OKLAHOMA GEOLOGY NOTES

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Reference Book for Geologists

A steering committee headed by J. V. Howell of Tulsa has for several years labored on a glossary of geologic terms. The committee consisted of 13 experts in the various fields. Subcommttees on 25 specialties selected the definitions and wrote many of these definitions. The editor was A. C. Trowbridge of State University of Iowa, and L. M. Nichols of the Oil and Gas Journal served as Technical Editor. The project was operated under the National Academy of Sciences and the National Research Council.

The volume is now issued as Glossary of Geology and Related Sciences. It consists of 335 pages and is priced at $6.00. This valuable and necessary reference work is obtainable from American Geological Institute, 2101 Constitution Avenue, N. W. Washington, D. C.

Ten-year Bibliography Issued

The bibliography of North American geology is published by the U. S. Geological Survey. It comes out in volumes covering one and two-year periods and these volumes are then combined in ten-year volumes. The ten-year volume for the years 1940-1949 has just been issued as Bulletin 1049, in two parts totaling 2205 pages. Entries under Oklahoma are:

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With the new issue, full coverage through 1954 is contained in Bulletin 746 (1775-1918), Bulletin 823 (1919-1928), Bulletin 937 (1929-1939), Bulletin 1049 (1940-1949), Bulletin 985 (1950), Bulletin 1025 (1951), Bulletin 1035 (1952-1953), and Bulletin 1054 (1954).

C. C. B.

Correction to Listing of Oklahoma Geologists

In the last number of the Notes Oklahoma geologists were listed. By error, the fellows of the Geological Society of America were given in the table as BSA, which should stand for Boy Scouts of America. The new membership list of the society is just out and it shows a total of 47 fellows and 105 members in Oklahoma. These 47 fellows are distributed as follows: Tulsa, 30; Norman, 9; Oklahoma City, 2; Enid, 2: Bartlesville, 2: Ardmore, 1; Duncan, 1. About 2.5 percent of the geologists of Oklahoma are fellows of the GSA, about 5 percent are members.

Subsequent to the publication of the list at least three GSA fellows have moved to Oklahoma: John C. Maher, with Pure in Tulsa (welcome back), Aureal T. Cross with Pan-American in Tulsa, and L. R. Wilson with the School of Geology and the Survey in Norman. C. C. B.

The Weathering Process

By Albert L. Burwell

Weathering has been defined in Webster's International Dictionary as "action of the elements in altering the color, texture, composition, or form of exposed objects." Geologists view the subject from a number of angles, the angle depending upon the special field of interest of the individual. This difference may be noticed in the attitude of persons working in igneous geology and those working in sedimentary geology. Perhaps the most widely used definition would describe weathering as "rock breakdown, rock decomposition, and rock rotting." This definition classifies weathering as a process of deterioration, degradation, and decadence, whereas the dictionary definition carries no such implication. Of course it is only natural to use the term decay when one observes an area of what originally was hard crystalline rock now changed to a mass of dirt and rubble.

Keller (1955) recommends what he believes is a better definition of weathering as follows: "Weathering is the response of materials within the lithosphere to conditions at or near its contact with the atmosphere, the hydrosphere, and still more important, the biosphere." For the benefit of the layman, the lithosphere is that part of the earth which is composed predominantly of rocks, but includes soils and subsoils together with everything within this rocky crust. The hydrosphere, according to one authority, is the water, liquid or solid, including suspended and dissolved matter, on the crust; whereas another describes it as the "aqueous envelope of the earth, including oceans, all lakes, streams, and underground waters, and the aqueous vapors in the atmosphere." The biosphere is the plant and animal life in or on the crust.

Obviously, weathering is an extremely complex subject. Adding to the complexity, is a disagreement as to where weathering stops and some other process takes over. Weathering and the processes which bring about weathering are a vital group of geologic phenomena. The processes are physical, chemical, and biological. Temperature changes together with freezing and thawing are powerful factors in disintegration that are definitely physical, and may be followed by separation and classification of several components, processes that are also physical. If, however, the composition of any one or more of the component minerals of the rock is changed, either before or after disintegration, then chemical action has taken place. It is recognized that products resulting from the decay of plant and animal life are active chemical reagents. Tunnels and burrows of animals such as ants, earthworms, and rodents enable penetration of the earth's crust by the weathering agents.

