks and fossils and was known as the "rock boy" of the *Comanche Chief*. Hill spent some time working in Comanche on his brother's paper and also spent some years as a cowboy. In 1882 young Hill up and shipped his fossils to Ithaca, New York, he himself following soon thereafter. Upon arriving at Cornell he was told of entrance requirements, entrance examinations, credits, etc. Hill had the audacity to remind the Cornell

administration that Ezra Cornell had stated that he "would found an institution where any American boy could study anything." He further reminded them that he was an American boy and geology was anything (6). Needless to say, Hill went to school at Cornell and, after due time, received a Bachelor of Science degree. Hill's young life and the hardships he had successfully endured during his life did not decrease, but augmented, his self confidence. The young University of Texas, not as old as Hill, was no more ready for Hill than was Hill for what, at the time, was a small, staid, conservative institution, fighting for subsistence funds from an even more conservative legislature.

Geology had been announced as an elective subject in 1884; it was added as a required course in engineering in 1885, but it was not taught. Hill's primary contribution to geology at The University of Texas was the establishment in the fall of 1888 of a basic curriculum which was followed for many years with only slight change. Both Hill (7) and his successor, F. W. Simonds (8, 9), insisted that students enrolling in introductory geology or paleontology have a firm background in basic biology; in addition, Hill required chemistry as a prerequisite to introductory geology (7). Since biology was not offered at Texas, in order to meet his own requirement one of the first courses Hill

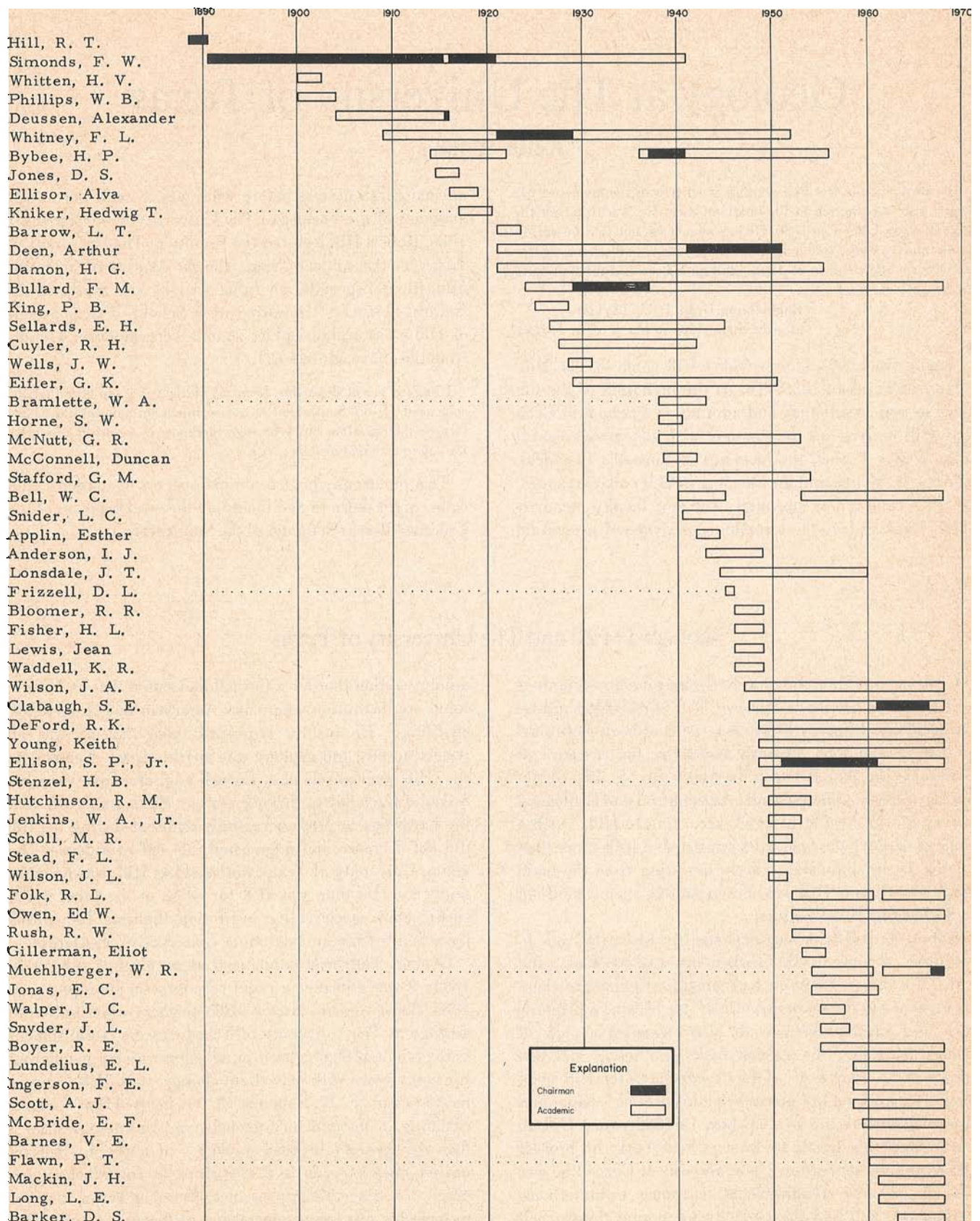


Fig. 1. Chart showing length of service of teachers who spent four or more long terms with the Department of Geology of The University of Texas.

organized on the campus of The University of Texas, and taught, was a course in biology. He taught biology (including botany) during his short residence, and his successor also taught the course for a number of years until a professor of botany could be recruited (10).

R. T. Hill's general philosophy pervaded the School of Geology for several years because he dominated the first program of courses (9). His successor did not rewrite the program but only modified it over the years. Hill's general philosophical approach was repeated in his inaugural address to the faculty in 1888 (11). Hill pointed to the better public morals resulting from increased hygiene, as a result of science teaching, the increased standard of living resulting from technology, but emphasized "the value of natural science as a cultural agency, even to those who do not wish to be specialists."

Hill's classes met on the top floor of the west wing of the Old Main Building (frontispiece) in a room that held the first library of The University of Texas. Although there is little record extant of Hill's courses, Hill's personality must have captivated his students. Perhaps it was the willingness of all young rebels to follow a young rebel, but Hill's students, during little more than two semesters of contact, supported him almost to a man in his 1891 argument with Dumble and suggested that Hill might even be a better State Geologist than Dumble (12, 13).

Hill resigned from The University staff in February 1890, after teaching about 2½ long terms. He then went with the Texas State Survey until his fight with Dumble in 1891. Certainly before his appointment to The University of Texas faculty he was working in Central Texas for the United States Geological Survey, but on the instructions of John Wesley Powell, lobbying before the State Legislature for a State Geological Survey (14). Be this as it may, Hill's reception by the faculty of The University was less than cordial, for his "colleagues" are known to have advised their students "against taking Professor Hill's courses

because they would be exposed to the heretical teachings of geology" (14).

Hill is supposed to have resigned his teaching appointment because the Regents would not buy him a petrographic microscope, but between a conservative and young university, trying to maintain equanimity with a conservative and provincial legislature, and the young rebel teaching geology, one can suspect many areas of incompatibility. Hill lasted from October 1888 to February 1890. Although his geology program was to go on relatively unaltered for almost fifteen years, Hill's greatest attainment, in such a short time, was (1) a number of students dedicated to his ideas and personality, and (2) the acquisition of two friends, later to be great in The University of Texas annals, who were to remain his friends until his death; these were the late Dean of Engineering T. U. Taylor and the late University of Texas President H. Y. Benedict. Even in the early 1930's R. T. Hill would come to town (Austin), gather up W. S. Adkins, and they would go to Benedict's house for dinner and the exhilarating after-dinner conversations that go with such individuals and light evening refreshment (15).

When the Regents replaced Robert T. Hill, they made certain that no young rebel would take his place. Instead, they elected Frederick W. Simonds to an Associate Professorship in the School of Geology (16) (fig. 1). Simonds was born in Massachusetts in 1853 and was already 38 years of age when he was hired by The University of Texas. Geology has long been considered a classical, and also staid, science by University of Texas administrators, excluding H. Y. Benedict and T. U. Taylor. F. W. Simonds, during his long tenure at The University of Texas, established this concept, much to the dissatisfaction, and even chagrin, a half century later, of young geologists who have to fight for support to pursue the exciting new ideas in geology.

In 1890, the stable conservative, F. W. Simonds, was considered more desirable by the administration than the young rebellious iconoclast that was R. T. Hill.

The Long Régime of F. W. Simonds

F. W. Simonds was born in Charlestown, Massachusetts, the son of a drygoods salesman. This was on July 3, 1853. About 1863 his parents moved to Indiana, and young Simonds was educated in the Bunker Hill and Indiana grade schools, Indiana high schools, took his B.A. and M.A. at Cornell and his doctorate at Syracuse (17). Immediately after leaving Cornell F. W. Simonds took up a teaching position at the University of North Carolina, under the administration of then President Kemp Battle (18, 19). At this time Simonds first became acquainted with William

Battle Phillips, who was Chief Assistant Chemist at the Experimental Station at North Carolina. In 1881 Simonds resigned his professorship in the Department of Natural History at North Carolina and went to California for his health. He stayed in California a decade and then came to Austin to take over the School of Geology at Texas (18).

When Simonds arrived on the campus, he took over a rough but going concern left by R. T. Hill. Collections were small, but arrangements were made with the personnel of the Dumble Survey (20) to collect duplicate samples for

the use of the School of Geology (21). Although no real changes were made in the curriculum, Hill's emphasis on field work was replaced by Simonds' lack of enthusiasm for it. The first decade of Simonds' régime at Texas was spent, apparently, in busy, busy lecturing and politicking. In addition to the various geology courses, Simonds taught biology until 1892, at which time a professor of biology joined the faculty (22).

Simonds also spent some time getting acquainted with the important personages in the State. Together, he and J. A. Singley convinced George W. Brackenridge that Brackenridge should purchase the Singley Texas collection of molluscs for The University of Texas (23). For this great collection in 1894 Singley received all of \$200 (24).

Having been promoted to full Professor of Geology in 1895, in 1896 Professor Simonds further inveigled George W. Brackenridge to purchase for \$250 another collection from J. A. Singley. This was the Southern United States collection of Mollusca. In 1897 the collections from the Galveston deep well were purchased from J. A. Singley for \$100, and again Mr. Brackenridge put up the money. In 1901 Simonds asked the administration to appoint J. A. Singley to curate these collections and the Dumble Survey collections, without success (24). Although such a position had been approved at various times, it was never budgeted. In fact, the Department of Geology has never had a curator for its invertebrate collections. Keith Young finished the curatorial task over 70 years after the fossils were acquired.

During these years the geology office and lecture room occupied the west end of the third floor of the Old Main Building, where the professor's office was separated from the lecture room by a thin but opaque partition. The lecture room seated a class of 30.

James M. Clark was the first assistant appointed in geology at The University of Texas. This was in 1891 (25). J. H. Herndon (26), E. E. Cawthorne (27), and Ben Sylvanus Brown (28) were the first students to graduate from The University of Texas who had taken courses in geology. N. F. Drake and S. S. Posey should be considered the first graduate students in geology (29, 30). Benjamin F. Hill was graduated in geology with a Bachelor of Arts degree in 1896 (31) and was immediately appointed the first Fellow in Geology at The University of Texas. He continued as a graduate student at The University, receiving his Master's degree in 1897 (32) and then went on for graduate work at Columbia University (33).

One might say that the first expansion was in 1900 when physical geography was offered for the first time in summer school (34). Also, W. B. Phillips was appointed an instructor in geology at The University of Texas, and a young man, also later to be appointed instructor, started to school as a freshman; this was Alexander Deussen.

Although Hill (35) has taken a great deal of credit for influencing Regent George W. Brackenridge in the establishment of the Texas Mineral Survey within The University administration, and later on, the establishment of the Bureau of Economic Geology and Technology, F. W. Simonds should receive some credit because as early as 1900 he was in correspondence (36) with Erasmus Haworth, asking Professor Haworth to describe the administration and financing methods for the Geological Survey of Kansas, which was associated with the University of Kansas. In this letter Simonds foresaw that perhaps the only way in which a geological survey could escape the uncertainties of legislative budgeting was for such a survey's budget to be a part of the total budget of The University of Texas. Although Hill never got along very well with Simonds (37), apparently they both saw the need for a geological research organization budgeted through the main University. E. P. Schoch (38) gave the Regents a bouquet for the insight to approve a University budgeted research unit.

In the years from 1883 to 1886 there had been complaints of give-aways of State lands that might contain valuable minerals. This was one of the reasons for establishing the [third] Agricultural and Geological Survey of Texas (Dumble Survey) in 1888 (63). Again, in the late 1890's there were charges before the Legislature that the State of Texas was selling its valuable State lands for a song, especially to the railroads. These claims, plus interest in irrigation of arid State lands (63), resulted in the establishment of The University of Texas Mineral Survey to "provide for a mineral survey of the lands belonging to the public schools, University and asylum lands of the state. . ." (64).

The year 1901 started out auspiciously for Geology at The University of Texas. The Legislature had established The University of Texas Mineral Survey, the primary purpose of which was to survey State lands for economic mineral potential (39). The Legislature apparently thought that this project could be finished in about two years. One of the great misunderstandings of geology by funding agencies (then and now) is the long maturation time of field work. The legislature never seemed to provide sufficient time for any particular project to accomplish enough to bear fruit. However, be this as it may, W. B. Phillips, who had been an instructor in the Geology Department for something less than one year, was promoted to Professor and also made Director of The University of Texas Mineral Survey (fig. 2). That Survey lasted until 1905. Benjamin F. Hill, who had been the first M.A. candidate in Geology at The University of Texas, also joined the Mineral Survey as an assistant geologist, and Steve H. Worrell, later to become Dean of the College in El Paso, joined the Mineral Survey as assistant chemist. With the establishment of the Min-

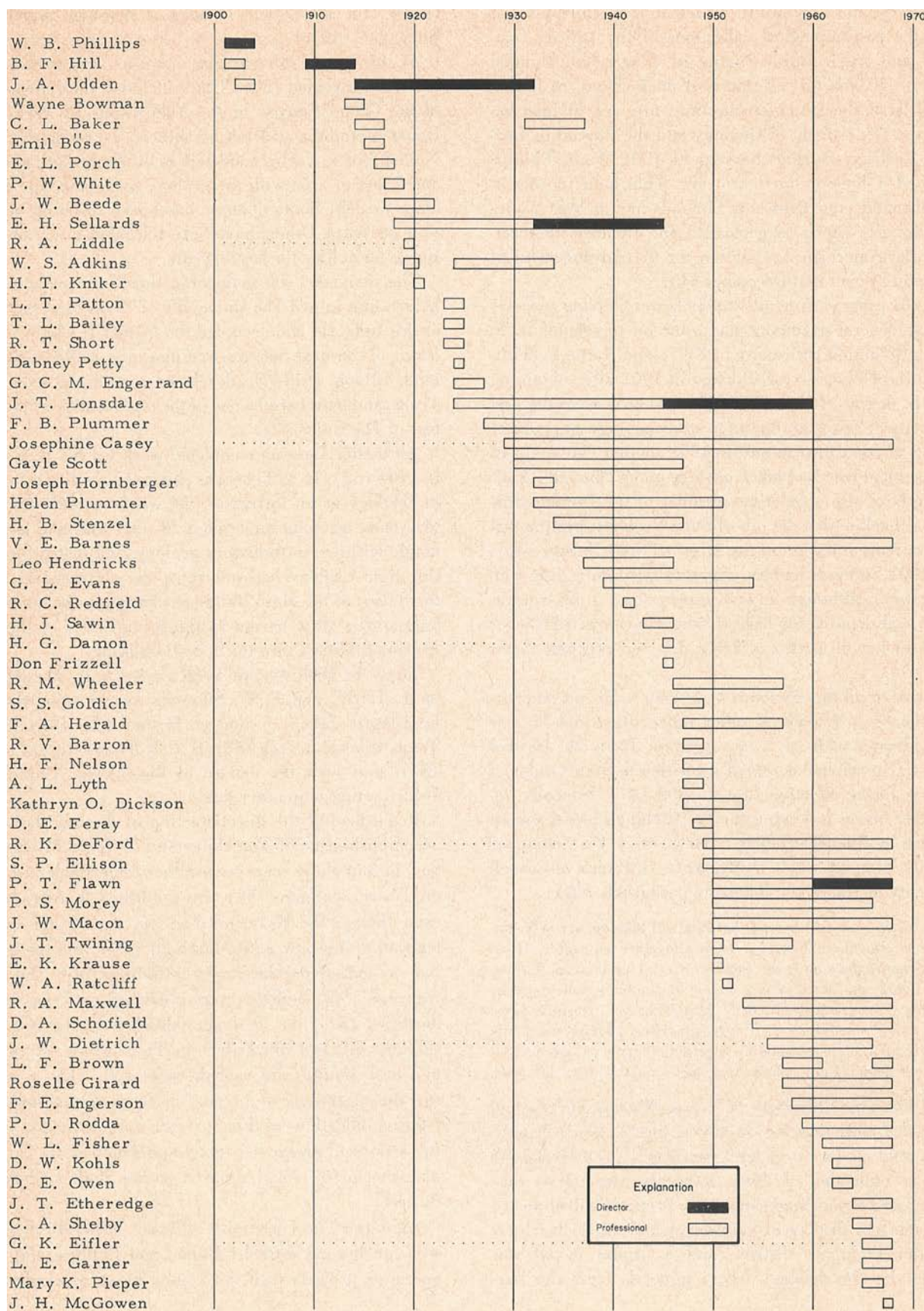


Fig. 2. Chart showing length of service of employees of The University of Texas Mineral Survey and of the Bureau of Economic Geology.

eral Survey, the Legislature loaned to The University of Texas the paleontological collections of the [third] Geological and Agricultural Survey of Texas (the Dumble Survey) (40, 41, 42). Because of an incident, to be described later, the Dumble collections are now divided between the Department of Geology and the Bureau of Economic Geology. During the year of 1901 W. B. Phillips published a bulletin on petroleum. This bulletin was in great demand, and Professor Simonds had at least 25 requests for free copies by geologists who attended the meeting of the American Association for the Advancement of Science in Denver that December (43).

In 1901 some of Simonds' students were having success; although several graduates had gone on to school, B. F. Hill (to Columbia University in 1897) and Hattie V. Whitten (to the University of Chicago in 1901 after obtaining an M. S. degree at Texas in 1900) (44, 45) were the first University of Texas graduates to study geology as graduate students at other institutions. In 1901 another University of Texas student who had taken geology under Simonds, A. C. McLaughlin, also a one-time member of the Dumble Survey, was bucking for the job of State Geologist of Missouri with the reorganization of the Missouri State Survey (46).

In 1901 Simonds had an opportunity to do a little consulting work, although he had to turn down a job consulting on coal deposits for lack of time. He charged \$100 for a week or less of work and \$10 a day and expenses thereafter (47).

In spite of all this Simonds makes out in his private correspondence to friends at other universities that he was very unhappy with his Texas position (47). He learned that I. C. Russell had accepted a position as State Geologist for New Jersey effective July 1, 1902 (47). Simonds immediately began jockeying for the Michigan professorship left open by Russell's change to New Jersey. On November 30, 1901, Simonds wrote Professor G. D. Harris of Cornell University at Ithaca the following paragraph (48):

Between us I am still hoping that fate will take me out of Texas. The later years here have not been altogether enjoyable. If an opening should show up in the North or West, I am inclined to think that I should consider it with a degree of readiness that would be surprising. I am frank to say that I should like I. C. Russell's place at Ann Arbor when he leaves it next July. If my friends would only give me a lift I might accomplish something, but they think me well enough off though I did come near dying of malarial fever last year.

In 1903 The University of Texas Mineral Survey had arranged a collection for display at the St. Louis Exposition. A gold medal for general excellence was awarded for the large collection of Texas minerals, ores, clays, oils, building and ornamental stones, etc. A special silver award was given to a display of quicksilver and quicksilver ores from the Terlingua district, and a bronze medal was awarded for the display of rare minerals from the Bar-

ringer Hill site, Llano County, a site now under Lake Buchanan (49).

At this time Professor Simonds was very proud of the new teaching aids (50). These included the relief models of the Grand Canyon of the Yellowstone by Howell, the Henry Mountains of Utah by Gilbert, the relief map of the United States, a relief model of Yellowstone National Park and adjacent area with the geology by Hague, and several other models. Some of these have been teaching tools for over 60 years. Others have been relegated to various back rooms for at least the last 30 years.

The year 1904 was momentous for Texas geology; J. A. Udden first joined The University of Texas Mineral Survey at this time. He had occupied the "Oscar II Chair" as Professor of Natural Science at Augustana College, Rock Island, Illinois (51). He developed a strong attachment to Texas, and later became one of the top scientific administrators of The University.

Alexander Deussen completed work for his B.A. degree in 1904 (52). In 1905 he was employed by the Department of Geology as an instructor; he was to remain for about ten years, teaching mineralogy to start with and later economic geology, introductory geology, and meteorology. At this time Geology had outgrown the old quarters on the third floor of the Main Building; therefore, the mineralogy laboratories were moved to the second floor of the Engineering Building, now the Speech Building.

The year 1905 was not such a good year. The lobbying of R. T. Hill and F. W. Simonds was in vain; the 1905 Legislature failed to budget further The University of Texas Mineral Survey (53). B. F. Hill had resigned in 1903 (54), and with the demise of the Survey, Phillips and Udden returned to other fields.

Regardless of the dissatisfaction of the Legislature, the accomplishments of The University of Texas Mineral Survey, in four short years seem rather remarkable. A bulletin on Texas petroleum (55) was published in August 1901, even though the Governor had not signed the enacting legislation into law until March 28, 1901, and the Regents had not authorized the Survey until May (56). The following year, 1902, bulletins were published on Texas mineral localities (57), the Terlingua quicksilver deposits (58), sulphur, oil, and quicksilver in Trans-Pecos Texas (59), and coal, lignite, and asphalt rocks (60). The year 1903 saw the appearance of a report on Texas mining laws (61). Other publications of this Survey before its demise include two reports of progress, a topographic map of the Terlingua quadrangle (62), and a report on the Shafter silver mine district.

Although The University of Texas Mineral Survey had seen much good work by Udden and Phillips, and by cooperative projects with the United States Geological Sur-

vey (65), it had not discovered on the State lands of Texas great natural riches ready for the plucking. The time was not yet ripe for such applied research, and legislators did not understand that mineral resources could not be mapped and investigated at the rate of 10 thousand square miles per year, or at a total cost of about one dollar per square mile (66).

The next few years went without organized geological effort, but in 1909, it was decided to try again. The reasons for this are hazy from present vantage points but probably lie in the expanding economy of the State, the rapid increase in interest in the oil industry, what other states were doing, and the ever-present charges that mineral-rich State lands were being sold off at agricultural prices (67). As a result the Bureau of Economic Geology was set up by the Legislature in 1909, but instead of being just attached to The University for administrative purposes, as was The University of Texas Mineral Survey, the Bureau of Economic Geology was established as an integral part of The University (68), as had been envisioned by Simonds (69) and Hill (70). W. B. Phillips was returned to head the Bureau of Economic Geology, and J. A. Udden returned as geologist. In 1911 the Bureau of Economic Geology was renamed the Bureau of Economic Geology and Technology (71).

Prior to 1910 degrees were by college only. Geology students received a B.A. in Arts and Sciences. In 1911 there occurred the first division of the college into degree units (72). There were now six degree units, and geology students receive a B.A. degree in the College of Arts and Sciences with a major in science.

The 1909-1910 session saw the first expansion in geological course offerings in some time (73). A four-year course leading to a degree in Mining Engineering had been added in the fall of 1909 (74). It was taught in the School of Mines. Ore deposits and courses in mining engineering were taught by A. C. Rowe, of the School of Mines at Austin. Ore deposits could be taken as a geology course. In the fall of 1914, by legislative fiat, the School of Mines was transferred to El Paso but was still listed jointly in the catalogue of the Main University at Austin for another ten years (75).

With Alexander Deussen and F. L. Whitney, tutors, one-year instructor appointments, and geological assistants, Simonds was able to add some new courses to the curriculum. Although individual course loads are large in any young college, Simonds had taught most of the courses himself until the advent of Alexander Deussen. Miss Hattie Whitten had done some teaching for three years (76), but in the fall of 1904 Simonds was able to turn over to the recently graduated Alexander Deussen part of his course load (77). However, he immediately added a new course,

meteorology, to take up the slack. With the acquisition of F. L. Whitney in 1909, Chairman Simonds saw a chance to expand, and courses in economic geology and paleogeography were added, taught by Deussen and Whitney, respectively (78).

To those of us now teaching in The University a course load for the year 1910 (78) would seem excessively large. This can be explained because teaching is now more complex; there are more students; courses are enlarged; expanding knowledge has made it more difficult to keep up with a wide range of subjects; and in the larger universities, research is also expected of the teacher.

In 1910 Simonds taught the following courses: paleogeography of North America, for two semesters; special geology (problems); advanced geology, for two semesters; geology of Texas; petrography; paleontological drawing; and historical geology, for two semesters. This averages five courses per semester. Professor Whitney once told me that during his 30-plus years' association with F. W. Simonds, he had never been able to get Professor Simonds off the campus and onto the outcrop (79). Perhaps teaching five courses per semester was reason enough. F. L. Whitney during his first year at Texas taught general geology, for two semesters; paleogeography, for two semesters; and paleontology, for two semesters. This averages three courses per semester, and he also taught the laboratories in paleontology. Alexander Deussen taught general geology, for two semesters; meteorology; mineralogy, for two semesters; and economic geology. This likewise averages three courses per semester, and he probably handled the mineralogy laboratories. A. C. Rowe taught ore deposits in geology and whatever courses he was required to teach in the School of Mines (80).

The year 1912 again saw considerable revision of the geology curriculum, with the first emphasis, of any strength, on professional geology (81). The following are disconnected quotations from a completely rewritten description of the geology curriculum in the University catalogue.

Students, preferring themselves to serve as professional geologists or as geologists on government surveys, may get training along one of two lines. One is along the line of stratigraphic geology and paleontology; the other is along the line of stratigraphic geology, mineralogy, petrography, and economic geology.

Students who desire to become geologists for oil companies, coal companies, or companies engaged in the mining of gold, silver, copper, lead, etc., will be trained along the latter line. The purpose is to give the student training that will then enable him to work out the stratigraphic and structural geology of the areas in which the companies operate, and the geologic relations of the mineral deposits.

Students who wish to become geologists on governmental surveys, or who wish to become teachers of geology in colleges and universities may be trained along either line.

At this time, a geology student could also enroll in courses in the School of Mines, including mine surveying, mining, metallurgy, ore dressing, etc. When the School of Mines was removed to El Paso (82) two years later, a great benefit was lost to the Geology Department of The University of Texas at Austin.

In a report on the Bureau of Economic Geology in the same catalogue, it was stated (83):

The first extensive field work undertaken by the Bureau was the examination of the coal and gas regions in Wichita and Clay counties. Dr. J. A. Udden's report on this field was issued in October, 1912. The area which he examined came into prominence during the autumn of 1911 as the most productive oil field in the State.

In July, 1911, the Bureau issued a complete report on the composition of Texas coal and lignite and the use of producer gas in Texas.

One of the important contributions of the Bureau of Economic Geology to the national economy was the discovery of potash. The following quotation is from Mansfield and Lang's "The Texas New Mexico Potash Deposits" (84).

Early discoveries.—Although the possibility of the presence of buried soluble salts of potassium in the Permian Basin had long been recognized by geologists and cognizance of this possibility had been taken by the Geological Survey in its first chapter on potash (in *Mineral Resources for 1910*, published 1911), the credit for the first actual discovery belongs to Dr. J. A. Udden, late director of the Texas Bureau of Economic Geology. In 1912 Udden found 5.4 per cent of potassium, calculated as chloride, in brine taken from a depth of 2200 feet in the Spur well, in Dickens County, Texas. The brine had been standing undisturbed in the well for two months. He later found 9.2 per cent of potash (K_2O) in some crystals of red salt taken between depths of 875 and 925 feet in the well drilled at Boden in Potter County, in 1915.

Udden continued to look for potash in wells, as did other geologists. Udden's status as first discoverer can be credited to his developing subsurface geology methods (85). He had been using subsurface techniques of one kind or another for over 15 years, and it was more or less routine with him to examine thoroughly all well cuttings that he could obtain.

Also in 1912 the Bureau of Economic Geology and Technology set up a degree program in competition with that of the Department of Geology (86). It was proposed that a series of courses leading to the Bachelor degree be set up in the "Technology of Fuel." These courses would be taught by Dr. Phillips, Dr. Udden, and Mr. Worrell. Although the program was proposed, and a general description was written up in the University catalogue, I cannot ascertain that any courses were ever taught. The proposal of the Bureau to enter the teaching field must have raised objections by personnel of the Geology Department.

Two students had entered school in 1911 and 1912 who were later to become outstanding geologists. In 1911 Alva C. Ellisor (87), later to become one of the outstanding micropaleontologists of the Gulf Coast of the United States

and Mexico, had entered school in a combined education-science major, with emphasis on geology. She would be honored in 1962 by her alma mater (88). In 1912 Parker D. Trask, from Corpus Christi, was a freshman in the College of Arts and Sciences, attending school on a Regents' scholarship and majoring in mathematics (89). He received his degree in mathematics, although he did take some geology as an undergraduate. He showed his further interest in geology by attending F. L. Whitney's field trips (90), without credit. Another student in The University at this time was Wayne F. Bowman. Bowman majored in the Department of Engineering, specializing in mining engineering. His interest in geology, however, is emphasized in that as soon as he graduated he went into the field as an assistant to C. L. Baker, studying geology in Trans-Pecos Texas (91).

If one ignores the 1912 proposal of the Bureau of Economic Geology and Technology to go into teaching in competition with the Department of Geology, the first real squabble between personnel of the Bureau and the Department occurred around 1915 (92). Although the cause of the altercation seems rather trivial, it was important, as from it stemmed an uncooperative attitude on both the part of the Department and the Bureau that lasted for many years.

As previously reported, shortly after the turn of the century, by legislative act the Department of Geology had received the extensive paleontological collections of the [third] Geological and Agricultural Survey of Texas (Dumble Survey). Phillips apparently had more or less taken these over when he returned to Texas as Director of the Bureau of Economic Geology. While coming to school one morning F. L. Whitney discovered that Dumble Survey fossils were being used as concrete aggregate in paving some new tennis courts at the site of the present Chemistry Building. Whitney blew his proverbial stack, which, even when Whitney was young, could be a memorable performance.

Whitney gathered up all of the fossils he could find and took them to the Geology Department. Professor Phillips, hearing of this, decided that maybe the fossils were more important than had been anticipated and requested their return to the Bureau. Instructor Whitney refused. The University of Texas was without a permanent president at this time, but a cousin of Professor Phillips, Professor William J. Battle, was Interim President of The University. Phillips appealed to the aid of his cousin, the Interim President. Whitney still refused. In remarking on this squabble to the author at one time, Whitney said, "Phillips' middle name wasn't 'Battle' for nothing."

Actually, Whitney won this confrontation, but in the ensuing 40 years of off-again on-again feuding, the Depart-

ment was to suffer even more than the Bureau, though the prestige of both suffered from lack of cooperation. Some six or seven years after the above incident, a young student named Gordon Damon would overhear Director of the Bureau, J. A. Udden, tell F. W. Simonds, head of the Geology Department, that he (Simonds) did not have a decent geologist on his entire staff (93). Almost 30 years later University President Homer P. Rainey appointed a secret *ad hoc* committee to investigate the relations between the Department of Geology and the Bureau of Economic Geology at The University of Texas (94). At least this was the connotation to members of the Department.

From its beginning in 1890 the Texas Academy of Science had been dominated by geologists. This was the second Texas Academy of Science; the first had been organized at Austin but had become defunct before 1890 (95). Almost 50 percent of the charter members were from the Dumble Survey (96). and E. T. Dumble continued to submit papers to the Academy for publication long after the demise of the Survey that bears his name. Much as explorers of the western United States used the St. Louis Academy of Sciences three or four decades earlier, members of the Dumble Survey used the annual meeting of the Texas Academy of Science as a sounding board for their new ideas and data after a year or more of field work in outlying parts of Texas.

Just after the turn of the century F. W. Simonds was secretary of the Texas Academy of Science (96), and at the time of the demise of the Academy in 1912, F. L. Whitney was treasurer (97). In 1912, with the war coming on and no interest in the Academy, the other officers voted its discontinuation with Whitney alone in favor of trying to carry on the Academy. Whitney had money left in the treasury and no organization. In order to deplete the treasury he republished his "Fauna of the Buda Limestone" as the last issue of the Texas Journal of Science, ordering exactly the number of copies that would exhaust the treasury and solve his money problems (97).

In 1915 a particular administrative event happened that cannot be explained in the light of modern knowledge (98). F. L. Whitney had been an instructor for six years and Alexander Deussen had been an instructor for eleven years. Whitney was promoted, and Deussen, without promotion, was named Chairman of the Department of Geology. Deussen resigned within three months. It might be noted that Whitney was a Cornell man, the original alma mater of F. W. Simonds, but on the other hand, Deussen was a Simonds' student. In any event, it doesn't make sense just reading about it.