In many respects weathering resembles synthetic chemistry. Synthetic chemistry in reality is nothing more nor less than tearing apart and putting back together in a different form. Of course, the purpose is to create a product or products having greater usefulness or value than the original material. Weathering is one of nature's ways of producing material of greater utility from material that has little value "in place" in the earth's crust. Weathering almost always yields something that mankind needs and can use better than the original rock. That something may be fresh, new, rich soils in which to grow foodstuffs, it may be a clay whose

physical and chemical properties make it suitable for chinaware, for enamel, for pottery, or for any number of other industrial products. It may be "black sand" liberated from the parent rock and from which titanium metal or titanium pigments may be prepared. Or it may be the clean high-purity silica sand separated and classified and from which the several kinds of glass are made. Truly, nature does not destroy. She refines, even though she takes a roundabout route to do so. She builds sometimes seemingly by most complicated methods to yield something better adapted to human needs. That change from beautiful granite to a mass of dirt and rubble may be only the first step in nature's plan, but who would deny that soil derived from the dirt and rubble is more valuable than the granite even if the process ended there.

It may be said that under proper conditions all mineral materials yield to weathering, but some minerals are more susceptible than others. The order of susceptibility for silicate minerals is a function of the internal structure or grouping of the ions. Complex silicates such as olivine weather easily, whereas the most simple, quartz, weathers very slowly. The order of susceptibility also follows the order of energies of formation, a fact that couples the subject of weathering with the sequence in which minerals crystallized in igneous rocks.

Examples of the weathering of igneous rocks are numerous in the Arbuckle and Wichita Mountain areas. Masses of "decayed" granite may be observed in the region around Tishomingo and Ravia in Johnston County. Similar in appearance but different in composition, masses of weathered anorthosite and gabbro occur in Comanche and Kiowa counties, especially in the regions about Roosevelt and Meers. Examples of the weathering of sedimentary rocks may be found throughout the State wherever these rocks crop out. Along the outcrop of sandstone, limestone, or shale the products of weathering form the adjacent soil. In the extreme northeastern part of the state deposits of tripoli and similar silicas are known. These deposits are thought to be the result of weathering and leaching of highly siliceous limestones or calcareous cherts of the area. Of course, these rocks, like all other sedimentary rocks, are products of the weathering of other rocks in prior ages. It is presumed that both calcium carbonate and silica were in mutual solution and that their deposition resulted from a disturbance of equilibrium due to change in pressure or temperature. In any event both minerals have been deposited together as a mixture of hydrous silica and calcium carbonate, after which the calcium carbonate has been removed by natural means.

Just where in this involved process that started with an igneous magma and ended with a light porous tripoli did weathering begin, be interrupted, begin again, and end? Isn't the process as a whole a repetition of weathering followed by diagenesis, a period of decomposition after which the products of this decomposition are recombined in molecular arrangements different from the parent material only to have the new materials again subjected to decomposition, and so on over and over until an end product is obtained which is the end product only for today.

What word in the dictionary is used to describe this cyclic chain of reactions? Certainly weathering is only one phase of the process. It seems as though here is a good chance for someone to coin a new word.

Petroleum Notes from the Twenties

Dr. Charles N. Gould was appointed Director of the reactivated Oklahoma Geological Survey on July 1, 1924. At this time there were relatively few oil geologists. Gould was preparing a speech on geologists and their place in oil field discovery and he wrote in November to several prominent oil geologists to determine what discoveries were made in Oklahoma, Kansas, and North Texas on geologic advice and who was responsible. Gould received replies from R. W. Clark, Luther White, M. G. Cheney, W. E. Wrather, Alexander Deussen, Everett Carpenter, D. W. Ohern, and R. C. Moore.

Gould had listed 57 fields discovered before geologists were active in the area, 164 fields located on geologic advice, and 13 recent fields which, as he put it, were "brought in without benefit of clergy." The replies are illustrative of the extreme difficulty even then of crediting a discovery to one man or company. Many a structure has been discovered by a man and recommended to his company without result. In other cases the test hole was poorly located or too shallow. Normally it is only possible to credit a discovery to the man who persuaded his company to drill the prospect and then only if that well was the first commercial one in the field. Most discoveries have been the result of the combined effort of many men, some of whom found the structure or trap earlier, but were not involved in the discovery well.

It is of interest that their contemporaries credit the following men with Oklahoma discoveries:

Pool name	*location*	*geologist*
Wheeler (1904)	3S-2W, Carter Co.	H. B. Goodrich for Santa Fe
Ada gas (1909)	4N-6E, Pontotoc Co.	Pierce Larkin
Boston (1913)		Munn
Mervine (1913)	2-27N-3E, Kay Co.	Ohern
Boynton (1914)	14N-15E, Muskogee Co.	Fohs and Garner
Yale (1914)	19N-6E, Payne Co.	Ohern and Buttram
Ripley (1914)	18N-4E, Payne Co.	Ohern and Buttram
Ingalls (1914)	19N-4E, Payne Co.	Ohern and Buttram
Porter (1915)	16-16N-17E, Wagoner Co.	Burt
Brinton (1915)	9-13N-12E, Okmulgee Co.	Fohs
Cement (1917)		Ohern and Buttram
Morrison (1917)	23N-3E, Pawnee	Ohern and Buttram
Billings (1917)	23N-2W, Noble Co.	Fohs
Ponca (1917)	8-25N-2E, Kay Co.	Marland
Garber (1917)	25-22N-4W, Garfield Co.	Sinclair
South Duncan (1919)		McCoy
Hewitt (1919)		W. J. Millard
Wetumka (1919)	4-9N-10E, Hughes Co.	M. K. Read
Deaner (1920)	15, 16-11N-11E, Okfuskee Co.	Bauer and Clark
Burbank (1920)	36-27N-5E, Osage Co.	Marland
Robberson (1920)	1N-3W, Garvin Co.	Pierce Larkin

Tonkawa (1921)	16-24N-1W, Kay Co.	Marland
Lyons-Quinn (1921)	2, 11-10N-11E, Hughes Co.	Ed Luman for Atlantic
Okemah (1921)	2-10N-9E, Okfuskee Co.	Beverly Tatum
Pollyanna (1921)	2-15N-11E, Okmulgee Co.	Uri and Weimer
Montezuma (1922)	22-12N-12E, Okfuskee Co.	Ed Bloesch
Mannford (1922)	T. 19N-9E, Creek Co.	Carl D. Smith
March (1922)	18N-5E, Payne Co.	Carl D. Smith
Josey (1923)	33-12N-11E, Okfuskee Co.	D. H. Radcliffe
Stroud (1924)	35, 36-14N-6, 7E, Lincoln Co.	L. E. Trout
Pollyanna, Wilcox (1924)	22-15N-11E, Okmulgee Co.	Uri and Weimer
Tuskegee (1924)	31-14N-10E, Creek Co.	R. W. Clark
Braman (1924)	21-28N-1W, Kay Co.	Marland-Comar
Masham (1925)	23N-4E, Pawnee Co.	Carl D. Smith

Fields of the time discovered by accident are Papoose, Prairie, Sayre, Youngstown (3-14-8), Peru, Poor Farm, Bald Hill.

Carpenter writes (Dec. 19, 1924), "I do not regard anticlines as the only controlling factor in the accumulation of oil. There are other factors equally important. To my mind, Petroleum Geology is a study of the rocks in their relation to the accumulation of oil and gas. Anticlines furnish only one condition under which oil and gas may accumulate. Other conditions equally important are furnished by Sand Lenses, Faults, Shoe-string Sands, etc. I regard the discoverer of any one of these conditions as the discoverer of the pool (if oil be found), even though it is not an anticline."