Hedwig T. Kniker (99) and Alva Ellisor (100) were both in school in 1915, but Miss Ellisor was farther along than Miss Kniker. They were enrolled as combined majors, majoring in education and science with emphasis on ge-

ology. Miss Kniker soon quit the education part of the program, but Miss Ellisor received her degree in education and science as a combined major. This combination for a major was soon dropped by The University, and a similar program was not reinstated until the 1960's.

In 1915 C. L. Baker had joined the Bureau of Economic Geology (101), and that spring when Wayne Bowman graduated from the School of Engineering, he signified his interest in geology by taking a job with the Bureau of Economic Geology as an assistant to Baker in the Davis Mountains (102). For the next 20 years Baker would periodically produce an important and imaginative work on the geology of Trans-Pecos Texas. Later in the summer of 1915 Baker had other plans and asked J. A. Udden for release. Udden wrote that he was sending out a Mexican geologist. Baker and Bowman went into Kent to meet the train, and the only man to depart from the train was a tall, blue-eyed, rugged blond. This was their first meeting with Emil Böse, the German-born geologist who had worked in Mexico, already, for 18 years. Baker stayed with the party for two weeks to show Böse the ropes, after which he went to Kent and caught the train east. That fall at the end of the field season Bowman and Böse took their mules and extra horses overland from the Davis Mountains to Austin. They camped out on the way and their trip took them about two weeks horseback, driving the work stock (102).

In 1911, and again in 1912, Whitney published on the fossils of the Buda Limestone. There was little transportation in those days and field work was restricted, especially with a geology class, to the distance that could be walked during an afternoon. The excellent collection of Buda Limestone fossils at The University of Texas, the only significant collection of Buda Limestone fossils in the world, resulted from this lack of transportation. For years before World War I Professor Whitney walked his paleontology class to Shoal Creek, and he and the class spent the afternoon extracting the fossils from the hard Buda Limestone (103). Although the number of fossils from the Buda Formation is not nearly so great as that from most other formations, the number of man-hours spent collecting these fossils is probably 100 times as great as that spent on the collections from any other formation.

By 1915 J. A. Udden was Director of the Bureau of Economic Geology and Technology, having replaced William Battle Phillips when the latter resigned to become President of the Colorado School of Mines (104). Udden had an inquisitive mind. Before coming to the Bureau, and while a professor at Augustana College, he had made a series of lectures on the subject of lighter-than-air craft (105). He had working models that he could turn loose to fly within auditoriums to illustrate to his audiences the feasibility of such aircraft. He, furthermore, carried on a correspond-

ence with Orville Wright concerning the problems and principles of flying machines (105). In geology Udden was also in the forefront of new methods and new ideas (106). He had employed subsurface methods and microfossils to solve stratigraphic problems before coming to Texas. Perhaps, because of conversations with Udden, F. L. Whitney started a course in micropaleontology at The University of Texas in 1915, only three months after a similar course had been inaugurated by Carey Croncis at the University of Chicago (107, 108). These are the first formal courses in micropaleontology in North America.

By 1915 Udden had apparently convinced much of The University that there was a real future in research, because in that year, the Bureau of Economic Geology and Technology was greatly expanded; it encompassed three divisions (109): (1) the Division of Chemistry, (2) the Division of Economic Geology, and (3) the Division of Engineering (110). Udden was Director of the Bureau and also head of the Division of Economic Geology. Also in the Division of Economic Geology were Charles Laurence Baker, geologist; Emil Böse, geologist; and E. L. Porch, Jr., assistant geologist. Head of the Division of Chemistry was E. P. Schoch, who had received a degree in Civil Engineering from The University of Texas in 1894 (111), an M.A. in 1896 (112), and a Ph.D. from the University of Chicago in 1902 (113). The Division of Engineering was the largest division, with Friedrich Ernst Giesecke heading it. With this expansion the Bureau of Economic Geology and Technology more than tripled in personnel.

Under J. A. Udden the Bureau of Economic Geology and Technology at The University of Texas very early started a series of subsurface studies. In Volume IV, No. 1, of the Bulletin of the American Association of Petroleum Geologists, a short note on some of these studies was published (114). It is entitled "Suggestions of a New Method of Making Underground Observations" and starts off with:

In the north-central part of the State of Texas, where wells are being drilled to the depth of 4,000 feet and more in order to penetrate the Bend formation (Pennsylvanian), which is the chief oil-bearing horizon in that part of the State, it has been found that the structure of the Bend and that of the underlying Ellenburger limestone (Ordovician) is quite generally the same. The plotting of underground structure by drillers' logs or by observations on cuttings from the Bend is very difficult, for the reason that there are small variations in the rocks of the Bend, not only vertically but also horizontally, and that these small variations lie near the limit between shale and limestone. Whether a certain part of the formation is reported as shale or as limestone will in large part depend upon the judgment and experience of the driller, or other observer . . . it has been found expedient to use the contact of the Bend and the underlying Ellenburger as the key horizon. Contours are drawn on the upper surface of the Ellenburger.

On page 84 Udden continues,

It has suggested itself to the writer that it ought to be possible,

with present refinements in physical apparatus and their use, to construct an instrument that would record the reflections of earth waves started at the surface, as they encounter such a well-marked plane of difference in hardness and elasticity as that separating the Bend and the Ellenburger formations.

Some such instrument as a seismograph, especially constructed to be sensitive to vertical waves, possibly a slight adaptation of some of the present seismographs would be amply suitable for the purpose. A seismic wave might be started by an explosion at the surface of the earth, and a record of the emerged reflection of this wave from the upper surface of the Ellenburger limestone might be registered on an instrument placed some distance from the point of explosion.

Subsurface studies at The University of Texas would continue, and within the next ten years such notable Gulf Coast micropaleontologists would receive degrees in geology as Alva Ellisor, Hedwig Kniker, Esther Applin (*nee* Esther Richards), Dorothy Carsey, J. B. Christner, and others. Likewise, at the Bureau of Economic Geology and Technology during this decade there would be emphasis on subsurface studies, and a laboratory in subsurface methods was established in the Bureau. In the early 1920's Marcus Goldman of the United States Geological Survey would spend some time at the Bureau of Economic Geology learning subsurface techniques introduced into that organization by J. A. Udden (115).

J. W. Beede joined the staff of the Bureau of Economic Geology in 1917 (116). He helped Udden supervise the well sample and subsurface laboratories. He was also a specialist in late Paleozoic rocks and was therefore a great aid to the Bureau in studying the late Paleozoic rocks of North Texas that were becoming so important in the young and booming oil industry of that area.

In 1914 Halbert P. Bybee was employed by The University of Texas as an instructor (117). The immediate emphasis on field work was no doubt due in part to his arrival and also in part to the appearance of the automobile. Bybee, in future years, would make tremendous moral and financial contributions to The University of Texas.

In spite of World War I, geology continued to grow. By 1918 the introductory geology laboratories were held in the temporary structure west of the Old Main Building (118).

In 1917 F. W. Simonds became Secretary of the General Faculty (119), a post he was to hold a decade. It was at this time that much of Simonds' character became associated with geology, or *vice versa*, in the minds of The University of Texas faculty. E. H. Sellards joined the Bureau of Economic Geology and Technology in 1918 (120). By 1926 Udden would turn over all of the administrative duties to Sellards (121). E. H. Sellards was also extremely conservative, and he greatly added to the impression of geological conservatism that Simonds had impressed on the minds of

the non-geological faculty at The University of Texas. With Simonds moving to the secretaryship of the general faculty, he released in 1921 the chairmanship of the Geology De-

partment which he had held almost thirty years, with the exception of three months during which Alexander Deussen was chairman before Deussen's resignation in 1915.

F. L. Whitney is Chairman—Geology Expands

F. L. Whitney had been with The University of Texas 13 years when he became Chairman of the Geology Department in 1921. His chairmanship would see many changes in staff, in students, and in course work. Whitney was involved in all of these, as chairman, but information available to me does not indicate the extent of his involvement.

In the fall of 1924 F. M. Bullard arrived on the scene (122), after making junior Phi Beta Kappa and also being the youngest person ever to receive the M.A. degree at the University of Oklahoma. Bullard would stay at Texas a long time and would advance to chairman so rapidly that his lower academic position (associate professor during his chairmanship) placed undue hardship on his chairman duties, because only full professors could vote on budget matters.

From its inception The University of Texas, budget-wise, had "come a duster." Although The University of Texas had been given millions of acres of land by the State Legislature early in the State's history, the land was poor West Texas land and according to Owen P. White (123) had brought in about \$1,000 per month to the endowment from grazing leases. In addition to the legislative stipend, The University could spend interest on an endowment that increased only at the rate of about \$12,000 per year, providing the \$12,000 was not spent as "available fund" before it was placed in the endowment. According to White,

... the poor old college has struggled along in genteel poverty, owning millions of acres of land, yet dependent for its existence upon the pennies which it could wring from the reluctant taxpayers of a commonwealth whose people are, even to this good day, largely "agin" higher education.

In place of looking like a college of the first class, which it proudly claims to be, the University of Texas, when viewed by a stranger, looks like a second-rate dairy farm.

In 1922 the University leased some land to Haymon Krupp with a forfeiture clause if drilling for oil did not start on a certain date. As White tells the story, with some exaggeration, the following events took place:

According to the terms of this lease, Krupp had to begin to drill within a certain specified time in order to avoid forfeiture, and if any oil was struck—an eventuality to which no one except Krupp and a geologist or two looked forward with any degree of hope—the university was to receive as its royalty one-eighth of the gross production.

When the lease was signed, Krupp went to work. He hired expensive oil experts, with alphabetical designations trailing along

like kite tails after their real names, to go out and locate the proper kind of anticlines for him, and then, after that had been done, he busied himself in getting together enough money to drill a well.

When Krupp was still several miles away from the precious stake, which had cost him several thousand dollars to have driven in the ground, one of his trucks broke down completely and—there he was! At that time, as the story goes, he had only two days left. What should he do? There was no possibility of his being able to reach his desired designation with his outfit. The breakdown had occurred on land covered by the lease and so, with no high-salaried geologist at hand to advise him, but merely because the ox was in the ditch and he had to act at once to prevent forfeiture, Krupp set up his rig at the scene of the disaster and went to work.

On June 4, 1923, the gusher came in. An oil town sprang up and to quote White again:

Krupp brought in his first well less than two years ago, and today, with a pipe line still unfinished and with only makeshift methods of storage on hand, there are eighteen wells down, which, pinched back as hard as can be, are none the less producing about 12,000 barrels of oil a day.

Out of this production the previously poverty-stricken university gets one-eighth. During January and February its oil income, which had formerly been \$1,000 a month, jumped to nearly \$2,000 a day.

In the mid-1920's times were good. With money coming in from a rich oil field, The University of Texas felt optimistic as to its future. Even W. S. Adkins, in Munich, was optimistic and wrote Emil Böse (124):

... After spending a year here in Europe I shall return to Austin September 1, 1926, where according to present plans, I shall settle down to the job of assistant geologist in the Bureau. I truly believe that Texas is now on the upward track, although it of course has still a lot of disagreeable things to get rid of. The Shell wish me to take a permanent job in their "Research Department" headquarters out of the Hague, but I shall have to let that drop for the moment. ... They have started a graduate school, with Simonds!! as research professor, also free to carry out any research he pleases. So you see The University of Texas is coming up in the world. Really, tho, they are likely to have a lot of money from oil in the future, and if they happen to have as much ideas as they will have money, they ought to be able to do something good. It is the first time I have ever seen Sellards optimistic about the future there. ... If you describe any types from the material would you object to sending the types to Austin at the Bureau; I will guarantee a fireproof place to store them until the Bureau gets a building, which likely will not be long, according to present indications.

The letter was written July 11, 1925, and the Bureau finally got a building 42 years later—and then they had to share it with the Department of Geology!

Even the University administration felt like doing things.

Although a graduate school had been created by the Board of Regents in June 1910 (125) and was administered by a committee of the general faculty known as the graduate council up until June 1925, it had never functioned at any great efficiency. According to the catalogue:

. . . recognizing the demands upon the University of Texas for graduate teachers and research, the Board of Regents requested the Thirty-ninth Legislature to make possible the organization of a Graduate faculty. The Legislature responded by appropriating money for graduate professorships, for fellowships for research, and for overhead expenses.

One item of appropriation was eight new professorships. Upon obtaining this sanction and financial support from the Legislature, the Regents in June 1925 authorized the organization of a graduate faculty.

Presumably Adkins, in Europe, had been kept informed by J. A. Udden of events transpiring at The University of Texas. In a letter dated April 26, 1926, he wrote Böse (126):

I understand that Whitney was sore (as usual) about my appointment. Hereafter in Texas we shall have to make everything harmonious. Since I am settling down there for as long as possible, I shall try to make every concession to avoid argument. With Sellards' managership I think things are due to improve always subject to political condition. Here's hoping that the University oil lands continue to produce because that will be the salvation of the situation. You know that Bybee has resigned. That may be the forerunner of better things, and that Sellards has been appointed as a professor in the newly formed graduate school—which was started off with a bang this year by getting several experts—Schuchert and others—to come to Austin for a few months each, to lecture. When I see Sellards in Paris I shall know more. Exactly what the net result of all this has been.

Reading between the lines, in letters from friend to friend, the dissension between the Department of Geology and the Bureau of Economic Geology is apparent.

As indicated by Adkins' reference to "several experts," as a result of the organization of the graduate faculty, the Department of Geology decided to advertise its graduate work. A large number of outstanding geologists from around the country were invited to teach one-third of a year (The University was on the quarter system) as visiting professors (127). Consequently, the graduate faculty list at that time included Arthur Keith, E. H. Sellards, F. W. Simonds, Charles Laurence Baker, Donald C. Barton, Charles Schuchert, J. W. Beede, F. B. Plummer, Wallace Pratt, W. A. Wrather, W. M. Davis, and G. D. Harris. Other members of the Department included, in addition to Professors Simonds and Sellards, Professor Whitney, Chairman; Associate Professor Bullard; Adjunct Professor Arthur Deen; and Instructors Allen, Damon, and P. B. King.

Accompanying all of this activity there was a fantastic expansion in course offerings. There were special courses

given by the visiting professors, primarily for graduate students. Stratigraphy and paleontology of the Southwestern States were covered by Professor G. D. Harris, from Cornell University, and a course in the occurrence and production of petroleum with special reference to the problems in the Southwestern States was given by Donald C. Barton. Charles Schuchert lectured on stratigraphy. C. L. Baker lectured on the geology of petroleum fields in Mexico; J. W. Beede lectured on petroleum production from Permian formations of West Texas; and F. B. Plummer covered petroleum production from the Pennsylvanian formations of Texas and the origin of petroleum, whereas Wallace Pratt lectured on the geologists in the petroleum industry, on petroleum in Texas, and on some recent developments in salt dome oil fields. Donald C. Barton taught geophysical methods, foreign salt domes, and organization of applied geology. William A. Wrather lectured on petroleum production in the mid-continent fields of the United States. Prof. W. M. Davis, of Harvard University, lectured on geomorphology, and at one public lecture antagonized the Daughters of the Texas Republic by refusing to visit the Alamo (128). None of these courses by visiting professors were to be given after 1926–27 (129). Although an impetus was given to graduate work, it did not have sufficient time to mature into an established, operating program; the depression put the quietus on much of this optimism, and much of the 1926–27 campaign to promote graduate work in geology at The University of Texas did not bear fruit. Had times remained good for a decade or so, results might have been different. The operation cannot be considered a complete failure, however, for in the introduction to his "Tectonics of Middle North America" Philip B. King states (130):

For many years I have been interested in the tectonics of the middle North America, that is, of the United States and the areas that immediately adjoin it. My interest was kindled when I was an instructor and graduate student at The University of Texas, and attended a course of lectures on "The structural symmetry of North America" given there in the spring of 1926 by Arthur Keith, a visitor from the U. S. Geological Survey.

A program that can, at least partly, inspire a Philip B. King cannot be considered a total failure. If one can inspire a King once every 20 years, graduate teaching is probably successful. The purpose of graduate teaching, at its best, is to make the Keiths available to the Kings, and then the Kings available to a new generation of students.

After the discovery of oil on University lands in 1923 The University of Texas suddenly discovered it was in the oil business, and The University of Texas Comptroller discovered himself an endowment officer, until the Endowment Office was established. It was not long after the discovery of oil on University land that The University of Texas also discovered, with somewhat of a shock, that

it had geological problems; that it did not know enough about the geology on University lands to conduct a leasing problem efficiently and to the best interests of The University.

The conservative E. H. Sellards believed that the Bureau of Economic Geology should engage in basic research only; consequently, there was no attempt by the Bureau to even participate in solving the geological problems of The University oil lands; Udden (131) had turned Bureau administration over to Sellards, and Sellards shunned Bureau participation in this aspect of The University. These were important and long-reaching decisions, or perhaps non-decisions because of a lack of aggressiveness. Later Sellards is supposed to have avoided participation by the Bureau of Economic Geology in the State regulation of the petroleum industry, and even later the Bureau made no attempt to participate in the water policy of or water development in the State of Texas (132). The result has been the creation of several mission-oriented geological staffs in several State agencies. These groups are engaged in technical service rather than research.

Later I will refer to the outstanding research contributions of the Bureau of Economic Geology during the directorship of E. H. Sellards. These are certainly a great credit to Sellards, and probably one should consider what effect on the Bureau's research program the assumption of large scale supervisory, regulatory, and technical services would have had. The remarkable research contributions of the Bureau, with a small staff and a limited budget, may justify Sellards' decisions.

University Lands-Geology was established by an act of the 41st Legislature in June 1929. It first operated under The University of Texas Comptroller, and later under the Endowment Officer. At present University Lands operates under the Director of the Office of Investments, Trusts and Lands of The University of Texas. Nevertheless, The Uni-

versity Lands-Geology has operated as a semi-autonomous department. According to Berte Haigh (133) :

The functions of the group, operating directly under the Geologist in Charge as prescribed by law, are to ascertain and record all available geological information pertaining to all minerals that may be present in those lands that were set aside in the Texas Constitution of 1876 and by the 18th Texas Legislature (1883) for the benefit of The University of Texas Permanent Fund; to advise, through the Geologist in Charge, the Board of Regents and the Board for Lease of University Lands with reference to such information; and to transmit to said Boards recommendations relative to the lease or sale and orderly development of minerals in such a manner as is believed will provide the greatest benefits to the University Permanent Fund.

University Lands-Geology was set up at San Angelo in 1929, but was moved to Midland in 1937. Hal P. Bybee (fig. 3) was the first Geologist-in-Charge, a position he retained for a little more than 25 years, sufficiently long for University Lands-Geology to bear the Bybee stamp of character and moral integrity. Berte R. Haigh was Geologist-in-Charge from 1954 to 1962, Harward L. Fisher from 1962 to 1964, and James B. Zimmerman from 1964 to the present.

The chief endowment of The University of Texas at Austin and El Paso and its various medical branches as well as of Texas A&M University has come from the successful operation of the University Lands and the monies received therefrom, directly or indirectly. According to The University of Texas Department of Geology Newsletter (134) :

... Millions of dollars in the fund are the direct product of Dr. Bybee's judgment and of the trust which the whole petroleum industry bestowed upon him.

Through University Lands-Geology, geology at The University of Texas has benefited all departments of The University far more than they have been willing to admit.

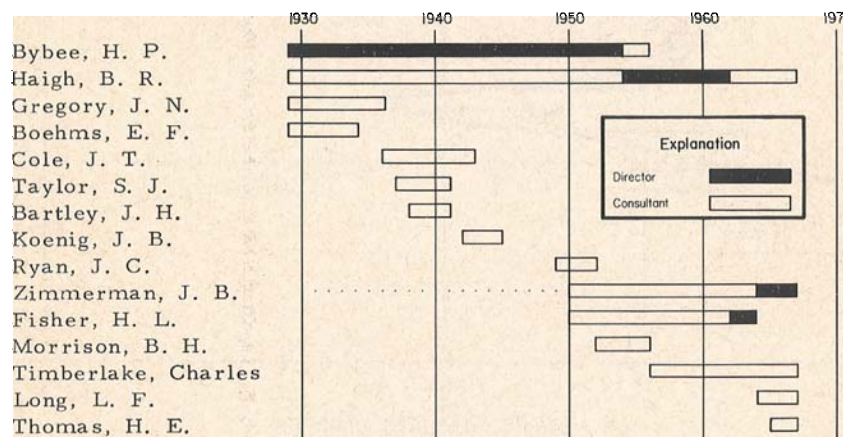


Fig. 3. Chart showing length of service of geologists who spent three or more years in the employ of University Lands-Geology.

In the early days of University Lands, 1929–1932, surface mapping and other field techniques were used. After 1932 subsurface techniques began to be used far more than surface methods. In later years methods utilizing electric and radioactivity logs have been dominant (133). Perhaps as important as the geological studies, the open auction bidding for bonuses utilized by The University of Texas,

rather than the sealed bid method used by other State land organizations, has been just as important to The University, in that bidding was put on a more competitive base. Bybee was, at least in large part, responsible for the auction style of bonus bidding (135).

As J. A. Udden grew older and the Bureau of Economic Geology and Technology grew administratively more cum-

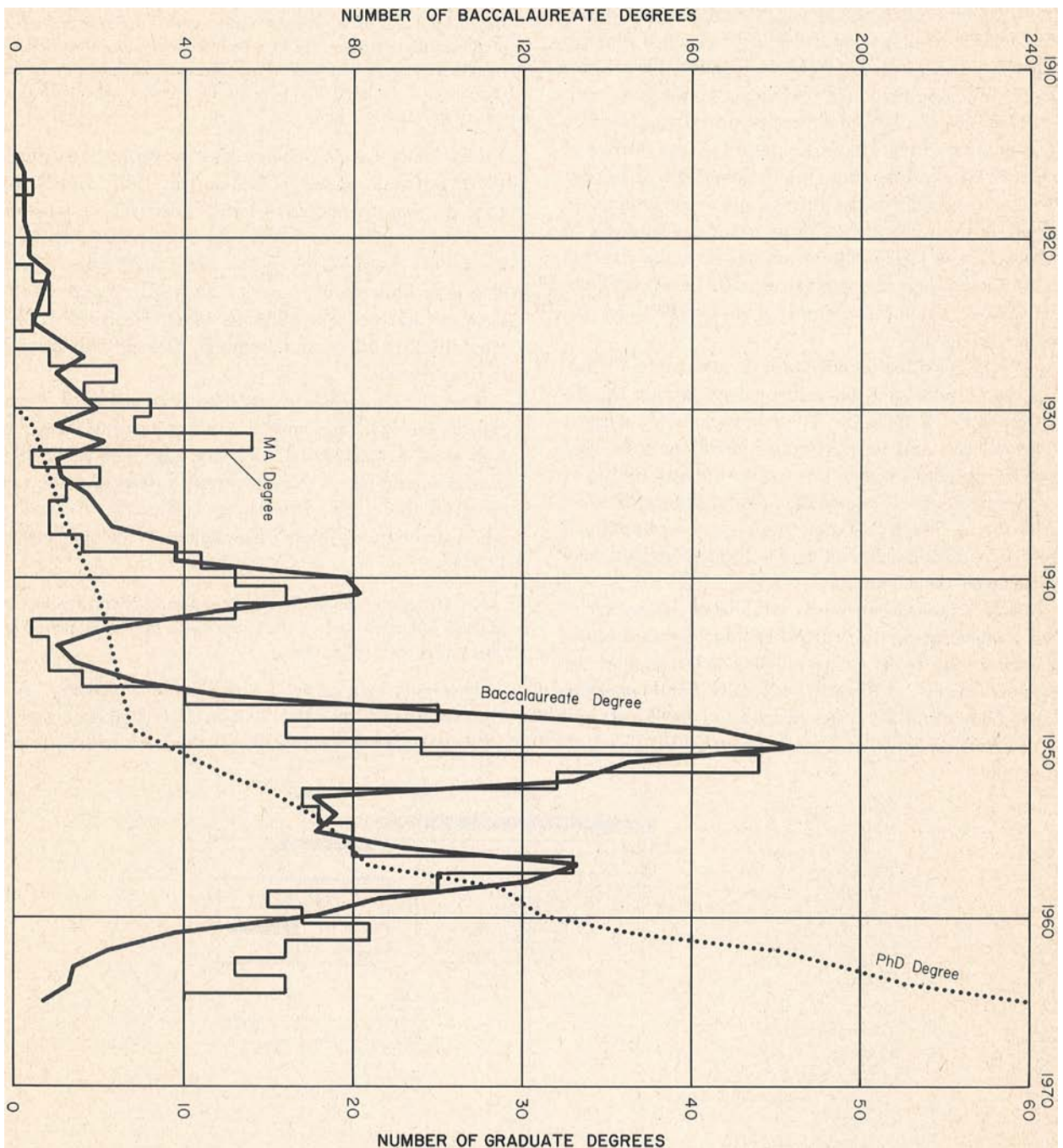


Fig. 4. Chart showing degrees in Geology granted at The University of Texas. The baccalaureate degree scale is different from the scale for graduate degrees. The Ph.D. curve is cumulative.

bersome, he gradually turned the administration of the Bureau of Economic Geology and Technology over to Elias Sellards (136). Some of the younger members of the Bureau who were not geologists became politically more powerful. In 1924 the Bureau of Economic Geology and Technology was split up into three separate research agencies (137): the Bureau of Economic Geology, with J. A. Udden as head; the Engineering Experiment Station (138), with F. E. Giesecke as head; and the Industrial Chemical Experiment Station (139), with E. P. Schoch as head. In the following year of 1925 (140), the same three agencies were recombined into the Division of Conservation and Development of Natural Resources of Texas (141). F. E. Giesecke, not Udden, was the new director of the new Division. In 1927, although a geologist under Udden in the Bureau of Economic Geology, Sellards, at least nominally, essentially became Udden's boss when he took over Giesecke's position as Director of the Division of

Conservation and Development of Natural Resources of Texas (142), of which the Bureau was a part. When Udden was in his prime such a move could not have been made, and on paper this was a ludicrous administration. In reality, however, Udden had already turned all administrative work over to Sellards some two years earlier (143).

General good times, the discovery of oil on University land and the consequent problems, plus the attempt to establish an outstanding graduate school overshadowed the everyday events of the chairmanship of F. L. Whitney. It should probably be emphasized that the period of the 1920's saw the first expansion in teaching to train geologists for the petroleum geology profession, and in spite of the disappointing graduate school results, at least superficially, these years saw the Master's degree in geology at The University of Texas become an expected part of the training of many geology students (144) (fig. 4).

F. M. Bullard Builds to Meet Expanding Classes

Early in the fall of 1929 the "establishment" of the Geology Department and the Bureau of Economic Geology had held a combined meeting for the purpose of obtaining a new building (145). Although names are not mentioned, at this time the "establishment" usually included only F. W. Simonds and E. H. Sellards. It was hoped that the Bureau and the Department could share the building. This hope was foredoomed, however, and the two organizations did not get together until 38 years later. I say the "establishment" met to discuss the new building, because apparently the geology faculty did not know of this discussion until the faculty meeting of October 1929 (145). By February of 1930 Dr. Simonds was able to announce to another faculty meeting (146)

... that no official information had been received to date concerning the appropriation of money for the geology building, although newspapers were listing a building for the department.

When monies were finally appropriated, F. M. Bullard as departmental chairman automatically became chairman of the Geology Department's building committee. Much that was good of this new building came out of Professor Bullard's fertile mind, and he followed through on minute details to an amazing degree. Thirty-five years later the building would be outmoded because it was no longer large enough and because of increased space requirements for research. At the time of its construction the primary effort of the Department of Geology at The University was teaching; by 1967 the effort between teaching and research would be about equally divided.

Another direction that the Department was to take started in 1930. This has been called "applied education" or, if you prefer, servicing the petroleum industry. However, this program never went so far as to remove geology from the College of Arts and Sciences. It started in 1930 with the Geology Faculty proposing that a Bachelor of Science degree be given in geology (146). The degree and course work were outlined, but the important statement is in paragraph 2 of the proposal sent to the general faculty. It read:

2. Resolved that the degree of B. S. in Geology be established. It should be professional in character and require a minimum of eight courses in geology, of which 5½ should be required courses, and 2½ elected courses.

From the general tone of this meeting it appears that the resolution and degree program were largely the work of Dr. Simonds. On March 31, 1930, the faculty of the College of Arts and Sciences passed the recommended degree program for the Bachelor of Science in Geology (147). At this time there was a special requirement:

The student must pass a general 4-hour written examination in his major subject on May 7 of the second semester of his senior year, or on May 7 or August 10 following the completion of the requirements in the major subject. The chairman of the department in which the major is taken shall fix the place of examination and supervise the giving of it, etc.

It is through the success of this program, with modification, that The University of Texas during the next

30 years would train almost one-twelfth of all the practicing petroleum geologists in the United States (148).

Fred M. Bullard was chairman during the post-World War I depression. These were trying times for chairmen as well as geologists. Trying, because it was impossible to hire and feed all of the geologists looking for work. M. B. Arick once told the writer that when he received his Master's degree he could not find a job. Becoming hungry and in desperation, Arick finally wrote E. H. Sellards, Director of the Bureau of Economic Geology, that if Sellards would put him on as an assistant to a field party so he could eat, that he, Arick, would furnish his own bed-roll and clothes and work without pay. Arick further said that Sellards was real nice to him; that he hired him and even gave him a salary of \$50 a month.

Because of the depression, for the 1934-35 long session salaries were lowered; at this time the salaries of the full professors in geology ranged from \$2850 to \$4200 for the 9-month period. The associate professor received \$2200 for the 9-month term, and adjunct professors received from \$1350 to \$1800 (149).

Although possession of the doctorate was unusual, the following letter is somewhat typical of the many, many letters that Professor Bullard received in the early 1930's (150).

Dear Dr. Bullard:

I am writing to ask if by chance you have some type of vacancy in your department.

I was granted the Ph.D. degree in June by Indiana University and at present am unemployed. I was in Austin a few weeks ago and Mr. Damon kindly guided me through your new building. I was much impressed by your new equipment and new building.

I am willing to work for some stipend or small salary in order to keep up my geology work. Several months ago I wrote Dr. Sellards and he in turn gave you my communication. You wrote me at that time that you had nothing to offer.

The writer of that letter, whom I shall leave anonymous, expressed conditions and thoughts similar to many, many letters written to the chairman in the early 1930's.

Further signs of hard times in geology were the number of people looking for teaching jobs. The following well-known geologists applied for teaching jobs at The University of Texas during the early and mid-1930's: George V. Cohee, Morton B. Stephenson, Frank B. Conselman, Cecil G. Lalicker, E. H. Rainwater, Gordon Rittenhouse, William L. Russell, Glenn C. Tague, Joseph M. Trefethen, Albert Elmer Wood, Addison Young, Carl E. Dutton, S. S. Goldich, Earl Ingerson, Ross A. Maxwell, Harold N. Fisk, C. J. Loeltherle, and the list goes on (150).

During Professor Bullard's reign as chairman, Professor Simonds and Professor Whitney constituted the budget council. Since these two could seldom agree, Bullard's position as chairman, and not being a member of the budget

council, was very difficult. As an example, in the spring of 1931 John W. Wells resigned from his position as instructor to take a fellowship. Simonds and Whitney wrote President Benedict and Dean H. T. Parlin a letter recommending that part of Wells' salary be assigned to employ L. S. Brown for the coming year to take Wells' place and to maintain Brown's salary as an adjunct professor (151). A few weeks later in a private letter to Dean Parlin, Professor Whitney objected very much to the letter he had already signed, pointing out that the Department had a young man on the staff who already had a doctorate, Robert H. Cuyler, who had proved extremely capable, enthusiastic, and energetic as an instructor, and who, furthermore, had always been willing to do much more than his share to further the interest of the Department. Whitney now suggested that since Cuyler had been an instructor for five years, and had never received an increase in salary, his promotion was more essential to the Department than Brown's retention (151).

In the late 1920's the Bureau of Economic Geology employed George C. Engerrand as a curator part time; the remainder of his time was taken up as associate professor of anthropology (152). After a few years he quit his position at the Bureau to be full time with the Anthropology Department (153). Engerrand was a Belgian who had collected in Europe and then had been a specialist in Tertiary geology with the Instituto de Geología de México. When he came to Texas he brought his European collections with him, and over a period of many years Professor Whitney of the Geology Department gradually purchased from Engerrand the beautiful European fossils now in the departmental collections (154). According to Whitney, Engerrand in turn plowed this money back into Mexico for the purpose of financing various revolutions (155).

It is with some nostalgia that we see that the Department purchased a carryall in 1932 for \$1166, even though it would appear that the inflation in automobile prices has been less than that in other areas (156).

The year 1934 was the first in which the Department tried to publish and print anything on its own. In that year Professor Bullard and the Department prepared a small pamphlet describing the summer field courses conducted by the Department. They asked the University Administration to print this. President Benedict declined because of two objections (157):

First, I rather doubt the extra students obtained by the advertising would pay for the pamphlet, and second, I am more doubtful of the advisability of the advertising of various summer school courses separately. So far we have spent nothing on advertising except to get out the summer session catalogue.

After some discussion by letter Benedict changed his mind and (158),

providing the Department of Geology has the necessary funds to

cover the expenses, thereunto appertaining, I concur with Dean Parlin in seeing no objection to the request in your letter of March 16, that the Department of Geology be allowed to pay for the printing of the summer session Geology pamphlet out of the maintenance and equipment account.