This view-point is years ahead of its time. There are some geologists and many supervisors and promoters who have not yet learned it. Too often, the oil geologist has to sell an anticline to get a stratigraphic trap drilled. As long as management slavishly worships the anticlinal theory and seismology, wise and observant independents will flourish and find many fields. C. C. B.

Authors of "Oil and Gas in Oklahoma"

The Survey issued in 1915 and 1917 its Bulletin 19 on oil and gas of the State. The usefulness of the bulletin was so apparent and its impact on oil geology so great that an improved and larger book was planned. The Survey enlisted the help as authors of men in the industry for each county where such was possible. The bulletin was written as county chapters and as general summaries. Each chapter was published when completed, the first issued in 1926, the last in 1930. The whole was then repaged and bound in 3 volumes as Bulletin 40. The stock of volumes 1 and 2 is now exhausted and that of volume 3 will be gone within a year. Nine of the individual chapters are out of print.

The bulletin was written by 45 individuals, most of them active petroleum geologists. Nine are now deceased, 14 are independents or consultants, 6 are teaching, 8 are with companies, 2 are with the Federal Sur-

vey, one with A.A.P.G., and the present address of 5 is not known. It seems highly desirable to publish something of the nature of Bulletin 40 revised and current. It would now be a formidable undertaking, but with extensive help from industry a useful and important volume is possible.

Anderson, Gustavus Edwin (1879-1940) (then of U. Okla.) 40-N
Ph.D., Chicago; Prof. Geology O.U. 1922-1940

Bale, Hubert E. (then T.P.C. & O. Co.) 40-GG
B.S. in Geology, O.U., 1924; Independent, Dallas, Texas

Becker, Clyde M. (1882-1938) (then independent) 40-I
B.S., O.B.U., 1912; Becker-Reed Oil & Gas Co.

Beckwith, H. T. (then consultant) 40-T

Bloesch, Edward (then consultant) 40-EE
Ph.D., Zurich; consultant, Tulsa
A.A.P.G., T.G.S. (pres., 1935)

Bowles, Charles E. (then State Chamber of Commerce) 40-AA

Boyle, J. Phillip (then consultant) 40-L, KK, XX
Oklahoma City, independent

Bullard, Bess Mills 40-Q
B.S. in Geology, O.U., 1921; Vassar College

Bullard, Fred Mason (then of U. Texas) 40-00
M.S., O.U., 1922; Ph.D., Michigan; Prof., U. Texas

Bunn, John R. (then of Bunn-Marvin Drlg. Co.) 40-V
B.S. in Geology, O.U., 1923; Southwest Dlg. Co., Tyler, Tex.

Carpenter, Everett Z. 40-V
B.A., O.U., 1911; Porter Oil & Gas Co., Okla. City

Clark, Glenn C. (then of Marland Oil Co.) 40-H
B.A., O.U., 1913; Ponca City

Clark, Robert Watson (1884-1948) (then consultant) 40-F, W
Ph.D., Michigan, 1924; Chief Geologist, Western Gulf Oil Co., Los Angeles
A.A.P.G. (V.P., 1943), A.I.M.E., G.S.A.

Clawson, William W., Jr. (then of I.T.I.O.) 40-JJ
Mobil Prod. Co., Billings, Mont.

Clifton, Roland L. (then Champlin Ref. Co.) 40-A, Y
M.S., O.U., 1925; consulting geologist, Enid

Cloud, Wilbur F. (then of U. of Okla.) 40 MM, RR
M.S., O.U., 1926; Prof. Petr. Eng., O.U., Norman

Conkling, Richard A. (1885-1952) (then consultant) 40-S
B.A., O.U., 1911; consultant, Okla. City
A.A.P.G. (founder), O.C.G.S. (founder)

Cooper, Chalmer Lewis (then of Okla. Geol. Survey) 40-H
M.G.E., O.U., 1923; M.S., O.U., 1926; Ph.D., Chicago 1945; U.S. Geol. Survey, Washington

Cram, Ira H. (then of Pure Oil Co.) 40-QQ
M.A., Minn.; V.P., Continental Oil Co., Houston
A.A.P.G. (pres. 1944), G.S.A., S.E.G., A.I.M.E.