The enrollment in introductory geology in the second semester of the year 1932-33 was approximately 503. In the fall of 1933 the enrollment had increased to 631. By the spring of 1934 the enrollment had again increased to 761, two hundred more than the year before (159). It was at this time that the beginning geology laboratories were cut from 3 hours to 2 hours each, so that the teaching staff could handle this ever-increasing load. In a letter from Raymond Woods to Dr. F. L. Whitney (160), Woods remarks:

A circular I received from the Ex-Students' Association has the notation that enrollment is 8,420 this fall. If the present rate of increase keeps up, they will have to build some more new buildings. Maybe you will have to move your Geology Department into the attic and let the English, Mathematics and History Departments have the rest of the Geology Building. At least you would have a large supply of rocks handy to drop on unsuspecting English professors' heads.

In the spring of 1934 the curriculum was being revised by the College of Arts and Sciences. In the new curriculum the Geology Department made an attempt to get its subject on a par with zoology and botany as one of the required courses in natural science for the Arts and Sciences degree. Geology was not included in this curriculum as proposed by a committee studying the Arts and Sciences degree. In a special meeting of May 1934, it was reported in the departmental minutes by Dr. Whitney that (161):

Dean Parlin requested Geology I be taken out of the class with botany and zoology with respect of fulfilling credit for natural science. According to Dean Parlin this was to be done in order to relieve the situation in regard to the teaching loads in geology and lack of students in botany. Dean Parlin requested that the department offer a first year course in geology without laboratories. This experiment would exist for two years, after which time the plan would continue, if it is considered successful, or if unsuccessful, we could return to the status quo.

The laboratory was retained in the beginning geology course, and geology continued on an equal footing with botany and zoology in the natural science curriculum.

The establishment of the Bachelor of Science degree in 1930 for the first time required a field course for the degree (162). This caused no real difficulties until 1936. In the summer of 1936 Marie Gramann and Dorothy Ries were getting their degrees in geology and wanted to take the field course. Marie Gramann was working on the Bachelor of Science degree, and for her this field course was required. However, the faculty got around the problem by voting, after considerable discussion, that the women of

the student body could elect any advanced geology course in lieu of a field course (163).

With continued enrollment and the continued trend toward applied education to satisfy industry, degrees and teachers were becoming more specialized. It was in 1938 that the Geology Department asked engineering to teach a special course in drawing for geology students and at the same time the Petroleum Engineering Department asked that a special course in mineralogy be taught for engineers (164). Thus began the long period of service courses in engineering for geology students and in geology for engineering students. It was also in 1938 that the Geology Department, because of overloading of some advanced courses, started the uniform two hour laboratory schedule that has been almost impossible to break to this date and that, over a long period of time, has limited the amount of laboratory work in many geology courses (165).

On May 21, 1938, S. E. Clabaugh, later to become chairman and to give long service to the Department of Geology at The University of Texas, was nominated to his first position in the department, a student assistant (166). Clabaugh headed the departmental building committee for the 1967 building.

Again, in 1938, money was of such importance that Deans H. T. Parlin and C. P. Boner were attempting to get departments to omit laboratories for many courses and thus save funds that might be used elsewhere. This was so important that a committee was appointed to represent the science departments of the College of Arts and Sciences and the Deans of the School of Engineering and the School of Pharmacy in discussions of this problem with their various staffs (167). Recommendations in the matter of the ratio of laboratory to lecture hours were retained, the committee report stating in part:

The committee subscribes to the principle that departments are best qualified to evaluate their courses and determine the proportion and the credit value of the different kinds of work which constitute any particular course (168).

However, it was pointed out that in many of the geology courses, such as subsurface and petrology, the laboratory hours had already been cut from three to two as requested by the Dean. Drs. Bullard and Cuyler thought that this had not lessened the value to the student because other extra work had been added in lieu of the laboratory hours that had been cut (169). It should be noted that in recent years the petrology laboratory has again been lengthened to three hours, but stratigraphy, mineralogy, paleontology, and introductory geology are still on the two-hour plan.

In 1939 the first course in subsurface geology, by title at least, was formally approved (170). This seems an extremely late date for proposal of such a formal course, when J. A. Udden had been applying subsurface geology at The

University of Texas at least since 1912 (171). It was also in 1939 that Professor Damon assembled and organized the first course in sedimentation, a course which was to be taught in 1940 and from then on (170). Courses in aerial photographs and geomorphology were also outlined for the year 1940.

Committees—committees—committees. Some time in the fall of 1939 Professor Bybee had asked Professor Deen to be chairman of a committee on committees. This committee met and returned with a report on January 22, 1940, suggesting that there be 15 standing committees in the Department: (1) absences, (2) automobiles, (3) building and use of rooms, (4) committee on committees, (5) curriculum, (6) equipment, (7) graduate school, (8) library, (9) maintenance and equipment expenditures, (10) museum, (11) placement of students, (12) publicity and public lectures, (13) student activities, (14) summer school, and (15) tutors and assistants—so many committees that they had to be arranged in alphabetical order. This over-organization resulted in more committees than staff members (172).

Except for the four senior professors, and Professor Simonds no longer entered into decisions, the personnel of the Department was locally trained and ingrown. By 1940 Professor Bybee had been chairman for over two years. He started to look for new blood from outside of the Department. In 1940 chairman Bybee filled a position with W. C. Bell, a new doctorate from the University of Michigan. Bell wrote up two new courses that he expected to teach, Geology 371f and Geology 372s. These courses were Lower Paleozoic Invertebrate Biostratigraphy and Upper Paleozoic Invertebrate Biostratigraphy, respectively. At the departmental meeting in 1941 Bell did not receive any cooperation; almost as soon as he arrived, the two courses, Lower Paleozoic Paleontology and Upper Paleozoic Paleontology, were inaugurated, but W. A. Bramlette, who had specialized in the Cretaceous at Texas, although he had studied the Upper Paleozoic at Kansas, was voted by the Department to teach Upper Paleozoic Paleontology (173). Part of Dr. Bell's problems stemmed from his being the only outsider on the staff who had been hired for a permanent position since F. M. Bullard in 1924.

In 1941 Dean Brogan corresponded with all departmental chairmen concerning a project, in which he was in favor, that would offer the Master's degree without a thesis, substituting therefor 12 hours of graduate work (174). Generally, the program was unsuccessful, although it has reared its ugly head again and again in ensuing years. In 1942 it was also decided that the Department of Geology should employ a geophysicist who would teach courses in geophysics and certain related subjects not then offered by the Department (175).

In 1942 an *ad hoc* committee, the member names of which were not published, was appointed to study the relationship between the Bureau of Economic Geology and the Department of Geology. At least that was the connotation to many geologists, although the committee may have been concerned largely with the relation of research to teaching. The following discussion occurs in the departmental minutes (176):

Although the budget council is not familiar with the contents of the report [of a committee concerning relations between the Bureau of Economic Geology and graduate teaching and research in the Department of Geology], it is understood that a special committee appointed by President Rainey has carefully studied the relationship between research workers and teachers of the University, and that its recommendations are in the hands of Vice President Budine. The other members of the budget council concur with Dr. Sellards, Director of the Bureau of Economic Geology, in his opinion that research workers in the Bureau cannot function satisfactorily as regular instructors in the Department, and likewise, that teachers in the Department cannot function as regular research workers in the Bureau. [This concept was continued under the directorship of John T. Lonsdale in the Bureau, except for Professor H. B. Stenzel, and was not changed until Peter T. Flawn became Director of the Bureau of Economic Geology.]

Cooperation between the Bureau and the Department is greatly handicapped by the separation of the two campuses. The location of the Bureau and Department in nearby buildings on the main campus, so that libraries and equipment could be used mutually, would be of the greatest assistance.

The close association of the Bureau and the Department, at least geographically, had been brought up when the proposal for a new building was made in 1929 (177); it was brought up again in 1942 (178) and at various times thereafter but was not achieved until 1967. In the above report (178) there was further discussion of all-over cooperation between The University of Texas University Lands Division, the Bureau of Economic Geology, and the Department of Geology. The following primary missions were listed for the three organizations: (1) The function of University Lands was to study and to make possible the development of minerals under University lands; (2) the function of the Bureau of Economic Geology was that of securing information concerning the geology of the State and, particularly, its economic products; (3) the function of the Department of Geology was to acquire old and new facts and offer these to classes. None of the organizations seemed to realize that new geologically oriented missions would appear in Texas. Neither did there seem to be any preparation to participate in new kinds of geologically oriented programs.

One of the highlights of the 1940 season to local geologists was the annual meeting of the Geological Society of America in Austin (179). Special exhibits were prepared at the Texas Memorial Museum (179), some through the cooperation of the petroleum industry; special field trips

were prepared by geologists of the Department of Geology and the Bureau of Economic Geology (180), and special guided tours through the Geology Building were conducted by students (181).

One cannot continue into the post-war period without commenting on the publications of the Bureau of Economic Geology during the inter-war period. J. A. Udden had been research-minded from the beginning. As already pointed out, Sellards was a conservative administrator and visualized the Bureau as only a research unit of The University of Texas. Consequently, the Bureau of Economic Geology never expanded the scope of its operation during Sellards' directorship.

On the other hand, the research output of the Bureau remained outstanding. The series of county geologic reports and other research reports dealing with the geology of Texas in the late 1910's and the 1920's provided a firm basis for further planning. The credit for the planning of the three volumes of "The Geology of Texas," the "Geologic Map of Texas," and the "Structural Map of Texas" must go to E. H. Sellards, as Udden had turned over to

Sellards all administration of the Bureau of Economic Geology before these were in the planning stage (182). Volume III of the series (U. T. Bull. 3701), "Upper Paleozoic Ammonites and Fusulinids," was largely Paleozoic paleontology, and although now out of print, never had the popular demand of the other two volumes. Volume II of the series (U. T. Bull. 3401), "Structural and Economic Geology," is now a collector's item, it is so rare. The data for this volume were soon outdated, and for this reason the volume has never been reprinted; it has been available by xerox on demand. Volume I of the series (U. T. Bull. 3232), "Stratigraphy," has been the backbone of Texas geology for 34 years. It has been reprinted many times, the last time in 1967. The three volumes of "The Geology of Texas," including the structural map of the State, would have maintained the excellent research status of the Bureau of Economic Geology had none of the other many fine research reports been published. To these largely academic research efforts the economy of the State of Texas owes a great debt.

Restriction and Expansion—The Result of War

The immediate effect of World War II on geology at The University of Texas was one of depression, just as the war affected education all over the country, except in very special fields. In turn, post-war economy brought on an unparalleled expansion. Thus, the second World War caused its own problems. During the war most of the geology graduates were girls, and there were not enough of them. One of the main problems was to see that girls were more or less equally distributed among the companies so that the representative of each company would feel that his company was getting its fair share (183). In 1942, as many members of the staff entered the services, Glenn C. Tague and C. Gardley Moon started terms as instructors, and Esther Applin (*nee* Esther Richards) started a term as assistant professor of micropaleontology (184). By 1943 the number of students had decreased so drastically that, because of overstaffing, Professor L. C. Snider was given a leave of absence without pay. Professor H. P. Bybee was put on full time with University Lands, and W. A. Bramlette was put on leave of absence so that he might continue exploration geology with Carter Oil Company (185). The cutting of the staff went too far, and by 1944 the staff had been so depleted that there was an attempt to get Captain G. K. Eifler out of the Air Force to teach (186). However, this turned out to be impossible.

Although we think that red tape is bad now, the following item of gobbledygook from the office of the Comptroller

in 1942 seems to cast some doubt on the present severity of red tape (187):

You state in your letter that you have ordered the stage from Bausch and Lomb and have applied the AA-2X rating. We appreciate your interest in getting this equipment for the University, but please do not assign any preference rating to any of our purchase orders until you have been authorized by this office to do so. In this case the AA-2X rating is not automatically applicable to the mechanical stage because the cost is over \$50.00. It will be necessary to file a PD-620 form with the Safety and Technical Equipment Branch of the War Production Board to get their permission to assign the AA-2X rating. In this case, the equipment will be used in research work and our PD-620 application will probably be approved, but the University is not in a position to assign an AA-2X rating until we have been specifically authorized to do so by the War Production Board.

In 1943 and early 1944 the great Mexican geologist Ezequiel Ordóñez was scheduled for a lecture tour of the United States, discussing the volcano Parícutin. Dr. Ordóñez became ill, and Professor F. M. Bullard gave the lectures in his stead (188). This developed into an invitation by the American Association of Petroleum Geologists Distinguished Lecture Committee for Fred Bullard to lecture on the same subject before various affiliated societies and universities in the spring of 1945 (189). Fred Bullard would again present this subject to the geologic public as a distinguished lecture of the American Association of Petroleum Geologists in the spring of 1954 (190). John A.

Wilson would take the American Association of Petroleum Geologists distinguished lecture circuit in 1961 (191).

During the war years the economy boomed and at the end of the war there was a sudden demand for trained geologists to provide exploration and development technology for the booming minerals industries. Oil companies hired any man who could breathe and had a degree, whether he was recommended by his faculty or not. Arthur Deen was Department of Geology chairman. The exploding student body demanded an increase in faculty (192) (fig. 1). H. B. Stenzel came over from the Bureau of Economic Geology on a half-time teaching appointment (193). Within a few years after the war, John A. Wilson, S. E. Clabaugh, S. P. Ellison, Jr., Ronald K. DeFord, Keith Young, and James L. Wilson were added to the staff (194). Of these only James L. Wilson deserted to the petroleum industry but eventually was repatriated to teaching at Rice University. There were no controls by the Geology Department over the geology degree at this time; any student who could pass the Arts and Sciences College requirements could get the degree. F's were not counted in the degree program if the course was retaken and a higher grade obtained. One poor student flunked the same course five times before finally getting a satisfactory grade on the sixth round; he also got a geology degree. Many such occurrences resulted in the establishment of the "C" rule in the 1950's, whereby a course could not be counted for the geology degree if the C were not obtained (195). The C rule also required that C be obtained in each course prerequisite to a second course before the student would be admitted to the second course (195). This tightened up the undergraduate curriculum and eventually resulted in better trained geologists.

At the same time the number of graduate students in-

creased to exceed 100, and Ronald K. DeFord, as graduate advisor, instituted a program to improve the quality of graduate education. Since that time the number of graduate students has not appreciably decreased, but the number of Ph.D. candidates now equals the number of M.A. candidates, and the quality of the work has steadily increased (fig. 4). The improvement of quality in graduate education was a cooperative project between DeFord, the departmental staff, and the so-called "Suez Crisis." This resulted in oil companies eventually acquiring better trained men.

In 1951 S. E. Clabaugh, J. A. Wilson, J. L. Wilson, and Keith Young, junior members of the staff, wrote a series of recommendations to the chairman and the budget council attacking the then extant methods of setting up graduate teaching, of not publicizing departmental procedures for promotion, and other features of the administration of the department with which they were dissatisfied (196). Their actions were somewhat successful, and the budget council facetiously nicknamed these four "The Junior Budget Council."

In the 1950's there was again talk of a new building. The splendid building which had been largely the responsibility of F. M. Bullard and which had been completed in 1932 was no longer adequate. There were now too many students for the building, and the primary mission of the Geology Department at The University of Texas had changed from one of teaching to one about evenly divided between teaching and research. Consequently, a new building, with facilities capable of housing the machinery of modern research technology, was necessary. We are now dedicating this building with a program that is to set an example for the building's future.

Geology in the Field

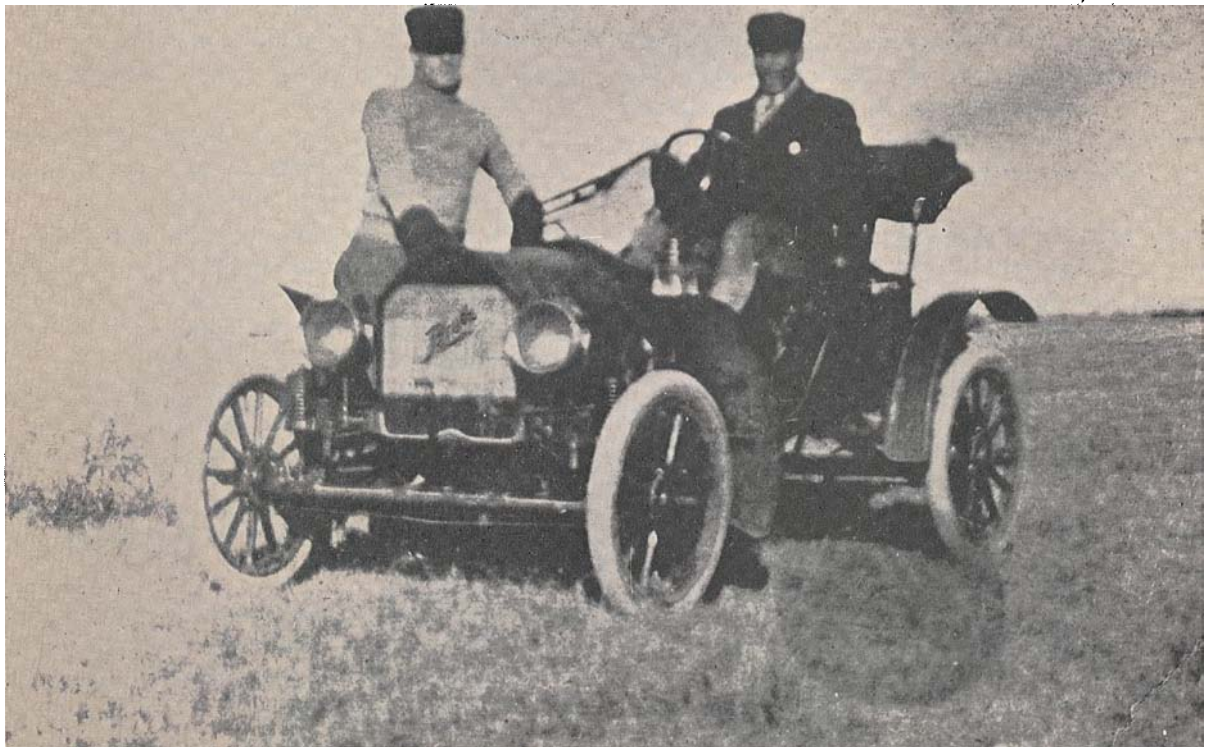
Geology in the laboratory and geology in the field are interdependent. There, however, the relationship frequently ends. At one time those who did not know better criticized the Geology Department at The University of Texas for not emphasizing field geology (197). These people had not studied the summer field course methods, nor had they realized the amount of independent (individual student) and class field work that can be and is carried on during the winter months at The University of Texas. In the early days at Texas field work may not have been as well organized as at other institutions, but the year-round practice of field geology more than made up for lack of organization. I recall, one time, hearing a visiting geologist from a northern university exclaim to H. B. Stenzel how lucky

Texans were—they could carry on field work the year round. Stenzel's answer, as I recall was, "Yes, but we just kid ourselves if we think we accomplish anything during the summer." Nevertheless, most of the concentrated field work for students is scheduled during the summer months; it is then that the professor discovers whether or not the student really has a "desire" to be a geologist.

Before World War I field work was largely restricted to the distance the student or the class could walk (198). Miss Heiman (199) illustrates J. A. Udden and the first vehicle used by the Bureau of Economic Geology and Technology (Pl. I B). On the other hand, in 1915, Baker, Bösc, and Bowman had a string of horses and mules in the Davis Mountains. In spite of such transportation difficulties



(A) Geology rig of W. B. Phillips for 1903 to 1905. Phillips was then Director of The University of Texas Mineral Survey. This picture was taken on the "black waxy" near Oquinn, Fayette County. Black waxy was a term that applied to all the Cretaceous type soils, and since the Miocene was derived from the Cretaceous, the term was also used for those soils.



(B) First car of the Bureau of Economic Geology. The photograph is of Mr. Drury M. Phillips and Dr. J. A. Udden, at the wheel, near Wichita Falls in 1911. The car was a Brush, single cylinder, twelve horsepower.

Simonds discusses the annual excursions with geology students to the Paleozoic outcrops and Enchanted Rock (200). Sigma Gamma Epsilon trips to Hamilton Pool or Cypress Mill in the early 1920's were really major excursions.

Field work was emphasized with the arrival of H. P. Bybee in 1914, but transportation was still a critical factor—one either walked or rode placidly behind a tame horse, since few geologists were trained to handle broncs. By 1920 organized field excursions were started, and one such excursion (1920) to Trans-Pecos is illustrated in the 1965 Newsletter (201); it is worth noticing that the largest single item of equipment seems to be spare tires. It was also on this trip that Bob Cannon's sheets were used to strain the water at Diablo Tank, because after three weeks of sleeping out a visual inspection of sheets showed Bob's to be the cleanest (202). On the same trip a ring gear was broken on a curve west of Sierra Blanca. While the ring gear was being removed, a car coming around an adjacent curve ran off the road and was wrecked. The husband and his family were taken to Sierra Blanca with the ring gear when the geologists went in to repair the gear, but not until a bottle of rum had been removed from vicinity of the man with the wrecked car. After its repair, while reinstalling the gear, Professor Whitney, being Professor Whitney, worried about the bottle of rum in his possession, and the face it would present to the public if such were discovered in the possession of a University of Texas professor. About this time W. S. Adkins appeared, and to his immense relief Professor Whitney was able to dispose of the bottle of rum (203).

Nevertheless, for the reconnaissance type of geology in use by petroleum companies in the 1920's, the field courses of that decade were well designed. As the techniques of exploration became more sophisticated, the courses for training young geologists in field methods also became more sophisticated.

With the participants scattered to the wind, and many of them gone, it has been difficult to discover just where field courses were held in the early days. Certainly one grand excursion with the Bybees covered much of the western half of the United States (204). In 1923 the field course was held at Crane's Mill on the Guadalupe River in Comal County (205). The amount of geology that was covered in this area indicates that perhaps this area was a base camp for several years. Whitney (206) complained about the difficulties of mapping the Quaternary deposits of eastern Hays and Comal counties with Cuyler driving, because Cuyler did not know how to drive at speeds of less than 45 miles per hour. Whitney doubted that that part of the map was very accurate.

In 1929 the summer field course, under Whitney, was based out of Georgetown (207), and Whitney had manu-

script maps (208) of both Williamson and Comal counties for which much of the geology was compiled from maps and observations made during the summer field courses (208).

In the late 1930's Bybee proposed that there should be a Paleozoic field course based out of Brady, or some similar locality (209). And at this time there began almost a decade and a half in which Bullard, Cuyler, Ellison, Young, and others ran a Paleozoic field course from the Brady area. During part of this time the field course was held at Curtis Field in conjunction with the field course from Texas A&M (210).

The first Tertiary field course was established for the summer of 1947 and was based in Palestine (211). S. O. Burford, a former student, was granted leave from the Humble Oil & Refining Company to conduct this field course (212). The geology part of the course was successful, but the living conditions were less than desirable. Consequently, the Geology Department, with the approval of the administrations of both schools, entered into a contract to base the Tertiary field course in the dormitories at Texas A&M University (210). This went well for several years, but one year the cadets flooded the tea-sippers out of their dormitory (213). The year before the flooding, The University of Texas geology field course had entered and won Texas A&M intramural softball, after John O. Donohoe pitched nine no-hit games. Those who were flooded have always thought that the flooding was revenge for the lost softball games of the previous season. I don't know about the geologists, but the Geology Department at The University of Texas certainly turned out one fine softball team: S. P. Ellison was in charge of the course that year, but he didn't even get a hit.

In 1947 the Fort Stockton Chamber of Commerce tried to get The University of Texas geologists to sign a contract to use Gibbs Field as the base camp for the geology field courses (214). However, the Department had already signed a ten-year contract in 1946 to base the Trans-Pecos work at facilities of the Davis Mountains State Park (215). In 1946, the summer that the courses first used the facilities at Davis Mountains State Park, Hadley and Todd, outfitters from Alpine, observed the operations of G. K. Eifler's field course and the "primitive conditions" that the students were living under. Hadley and Todd volunteered (216) to

... supply a field trip for any length of time, service the field trip and make all of the conditions under which geology students work in the field, much more simple.

Of course they did not envision the limited budget with which either senior or graduate geology students operate.

Because there was always a water shortage, and because the facilities were not located in the best area for graduate work, in 1951 the Department requested a termination of

the ten-year contract with the State Parks Board after only five years (217). The termination was completed. As the years continued those who had been teaching the field courses were replaced by younger men; men who were not interested in the rocks in the Brady vicinity. It was at this time that facilities for a field course in the Marathon Basin were found, and the field course has been in the Marathon Basin ever since, with, now and then, a week's excursion into the Tertiary. W. R. Muchlberger, R. L. Folk, E. F. McBride, R. E. Boyer, and S. P. Ellison, Jr., have been associated with this course. There are no longer sufficient students for a field course in both the Tertiary and the Paleozoic.

In 1942 H. P. Bybee had proposed a field course for students just getting a start in geology (218). Originally this was a freshman course, Geology 310, but eventually it was raised to junior rank for the benefit of non-geologists who had the experience to enroll in the course. This course has been taught for about 25 years, and all agree as to its value to the geology major.

The Bureau of Economic Geology in the Post-War Period

During the war E. H. Sellards had remained as Director of the Bureau of Economic Geology, although he was 65 years old in 1940. In 1939, on the death of Professor J. E. Pearce, he was appointed Director of the Texas Memorial Museum (220). In January 1945, as a forethought to his retirement as Director of the Bureau of Economic Geology, he prepared for President T. S. Painter an extensive report on the state of the Bureau (221). In September 1945 John T. Lonsdale was appointed Director of the Bureau (222). Sellards stressed the importance of increased budget in the post-war period for whoever should succeed him as Director. He pointed out (1) that there should be an increase in the number of publications of the Bureau; (2) that the general investigations fund was not nearly large enough; (3) he emphasized that the budget for investigations in the Texas Coastal Plain was insufficient to provide the required field assistance, much less the needed drafting; (4) the budget for the Central Mineral Region investigations was also inadequate; (5) he requested a \$1000 increase in budget for the Bureau's Well Sample Library; (6) an increase of \$6,000 per annum was requested for investigations in Trans-Pecos Texas.

During Dr. Lonsdale's term as Director of the Bureau of Economic Geology, a cartographic section was organized under the capable direction of James W. Macon. The creation of a Revolving Publication Fund lifted certain restrictions on the Bureau's publication efforts. Lonsdale served on the Department's budget council and deserves

In 1951 the senior field courses had an enrollment of almost 150 students, and for several years just before and after 1950 the enrollment in the senior field course was over 100 students. This prompted the Chairman of the Department of Geology to write President T. S. Painter (219):

I should like to make a few remarks for your consideration. I feel quite certain that no university in the United States has ever inaugurated such an enormous field course program. Furthermore, the major portion of this program (except Geology 310) is advanced in character and the demand for highly trained full qualified staff members is evident. This fact, in addition to the necessity of having a small number of students for each staff member in order that adequate supervision may be possible, makes for an expensive item in the summer session budget.

One of the several criticisms leveled at this Department in the past by geologists and universities has been the inadequate field work offered our students. I am happy that this program, expensive as it is, has been approved and, although there are numerous problems in connection therewith, they can be and have been surmounted. Your support has been greatly appreciated.

part of the credit for building the post-war staff. He constantly battled to raise Bureau staff salaries to levels necessary to maintain Bureau leadership in geological research (223).

On the death of John Lonsdale in 1960, Peter T. Flawn was appointed Director of the Bureau of Economic Geology and Virgil E. Barnes, with a research record few can equal, was named Associate Director. Dr. Flawn brought a new dimension to geological research at The University of Texas. In addition to continuing the excellent research status of the Bureau of Economic Geology, under his direction there has been a greater stress on regional studies of economic service to those regions (224). Geology has been put before the public to a greater extent by the entrance of the Bureau of Economic Geology into the publication of handbooks for amateurs and students (225), and the publication of geological reports on State parks (226). In the pre-war period F. L. Whitney worked with the various Boy Scout organizations. Ross Maxwell has continued this valuable service during the last several years. The continued research of the Bureau of Economic Geology personnel has resulted in, among many, the Ellenburger report (227), the pre-Simpson stratigraphy report (228), a report on the basement rocks of Texas and New Mexico (229), the Edwards Symposium (230), "The Ouachita System" (231), the Stone City fauna report (232), and the report on the evolution of the *Athleta petrosa* gastropods (233). With the cooperation of industry and local geologi-

cal societies, the Bureau, in 1961, undertook the monumental task of compiling and publishing a new State geologic map. It will appear as an atlas containing some thirty-five 1° by 2° sheets; V. E. Barnes is project director for this atlas. To emphasize the length of maturation of surface studies of large areas, G.S.A. grants for the study of the geology of the Big Bend National Park were first awarded in 1936. Thirty-one years later the "Geology of the Big Bend National Park, Brewster County, Texas," was issued by the Bureau of Economic Geology as a publication

of The University of Texas (234). The work on this report was started in the first half of the Sellards directorship, continued through the Lonsdale directorship, and finished well into Flawn's term as Director.

In this year of 1967 Miss Josephine Casey, Secretary, Administrative Assistant, and Editor under three Directors of the Bureau of Economic Geology, completed 41 years of service. Her contribution to geology at The University of Texas must not pass unnoticed.

The Long Search for Distinction

In a 1938 letter to J. W. Calhoun, then President of The University, H. P. Bybee reminded him (235) :

. . . this is just a sort of reminder that the Department of Geology and especially the writer, is interested in having a distinguished professorship allocated to the Department of Geology.

This is the first evidence I can find of the beginning of the long search for distinction that was to follow. Bybee started so early and pushed so consistently that one tends to see his deft hand guiding the hands of the two subsequent chairmen (236). The search for distinction had several ramifications, each of which was tried separately, and many of which, as yet, have not been completely realized. One of the earlier attempts was in geography, after the retirement of F. W. Simonds (237). A second direction was space and money for research (238); still a third was in the area of geophysics. Another line that was to be followed up was meteorology (239). The Geology Department had taught a course in meteorology during the first two decades of this century (77, 80) and during the second World War, and in 1945 a complete report was written up for the expansion of this field (240). However, by administrative order in 1947, an informal committee, composed of Dr. T. S. Painter, J. C. Dolley, and M. J. Thompson, set up meteorology courses in the Department of Aeronautical Engineering, without even consulting the Geology Department or paying any attention to the Department's report or course offerings (241).

The appointment of E. L. DeGolyer to a distinguished professorship in the spring semester of 1940 was a big start (242). However, DeGolyer in resigning at the end of the one semester seems to have been rather disenchanted with the teaching life, although his letter of resignation states that the press of business left him no time for teaching (243). Professor L. C. Snider was secured to replace DeGolyer (244). Almost immediately Professor Snider's health became more or less critical, and his contribution to teaching was never what it should have been had his health remained excellent.

Professor and Chairman H. P. Bybee began agitating for geophysics in the curriculum almost as soon as he became chairman (245). He was supported in this by industry, by P. T. Moore, D. C. Barton, C. Gardley Moon, and by a host of others (246). In a general report to Dean A. P. Brogan in January 1942, it was again emphasized that a professor of geophysics should be employed (247), and that he should offer geophysics and related subjects not then offered by the Department of Geology. The budget council's recommendations for the 1943-45 biennium included a position for an assistant professor of geophysics at \$2800 per long session and also a position for an assistant professor of geography at the same salary (248). But who was able to find either a geophysicist or a geographer during the war, and especially at those salaries? Eventually, in the spring semester of 1943 a geophysics course was taught. This course developed during correspondence between Paul Weaver and A. H. Deen (249) and it was largely through the efforts of Paul Weaver, head geophysicist for the Gulf Production Company, that the course was successful.

The breakdown of the first geophysics course at The University of Texas included (1) a General Introduction by Paul Weaver; (2) Magnetic Methods of Prospecting by Paul Weaver; (3) Gravity Methods by Darrell Hughes, Shell Petroleum Company; (4) Electrical Methods by Dr. W. M. Rust, Humble Oil & Refining Company; (5) Problems in the Logging of Wells by Mounce and Thompson, Humble Oil & Refining Company, and L. W. Storm, Schlumberger Well Survey Company; (6) Soil and Soil Gas Methods by Dr. Leo Horvitz; (7) Theoretical Consideration of Seismic Methods by Dr. M. M. Slotnick, Humble Oil & Refining Company; (8) Applied Seismology by a Mr. Allen, Petty Geophysical Engineering Company; and (9) Miscellaneous Methods and General Résumé by Dr. L. W. Blau, Humble Oil & Refining Company (250). Apparently some special lectures in geochemical prospecting were given by J. Brian Eby late in May (251).

Although approximately 28 students attended this first geophysics course (252), and it reminds one of later seminars conducted by Ed W. Owen, no geophysics developed within the Geology Department as a result. However, Darrell Hughes would soon leave Shell Petroleum Company and start teaching geophysics from the Physics Department at The University of Texas (253).

In a previously mentioned report from the Department of Geology to Dean A. P. Brogan, Bybee had emphasized that a larger number of graduate students from other schools could be expected if The University would offer more scholarships or other aids to students, offer more courses, and increase the staff so that there would be a greater variety of courses (254). It was further emphasized that there should be more research aid to both staff and students. In 1940, Bybee, writing to Hulon W. Black, had emphasized the need for money for staff members in the Geology Department to have time to perform their research, and even at that time had suggested an endowment of \$100,000 from which the income would send staff members to scientific meetings (255). The Geology Foundation has provided many of the above needs. The University has increased its research support, and contributions from the federal government are considerable. Younger staff members and graduate students cannot possibly realize their debt to H. P. Bybee.