Decker, Charles LaVerne (1898-1955) 40-P
M.A., Mo. U., 1925; consultant, Houston

Dott, Robert Henry (then of Mid-Continent Petr. Corp.) 40-J, K
M.S., Michigan; Exec. Dir., A.A.P.G., Tulsa

Gouin, Frank C. (then consultant) 40-E, M, DD
U. New Mex., 1916; Independent, Duncan
Greene, Frank C. (then of Skelly Oil Co.) 40-D, CC
A.A.P.G. (founder), G.S.A., P.S.A.
Honess, Charles W. (1885-1949) (then of Gypsy Oil Co.) 40-R
Ph.D., Columbia, 1923; O.G.S., 1916-23; Gulf Oil Corp.
A.A.P.G. (founder), G.S.A., S.E.P.M., A.A.A.S.
Ireland, Hubert Andrew (then of Univ. of Okla.) 40-NN
M.S., O.U., 1927; Ph.D., Chicago, 1935; Prof. Geology, Kans.
Kite, William Casper (then consultant) 40-0
B.A., O.U., 1916; consultant, Okla. City
Koschman, Albert Herbert (then of Okla. A & M Coll.) 40-X
M.A., Wisc., 1920; U.S.G.S., Denver
Min. Soc., S.E.G., G.S.A., Sci. Soc. Colo. (pres., 1948-49)
Levorsen, Arville Irving (then of Independent Oil & Gas Co.) 40-C
M.E., Minn., 1917, D. Sc., hon.; consultant, Tulsa
A.A.P.G. (pres., 1935); G.S.A. (pres., 1947), S.E.P.M.
McDonald, O. C. (then consultant, Tulsa) 40-C
Melton, Frank Armon (then of U. of Okla.) 40-LL
Ph.D., Chicago, 1924; Prof. Geology, O.U., Norman
Merritt, John Wesley (then consultant, Tulsa) 40-C
Northwestern, 1912; consultant, Tulsa
Powers, Sidney (1890-1932) (then of Amerada Petr. Corp.) 40-G
Ph.D., Harvard, 1915
A.A.P.G. (pres., 1930), G.S.A., S.E.G., A.I.M.E.
Radler, Dollie (Hall) (then of Amerada Petr. Corp.) 40-VV
M.S., O.U., 1921; consulting, Tulsa
Redfield, John S. (then Okla. Geol. Survey) 40-00
M.S., O.U., 1929; Shreveport, Louisiana
Roth, Robert I. (then of Atlantic Oil Co.) 40-K
G.S.A.; Humble O. & R. Co., Wichita Falls, Texas
Sawyer, Roger W. (1895-1941) (then Skelly Oil Co.) 40-HH
B.A., O.U., 1915; Pure Oil Co.
Six, Ray L. (then of U. of Okla.) 40-UU, WW
M.S., O.U., 1929; Prof. Geology, Okla. State U.
Soyster, Hale Bryan (then U.S. Bur. Mines) 40-FF
A.B., Cal., 1922; U.S. Geol. Survey
Stone, J. A. (then Okla. Geol. Survey) 40-II
Taylor, Thomas G. (then U.S. Geol. Survey) 40-FF
Tomlinson, Charles Weldon 40-Z
Ph.D., Chicago; independent, Ardmore
A.A.P.G. (pres., 1949), G.S.A.
Travis, Abe (then of U. of Okla.) 40-SS
M.S., O.U., 1930; Tulsa
Weirich, Thomas Eugene (then of Tidal Oil Co.) 40-TT
B.S., O.U., 1922; Phillips, Bartlesville
White, Luther H. (then of J.A. Hull Oil Co.) 40-B
B.A., O.U., 1914; consulting, Ft. Worth
Woodruff, Elmer Grant (1872-1952) (then consultant) 40-U
M.A., Nebr., 1901; U.S. Geol. Survey, Tulsa
A.A.P.G., G.S.A., T.G.S. (hon. mem.)