In 1929 when a new building was suggested, there had been talk of joint occupancy of one building by the Department and the Bureau of Economic Geology. However, J. A. Udden had not only never wanted to share a building with the Department but had persistently opposed it and had stated in a meeting, in no uncertain terms, that if such a building were constructed, he would insist that a wall be built between the two occupying tenants. Dr. Udden wanted no part of the Department of Geology (256). The Bureau of Economic Geology did not get a part of the 1932 building.

Building needs were again anticipated in 1946, at the request of Professor William J. Battle, Chairman of the Building Committee of The University (257). The Department at this time asked for a new lecture hall with a capacity of 500, plus 21,000 square feet of laboratories, classrooms, garages, and storage. The Bureau of Economic Geology was not included, since an additional building was anticipated for it (258). University politics decreed that other parts of The University would get buildings at this time.

In the early post-war years President Painter set up a committee to find an outstanding geographer to bring to Texas (259). Although geography started within the Department of Geology, it was, this time, frankly understood by all, including the geologists, that geography would be-

come a separate department as soon as it was administratively feasible.

As the chairmanship passed from H. P. Bybee to A. H. Deen, the search for distinction continued. The department had trained a number of young men and had hired some of them. When T. S. Painter became Acting President, he laid down an edict of no more inbreeding, at least in geology. Consequently, the search was carried on outside of The University not only for distinguished teachers but also for younger staff.

Two of the results of this search were S. P. Ellison, Jr., to become chairman in 1952, and Ronald K. DeFord, who was explicitly obtained to become the Graduate Advisor and take charge of the program of graduate work (260). DeFord arrived on the campus in August 1948, and Ellison in October 1948. Within less than two years the chairman would write the following letter to Dean A. P. Brogan (261):

In these days when little or no praise is heard and signs of appreciation of few things are in evidence I want to take this opportunity to say a word with reference to the excellent job that Graduate Advisor R. K. DeFord is doing in this department.

He and the others interested in graduate training are beginning diligently to formulate definite plans for a coordinated program of research and training which should lead soon to definite, well-supervised and meritorious results.

I want to congratulate him and the Budget Council for nominating him for the position of Graduate Advisor.

It was downright nice of the Budget Council to nominate him for Graduate Advisor since H. P. Bybee and J. T. Lonsdale, in describing the position, definitely stated that the prospective employee should be the graduate advisor (262).

The search for distinction did not end. There was a continued search for younger staff and also for more experienced staff. The establishment of the Geology Foundation late in 1953 (263) was the finalizing of a dream of the late Hal P. Bybee, which had started in 1939 when he was corresponding with E. L. DeGolyer (264) and P. T. Moore (265) concerning methods of endowing the Department of Geology. The travel and research and scholarship money available through the Geology Foundation have made it possible to keep younger staff members reasonably happy and satisfied. It has also resulted in increased research output and better teaching, not to mention increased support of graduate students. Furthermore, the establishment of the Farish Chair of Geology in 1961 and the acceptance of that Chair by J. Hoover Mackin in 1962 have led the Department farther along the road to distinction (266, 267).

For some intangible reason, perhaps with Ed it might just be plain curiosity, Ed W. Owen joined the Department of Geology in 1953. I say joined with tongue in check,

because the relationship might better be termed adoption—Owen adopted the Department, not *vice versa*.

Owen was another step toward the Department's goal. He started a series of seminars, modeled after the geophysics seminar that Paul Weaver had managed in 1943 (268). Paul Weaver even played a part in one of Owen's seminars. The first of these seminars invited industry to the campus. This was a big step in the mutual understanding between industry and University geologists. In addition, a generation of graduate students became acquainted with industrial leaders.

Now we have a new building. To the field geologists the new building may not mean greater accomplishments, but

it will mean better teaching. To the geologists whose research and teaching both depend on space and equipment, the new building will mean better teaching and more and better research. John Dos Pasos has said, "Those who ignore history are doomed to repeat it." The University of Texas can be proud of its heritage in geologic teaching and research. Since the direction of the future is laid down by the heritage of the past, the challenge of the future to Geology at The University of Texas is to continue the search for distinction. The achievement of distinction, great or small, specialized or generalized, requires able staff, good students, administrators with vision, and interested alumni.

References

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13. HERNDON, J. H. (1891) Plea for the life of the geological and mineralogical survey of Texas, and review of charges against Prof. E. T. Dumble, State Geologist, for "incompetency, plagiarism, and maladministration in office," and the sham trial thereof: Austin, Texas (privately printed for the author), 39 pp.
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27. According to the Catalogue for The University of Texas, 1890-91, p. 11 (1891), Cawthorne took geology under Simonds in the fall of 1890. However, his support of R. T. Hill in Hill's attempt to become State Geologist shows a close association

- with Hill (Dumble File, Texas State Archives, Austin, Texas).
28. B. S. Brown received a B.A. degree in 1891 (Catalogue of The University of Texas, 1890-91, pp. 115, 116) and took geology under Simonds while a graduate student in biology (Catalogue, Univ. Texas, 1891-92, p. 102). Brown continued graduate work at the Medical School at Galveston (Catalogue, Univ. Texas, 1897-98, p. 133) and eventually travelled around much of the world. There are fossils in the collections of the Dumble Survey (*see* reference 3) that were collected by Brown and Recent shells from the Philippines, Bimini, etc., that were also collected by Brown (intact labels, original, that are still with the fossils).
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 36. Letter from F. W. Simonds to Erasmus Haworth, dated May 31, 1900: from notes in the possession of Keith Young.
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 40. F. W. Simonds correspondence, 1901: from notes in the possession of Keith Young.
 41. Catalogue of The University of Texas, 1901-1902, Univ. Texas Bull. 12, p. 14 (1902).
 42. BENEDICT, H. Y. (1917) A source book relating to the history of The University of Texas: legislative, legal, bibliographical, and statistical: Univ. Texas Bull. 1757, pp. 423-425.
 43. F. W. Simonds correspondence, 1901: from notes in the possession of Keith Young.
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 100. Catalogue of The University of Texas, 1914-1915: Univ. Texas Bull. 1915, no. 5, p. 615 (1915).
 101. Catalogue of The University of Texas, 1914-1915: Univ. Texas Bull. 1915, no. 5, p. 360 (1915).
 102. C. L. Baker notes. See reference 91.
 103. F. L. Whitney. See reference 79.
 104. [SELLARDS, E. H.] (1936) William Battle Phillips, in SELLARDS, E. H., *Chmn.*, Quarter-Centennial Memorial Volume of the Division of Natural Resources: Univ. Texas Bull. 3501, p. 10 and pl. facing p. 10.
 105. HEIMAN, MONICA (1963) A pioneer Texas geologist; biography of Johan August Udden: S. M. Udden, Kerrville, Texas, pp. 41, 42, appendix IV.
 106. HEIMAN, MONICA, idem, pp. 11-15, 60-62.
 107. [Secretary of the Paleontological Institution] (1962) Francis Luther Whitney, 1878-1962: Paleontological Institution, Ithaca, New York, 2 unnumbered pp. and 1 fig.

108. YOUNG, KEITH (1963) Memorial to Francis Luther Whitney (1878-1962): *Geol. Soc. America Bull.*, vol. 74, pp. P21-P24.
109. Catalogue of The University of Texas, 1915-1916: *Univ. Texas Bull.* 1916, no. 13, pp. 264, 265 (1916).
110. SCHOCH, E. P. (1936) A history of the Division of Natural Resources, pp. 11-19, in SELLARDS, E. H., *Chmn.*, Quarter-Centennial Memorial Volume of the Division of Natural Resources: *Univ. Texas Bull.* 3501, pp. 12-13.
111. Catalogue of The University of Texas, 1894-95, p. 114 (1895).
112. Catalogue of The University of Texas, 1896-97, p. 133 (1897).
113. Catalogue of The University of Texas, 1915-1916: *Univ. Texas Bull.* 1916, no. 13, p. 27 (1916).
114. UDDEN, J. A. (1920) Suggestions of a new method of making underground observations: *Amer. Assoc. Petroleum Geol. Bull.*, vol. 4, pp. 83-85, fig. 1.
115. Letter from J. A. Udden to Emil Böse, dated January 8, 1921: Böse correspondence, Adkins File, *Univ. Texas Archives*, Austin, Texas.
116. Catalogue of The University of Texas, 1917-1918: *Univ. Texas Bull.* 1825, pp. 24, 322 (1918).
117. Catalogue of The University of Texas, 1914-1915: *Univ. Texas Bull.* 1915, no. 5, p. 175 (1915).
118. Catalogue of The University of Texas, 1917-1918: *Univ. Texas Bull.* 1825, p. 39 (1918). A picture of this building appears on the first page of the Department of Geology Newsletter no. 11 (1962).
119. Catalogue of The University of Texas, 1917-1918: *Univ. Texas Bull.* 1825, p. 7 (1918).
120. Catalogue of The University of Texas, 1918-1919: *Univ. Texas Bull.* 1925, p. 334 (1919).
121. In a letter from W. S. Adkins to Emil Böse, dated April 26, 1926, Adkins points out that the administration of the Bureau of Economic Geology has already been put in the hands of E. H. Sellards: Adkins File, *Univ. Texas Archives*, Austin, Texas.
122. Catalogue of The University of Texas, 1924-1925: *Univ. Texas Bull.* 2517, p. 134 (1925); also Newsletter (no. 9), Department of Geology, *Univ. Texas*, p. 1 (1960).
123. WHITE, O. P. (1925) The University of Texas strikes oil: *The New York Times Magazine*, May 3, 1925, pp. 8 ff.
124. Letter from W. S. Adkins to Emil Böse, dated July 11, 1925: Adkins File, *Univ. Texas Archives*, Austin, Texas.
125. The Graduate School Catalogue, 1925-1926: *Univ. Texas Bull.* 2627, pp. 20, 21, 79 (1926); and The Graduate School Catalogue, 1926-1927: *Univ. Texas Bull.* 2727, pp. 80, 81 (1927).
126. Letter from W. S. Adkins to Emil Böse, dated April 26, 1926: Böse correspondence, Adkins File, *Univ. Texas Archives*, Austin, Texas.
127. See reference 125.
128. This story was related to me by Dr. John T. Lonsdale: Prof. W. M. Davis had lectured to the Daughters of the Texas Republic one evening. After the lecturer had finished a number of the members gathered around the podium. One lady asked Prof. Davis if he had seen the Alamo. Prof. Davis replied that he had not. Several ladies suggested that he must see the Alamo, to which Prof. Davis replied, "Ladies, I don't give a damn if I never see the Alamo."
129. The graduate School Catalogue, 1927-1928: *Univ. Texas Bull.* 2827, pp. 86-88 (1928).
130. KING, P. B. (1951) The tectonics of middle North America: Princeton Univ. Press, Princeton, New Jersey, p. v.
131. See reference 121.
132. I've found no written statements to corroborate the story that Sellards actually turned down the opportunity for the Bureau of Economic Geology to at least participate in the State regulation of the petroleum industry. The discussion here is largely based on negative evidence. If the Bureau of Economic Geology had been aggressive in trying to participate in State regulation, in the University Lands program, in the development of the State's water, or in the overall water policy, there should be some written evidence of this.
133. Letter from Berte R. Haigh, dated 21 July 1967. Much of the material on University Lands used here plus the flow chart of personnel (fig. 3) is based on information kindly supplied by Haigh.
134. Newsletter (no. 6), Department of Geology, *Univ. Texas*, p. 1 (1957).
135. Personal communication from H. P. Bybee in 1954.
136. See reference 121.
137. Catalogue of The University of Texas, 1924-1925: *Univ. Texas Bull.* 2517, p. 27 (1925).
138. The Engineering Experiment Station became the Bureau of Engineering Research in 1926 (Catalogue of The University of Texas, 1926-1927: *Univ. Texas Bull.* 2617, p. 287 (1926)).
139. The Industrial Chemical Experiment Station became the Bureau of Industrial Chemistry in 1927 (Catalogue of The University of Texas, 1927-1928: *Univ. Texas Bull.* 2817, p. 322 (1927)).
140. Catalogue of The University of Texas, 1925-1926: *Univ. Texas Bull.* 2617, pp. 262-264 (1926).
141. SCHOCH, E. P. (1936) A history of the Division of Natural Resources, pp. 11-19, in SELLARDS, E. H., *Chmn.*, Quarter-Centennial Memorial Volume of the Division of Natural Resources: *Univ. Texas Bull.* 3501, pp. 12-13.
142. Catalogue of The University of Texas, 1927-1928: *Univ. Texas Bull.* 2817, p. 30 (1928).
143. See reference 121.
144. [Secretary of the Paleontological Institution] (1962) Francis Luther Whitney, 1878-1962: Paleontological Institution, Ithaca, New York, 2 unnumbered pp., 1 fig.
145. Minutes of the Geology Department faculty meeting for October 29, 1929: *Univ. Texas Archives*, Austin, Texas.
146. Minutes of the Geology Department faculty meeting for February 27, 1930: *Univ. Texas Archives*, Austin, Texas.
147. Catalogue of The University of Texas for 1929-1930, Pt. V, College of Arts and Sciences and School of Education, with announcements for 1930-1931: *Univ. Texas Bull.* 3017, p. 208 (1930).
148. Newsletter (no. 4), Department of Geology, *Univ. Texas*, p. 1 (1955).
149. Budget for the Department of Geology, The University of Texas, for the long session 1934-1935: *Univ. Texas Archives*, Austin, Texas.

150. Chairman's correspondence, Department of Geology, 1933-1936: Univ. Texas Archives, Austin, Texas.
151. Letter from F. L. Whitney to H. T. Parlin, dated June 23, 1931: Univ. Texas Archives, Austin, Texas.
152. Catalogue of The University of Texas, 1924-1925: Univ. Texas Bull. 2517, p. 27 (1925).
153. Catalogue of The University of Texas, 1927-1928: Univ. Texas Bull. 2817, pp. 30, 126 (1928).
154. Letter from F. L. Whitney to G. C. M. Engelrand, dated October 25, 1929, and minutes of Geology Department faculty meeting for November 8, 1932: Univ. Texas Archives, Austin, Texas.
155. F. L. Whitney. *See* reference 79.
156. Minutes of the faculty meeting of the Department of Geology for June 4, 1932: Univ. Texas Archives, Austin, Texas.
157. Letter from H. Y. Benedict to F. M. Bullard, dated March 14, 1934: Univ. Texas Archives, Austin, Texas.
158. Letter from H. Y. Benedict to F. M. Bullard, dated March 26, 1934, and letter from F. M. Bullard to H. T. Parlin, dated March 16, 1934: Univ. Texas Archives, Austin, Texas.
159. Enrollment records for Introductory Geology, Department of Geology: Univ. Texas Archives, Austin, Texas.
160. Letter from Raymond Woods to F. L. Whitney, dated October 8, 1936: Univ. Texas Archives, Austin, Texas.
161. Minutes of the faculty meetings of the Department of Geology for May 8, 1934, January 29, 1934, and March 29, 1934, and letter from F. M. Bullard to H. T. Parlin of February 5, 1934: Univ. Texas Archives, Austin, Texas.
162. Minutes of the meeting of the Geology Department faculty for March 6, 1930: Univ. Texas Archives, Austin, Texas.
163. Faculty meeting minutes of the Department of Geology for May 5, 1936. In a letter from F. L. Whitney to Harriet Smith, dated February 13, 1929, Whitney stated, ". . . we have had boys camp only every year except one. A year before last [summer, 1927] I tried taking girls in the camp, but the work in the field was just too strenuous for them!!"
164. Faculty meeting minutes of the Department of Geology for January 3, 1938: Univ. Texas Archives, Austin, Texas.
165. Faculty meeting minutes of the Department of Geology for May 16, 1938: Univ. Texas Archives, Austin, Texas.
166. Minutes of the faculty meeting of the Department of Geology for May 21, 1938: Univ. Texas Archives, Austin, Texas.
167. Minutes of the faculty meeting of the Geology Department for November 14, 1938: Univ. Texas Archives, Austin, Texas.
168. Minutes of meeting of the faculty of the Geology Department for November 14, 1938: Univ. Texas Archives, Austin, Texas.
169. Minutes of the meeting of the faculty of the Department of Geology for November 14, 1938: Univ. Texas Archives, Austin, Texas.
170. Minutes of the faculty meetings of the Department of Geology for January 9, 1939, and February 20, 1939: Univ. Texas Archives, Austin, Texas.
171. HELMAN, MONICA (1963) A pioneer geologist; biography of Johan August Udden: S. M. Udden, Kerrville, Texas, pp. 60, 61.
172. Minutes of faculty meetings of the Department of Geology for January 22, 1940, October 28, 1941, and November 4, 1941: Univ. Texas Archives, Austin, Texas.
173. Minutes of faculty meetings of the Department of Geology for January 17, 1941, and February 11, 1941: Univ. Texas Archives, Austin, Texas.
174. Minutes of faculty meeting of Department of Geology for May 6, 1941. Also letter from A. P. Brogan to Departmental Chairmen, dated April 29, 1941, and letter from H. P. Bybee to A. P. Brogan of May 7, 1941: Univ. Texas Archives, Austin, Texas.
175. Report, undated [1942 on internal evidence], from the Geology Department to A. P. Brogan and minutes of the faculty meeting of the Geology Department for January 3, 1938: Univ. Texas Archives, Austin, Texas.
176. Report, undated [1942 on internal evidence], from the Geology Department to A. P. Brogan: Univ. Texas Archives, Austin, Texas.
177. Minutes of the faculty meeting of the Department of Geology for October 29, 1929: Univ. Texas Archives, Austin, Texas.
178. Report, undated [1942 on internal evidence], from the Geology Department to A. P. Brogan: Univ. Texas Archives, Austin, Texas.
179. Circular for late announcements for the Geological Society of America fifty-third annual meeting, December 26-28, 1940: Univ. Texas Archives, Austin, Texas.
180. Excursions made during and following the meeting: Geol. Soc. America and affiliated Soc's., 53rd Ann. Meeting, Austin, Texas, 131 pp., illus.
181. Tour of the Geology Building: mimeographed notes for a tour guided by students, Univ. Texas Archives, Austin, Texas.
182. Letter from W. S. Adkins to Emil Böse. *See* reference 121.
183. Chairman's correspondence, Department of Geology, 1942-1945: Univ. Texas Archives, Austin, Texas.
184. Letter from A. H. Deen to M. R. Gutsch, dated October 15, 1942: Univ. Texas Archives, Austin, Texas.
185. Letter from Leo C. Haynes to A. H. Deen, dated October 4, 1943: Univ. Texas Archives, Austin, Texas.
186. Letter from J. A. Burdine to Colonel Charles H. Bowman, dated August 26, 1944; there is other correspondence on the same subject in the chairman's correspondence of the Department of Geology: Univ. Texas Archives, Austin, Texas.
187. Letter from M. K. Doss to W. C. Hixon, dated November 30, 1942: Univ. Texas Archives, Austin, Texas.
188. Letter from A. H. Deen to H. T. Parlin, dated December 2, 1943: Univ. Texas Archives, Austin, Texas.
189. Letter from F. M. Bullard to H. T. Parlin, dated April 9, 1945: Univ. Texas Archives, Austin, Texas.
190. Newsletter (no. 3), Department of Geology, Univ. Texas, p. 2 (1954).
191. Newsletter (no. 10), Department of Geology, Univ. Texas, p. 4 (1961).
192. Letter from A. H. Deen to H. T. Parlin, dated October 15, 1945: Univ. Texas Archives, Austin, Texas.
193. ELLISON, S. P., JR., (1958) History of Geology Faculty at The

- University of Texas: Newsletter (no. 7), Department of Geology, Univ. Texas, p. 1 (1958).
194. ELLISON, S. P., JR., *id.*, p.1.
 195. Newsletter (no. 4), Department of Geology, Univ. Texas, p. 1 (1955), and Newsletter (no. 5), Department of Geology, Univ. Texas, p. 3 (1956).
 196. Letter from S. E. Clabaugh, J. A. Wilson, J. L. Wilson, and Keith Young to the Graduate Faculty of the Geology Department and the Chairman of the Geology Department, dated November 21, 1951: Univ. Texas Archives, Austin, Texas.
 197. Letter from A. H. Deen to T. S. Painter, dated July 14, 1949: Univ. Texas Archives, Austin, Texas.
 198. F. L. Whitney. *See* reference 79.
 199. HEIMAN, MONICA (1963) A pioneer geologist; biography of Johan August Udden: S. M. Udden, Keriville, Texas, frontispiece.
 200. DEFORD, R. K. (1957) Historical note: Newsletter (no. 6), Department of Geology, Univ. Texas, pp. 8, 9.
 201. Newsletter (no. 14), Department of Geology, Univ. Texas, p. 50 (1965).
 202. This story was related by F. L. Whitney at the first Geology Homecoming, October 16, 1954.
 203. F. L. Whitney. *See* reference 79.
 204. A slightly out-of-focus snapshot in the Department of Geology files shows this group at one of the stops.
 205. Newsletter (no. 9), Department of Geology, Univ. Texas, p. 7 (1960).
 206. F. L. Whitney. *See* reference 79.
 207. Letter from F. L. Whitney to J. W. Brice, dated June 1, 1929: Univ. Texas Archives, Austin, Texas. Whitney says, in part, ". . . with headquarters in the Presbyterian parsonage. We shall certainly be a 'pious bunch' if we have a good cook and a good bake oven."
 208. Whitney's unpublished maps are now in the Geology Library, The University of Texas. Just this last spring we discovered a need for his Williamson County map. The compilation of the maps was from plane-table sheets to topographic sheets and from topographic sheets to the final map. Aerial photographs were not yet available. The plane-table sheets were not discarded until 1967. Some of the Whitney maps were edited to about 24 quadrangle maps, of 15 minutes each, by Keith Young; 16 of these are on open file in the Bureau of Economic Geology.
 209. The exact dating of this course is not recorded in the minutes of the Geology Faculty meetings; it was in operation by 1940.
 210. Letter from A. H. Deen to L. L. Click, dated December 19, 1947: Univ. Texas Archives, Austin, Texas.
 211. Chairman's correspondence, Department of Geology, for 1946 and 1947: Univ. Texas Archives, Austin, Texas.
 212. Letters between A. H. Deen and S. O. Burtford, dated April 19, April 24, April 26, and May 5, 1947, and other correspondence: Univ. Texas Archives, Austin, Texas.
 213. The writer was a member of the staff on this particular field course. He needs no reference to refresh his memory of the incident.
 214. Letter from Clayton W. Williams to H. P. Bybee and from Clayton W. Williams to T. S. Painter, both dated March 4, 1947, and other correspondence: Univ. Texas Archives, Austin, Texas.
 215. Letter from A. H. Deen to Clayton W. Williams, dated March 7, 1947: Univ. Texas Archives, Austin, Texas.
 216. Letter from T. R. Hadley to A. H. Deen, dated September 10, 1946: Univ. Texas Archives, Austin, Texas.
 217. Letter from A. H. Deen to Jack Taylor, dated October 3, 1951: Univ. Texas Archives, Austin, Texas.
 218. Minutes of the faculty meeting of the Department of Geology, dated May 13, 1942: Univ. Texas Archives, Austin, Texas.
 219. Letter from A. H. Deen to T. S. Painter, dated July 14, 1949: Univ. Texas Archives, Austin, Texas.
 220. At the faculty meeting of the Geology Department for January 21, 1939, Sellards informed the faculty of his appointment as Director of the Texas Memorial Museum and asked to be relieved of his teaching duties. Since he was continued (*see* reference 222) as Director of the Bureau of Economic Geology until the fall of 1945, he directed both agencies during the war.
 221. Report from E. H. Sellards to T. S. Painter, dated January 15, 1945: Univ. Texas Archives, Austin, Texas.
 222. Letter from J. T. Lonsdale to A. H. Deen, dated June 7, 1945: Univ. Texas Archives, Austin, Texas.
 223. Much of the information for this paragraph was kindly supplied by Dr. Peter T. Flawn.
 224. For example, "Mineral resources of South Texas: Region served through the port of Corpus Christi," by ROSS A. MAXWELL, Rept. Invest. 43, 140 pp., 7 figs., 5 pls., 44 tables (1962); and "Rock and mineral resources of East Texas," by W. L. FISHER et al., Rept. Invest. 54, 439 pp., 71 figs., 6 pls., 49 tables (1965).
 225. Examples are "Texas rocks and minerals, an amateur's guide," by ROSELLE M. GIRARD, Guidebook 6, 109 pp., illus. (1964), and "Texas fossils, an amateur collector's handbook," by WILLIAM H. MATTHEWS III, Guidebook 2, 123 pp., 49 pls. (1963).
 226. For instance, "The geologic story of Longhorn Cavern," by WILLIAM H. MATTHEWS III, Guidebook 4, 50 pp., 41 figs. (1963), was published in 1963. "The Big Bend of the Rio Grande—A guide to the rocks, landscape, geologic history, and settlers of the area of Big Bend National Park," by ROSS A. MAXWELL, is in press.
 227. "The Ellenburger group of Central Texas," by PRESTON E. CLOUD, JR., and VIRGIL E. BARNES: Univ. Texas Pub. 4621, 473 pp., 8 figs., 45 pls., 3 tables. [The title page says that the volume was issued in December 1948, but because of a delay in map-processing it was not really available until early 1949.]
 228. "Stratigraphy of the pre-Simpson Paleozoic subsurface rocks of Texas and southeast New Mexico," by VIRGIL E. BARNES, with contributions by P. E. Cloud, Jr., L. P. Dixon, R. L. Folk, E. C. Jonas, A. R. Palmer, and E. J. Tynan: Univ. Texas Pub. 5924, 836 pp., 38 figs., 65 pls., 14 tables, 1959.
 229. "Basement rocks of Texas and southeast New Mexico," by PETER T. FLAWN: Univ. Texas Pub. 5605, 261 pp., 2 figs., 3 pls., 7 photomicrographs, 12 tables, 1956.

230. "Symposium on Edwards Limestone in Central Texas," by F. E. Lozo, H. F. Nelson, Keith Young, O. B. Shelburne, and J. R. Sandidge: Univ. Texas Pub. 5905, 235 pp., 23 figs., 40 pls., and 3 tables, 1959.
231. "The Ouachita system," by Peter T. Flawn, August Goldstein, Jr., Philip B. King, and C. E. Weaver: Univ. Texas Pub. 6120, 401 pp., 13 figs., 15 pls., 7 tables, 1961.
232. "Pelecypoda from the type locality of the Stone City beds (Middle Eocene) of Texas," by H. B. Stenzel, E. K. Klause, and J. T. Twining: Univ. Texas Pub. 5704, 237 pp., 31 figs., 22 pls., 4 tables, 1957.
233. "Evolution of *Athleta petrosa* stock (Eocene, Gastropoda) of Texas," by W. L. Fisher, Peter U. Rodda, and John W. Dietrich: Univ. Texas Pub. 6413, 117 pp., 33 figs., 11 pls., 4 tables, 1964.
234. "Geology of Big Bend National Park, Brewster County, Texas," by Ross A. Maxwell, John T. Lonsdale, Roy T. Hazzard, and J. A. Wilson: Univ. Texas Pub. 6711, 320 pp., 152 figs., 11 pls., 16 tables, 1967.
235. Letter from H. P. Bybee to J. W. Calhoun, dated April 22, 1938: Univ. Texas Archives, Austin, Texas.
236. In a letter from A. H. Deen to C. P. Boner, dated September 16, 1950, Deen gives a great deal of credit to both H. P. Bybee and J. T. Lonsdale. S. P. Ellison, Jr., thinks that Lonsdale should get more credit than extant correspondence suggests. Certainly it was he who interviewed me in Madison, Wisconsin, in the spring of 1948.
237. Correspondence of December 4 and 5, 1940, between Homer P. Rainey, H. T. Parlin, and a committee composed of Arrowood, Bybee, Fitzgerald, Hackett, Johnson, Webb, and Wiley: Univ. Texas Archives, Austin, Texas. See reference 259 also.
238. Report, undated [1942 on internal evidence], from the Geology Department to A. P. Biogan: Univ. Texas Archives, Austin, Texas.
239. Minutes of the meetings of the faculty of the Geology Department, for February 11 and February 13, 1941: Univ. Texas Archives, Austin, Texas.
240. Letter and report from H. Gordon Damon to A. H. Deen dated January 3, 1945, and letter from A. H. Deen to T. S. Painter, dated January 12, 1945: Univ. Texas Archives, Austin, Texas.
241. Correspondence between A. H. Deen, T. S. Painter, and M. J. Thompson, etc., 1947: Univ. Texas Archives, Austin, Texas. The technique of decision making might be questioned. Whether or not the decision to remove meteorology from Geology was a valid decision will not be known for another twenty years, and it is just possible, with the continued surge whether or not the decision to remove meteorology from in environmental sciences, that any decision to expand meteorology would have been good.
242. Correspondence between E. L. DeGolyer and H. P. Bybee during 1938, 1939, and 1940: Univ. Texas Archives, Austin, Texas.
243. Letter from E. L. DeGolyer to H. P. Bybee, dated August 27, 1940: Univ. Texas Archives, Austin, Texas.
244. Letter from A. H. Deen to M. R. Gutsch, dated October 16, 1941: Univ. Texas Archives, Austin, Texas.
245. Minutes of the faculty meetings of the Department of Geology for May 25 and May 31, 1937, and January 3, 1938: Univ. Texas Archives, Austin, Texas.
246. Chairman's correspondence, Department of Geology, 1939-1942: Univ. Texas Archives, Austin, Texas.
247. Report, undated [1942 on internal evidence], from the Geology Department to A. P. Brogan; also minutes of the faculty meeting of the Department of Geology for January 3, 1938. Geophysics had been discussed even earlier in correspondence between Donald C. Barton and H. P. Bybee and in faculty meetings (minutes of faculty meetings of the Department of Geology for May 25 and May 31, 1937, and January 3, 1938): Univ. Texas Archives, Austin, Texas.
248. Recommendation of the Geology Department Budget Council for the 1943-1945 biennium: Univ. Texas Archives, Austin, Texas.
249. Correspondence between A. H. Deen and Paul Weaver, 1942: Univ. Texas Archives, Austin, Texas.
250. Outline of course for Geophysics 355, spring of 1943: Univ. Texas Archives, Austin, Texas.
251. Letter from J. Brian Eby to A. H. Deen, dated May 12, 1943: Univ. Texas Archives, Austin, Texas.
252. Letter from A. H. Deen to H. T. Parlin, dated May 18, 1943: Univ. Texas Archives, Austin, Texas.
253. Letter from A. H. Deen to Gardley Moon, dated January 27, 1946: Univ. Texas Archives, Austin, Texas. Also Final Announcement of Courses, Long Session, 1946-1947: Univ. Texas Pub. 4635, p. 60 (1946).
254. Report, undated [1942 on internal evidence], from the Geology Department to A. P. Brogan: Univ. Texas Archives, Austin, Texas.
255. Letter from H. P. Bybee to Hulon W. Black, dated January 12, 1940: Univ. Texas Archives, Austin, Texas.
256. Letter from A. H. Deen to Hulon W. Black, dated April 27, 1951: Univ. Texas Archives, Austin, Texas.
257. Letters from A. H. Deen and J. T. Lonsdale to W. J. Battle, May, 1946: Univ. Texas Archives, Austin, Texas.
258. Report from the Department of Geology to W. J. Battle on space needs for the future, dated May 9, 1946: Univ. Texas Archives, Austin, Texas.
259. Letter from H. T. Parlin, Chmn., A. H. Deen, and C. W. Hackett to T. S. Painter, dated March 19, 1948. See also other correspondence in the Geography File. This committee more or less continued a committee appointed by H. T. Parlin in 1940 to search for a Distinguished Professor of Geography. The Parlin-appointed committee was composed of C. F. Arrowood, H. P. Bybee, J. A. Fitzgerald, C. W. Hackett, Elmer Johnson, W. P. Webb, and C. A. Wiley (letter from Parlin to the Committee, dated November 29, 1940). In 1941 Fitzgerald and Johnson were dropped from the committee (letter of January 6, 1941, from Parlin to the committee): Geography File, Univ. Texas Archives, Austin, Texas.
260. Letter from A. H. Deen to H. P. Bybee and J. T. Lonsdale, dated April 20, 1948: Univ. Texas Archives, Austin, Texas.
261. Letter from A. H. Deen to A. P. Biogan, dated April 18, 1948: Univ. Texas Archives, Austin, Texas.
262. Letter from A. H. Deen to H. P. Bybee and J. T. Lonsdale, dated April 20, 1948: Univ. Texas Archives, Austin, Texas.

263. Newsletter (no. 3), Department of Geology, Univ. Texas, pp. 1, 2 (1954).
264. Letter from E. L. DeGolyer to H. P. Bybee, dated April 1, 1939: Univ. Texas Archives, Austin, Texas.
265. Letter from H. P. Bybee to P. T. Moore, dated February 7, 1939: Univ. Texas Archives, Austin, Texas.
266. Newsletter (no. 10), Department of Geology, Univ. Texas, p. 7 (1961).
267. Newsletter (no. 11), Department of Geology, Univ. Texas, p. 3 (1962).
268. Newsletter (no. 3), Department of Geology, Univ. Texas, pp. 3, 4 (1954).

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