



GEORGE WILLIS STOSE

MEMORIAL TO GEORGE WILLIS STOSE (1869-1960)

By HUGH D. MISER

George Willis Stose was born in Chicago, Illinois, October 5, 1869. He died January 30, 1960, at his home, 2308 South Nash St., Arlington, Virginia. His death was preceded by a long illness—a heart attack in 1953, which reduced his strength, and a cerebral hemorrhage in November, 1955, which brought partial paralysis. Burial was in Overlook Cemetery, Bridgeton, New Jersey.

George was descended from ancestors who came to America from Alsace, then a part of France. His great grandmother, the widow of Clement Stose, Sr., brought her four children to the United States in 1801 and settled at Lancaster, Pennsylvania. His grandfather, Clement Stose, Jr., was born in 1799, the youngest child, and was thus 2 years old at the time of the family's voyage to America.

His father, Charles Stose, the oldest child of Clement Stose, Jr., was born in Lancaster, July 11, 1828, and accompanied the family to Chicago in 1832. George's mother, Caroline Sigwalt, was born in Alsace, December 31, 1828. Charles and Caroline were married October 23, 1851, at Long Grove, Illinois, near Chicago; the youngest of their seven children was George.

George W. Stose and Sarah V. Kyte were married in 1896; their children were two sons, Harold F. Stose of Boston, Massachusetts, and Charles Willis Stose of Narberth, Pennsylvania; Sarah died in August 1937. He and Anna Isabella Jonas, who had long worked with him on geologic problems of mutual interest in the Appalachians and the Piedmont, were married in September 1938. He is survived by Anna J. Stose, the sons, Harold F. and Charles Willis, and two grandchildren, Mrs. Gwen Stose Fisher and Dr. Willis Gilson Stose.

Stose attended grammar and high schools in Chicago and was enrolled at Massachusetts Institute of Technology from 1889 to 1894. In 1893 he received the B.S. degree in civil en-

gineering after which he spent a year in graduate work in geology. He was thus one of the many geologists of his generation to receive a civil engineering degree in advance of geologic training.

His appointment to the position of field assistant in geology at \$50 per month on the U. S. Geological Survey was recommended by G. K. Gilbert in a letter of July 13, 1894, addressed to C. D. Walcott, Director. Stose was one of Gilbert's assistants that summer in a study of the geology and artesian-water supply of the Apishapa quadrangle, Colorado, in the Great Plains east of the Rocky Mountains. His knowledge of the area, supplemented by some additional field work in 1910, enabled him to prepare the Apishapa Folio.

Thus, under Gilbert, a distinguished geologist, Stose began a long active career on the U. S. Geological Survey. His ability, industry, and sound and effective work led to his appointment to positions of great responsibilities, all of which he discharged with distinction. He attained and held for many years the important position of Chief Scientist (Geologist). He was retired October 31, 1941, at the age of 72 years, after his employment had been extended for 2 years by Presidential orders. He was reemployed July 29, 1942, to make war-time studies of manganese deposits in Alabama and Virginia; and although his employment was terminated February 28, 1943, he prepared Survey and other geologic reports in a Survey office until 1953. His devotion to the work of the Survey thus spanned 60 years.

Stose's geologic interests, activities, and contributions were varied and were many. They included the general subjects: structure and stratigraphy of the Appalachians, manganese deposits of the southern Appalachians, barite and strontium mineral production, and geologic maps of the United States, North America,

South America, and many States. In the early 1930's he was a member of a nation-wide committee that prepared the rules for classification and nomenclature of rock units (Ashley and others, 1933). An important position held by him for 42 years was that of member of the Geological Survey's Committee on Geologic Names, from the date of its organization in 1899 until 1941.

Another responsible position was his assignment in 1895 to assist Bailey Willis in the editing of geologic maps. His industry and ability soon won his advancement, on August 12, 1897, to succeed Willis as "Editor of Geologic Maps, in charge of the Section of Geologic Maps." In this position, which Stose held until 1941—a period of 44 years—he was responsible for the suitability of geologic maps and other illustrations used in Survey reports and he directed the publication of all illustrations in the folios of the Geologic Atlas of the United States. The first folios were printed in 1894. He was thus attached early to the folio-publication program, and he pushed enthusiastically the publication of folios, but conditions arising in World War I caused decreased emphasis on folios and increased emphasis on other series of Survey publications. The first folio to bear his title and his name as "Editor of Geologic Maps" was the Big Trees (California) Folio 51 printed in 1898, and the last was the Montevallo-Columbiana (Alabama) Folio 226 printed in 1940. Only one later folio, the Hollidaysburg-Huntingdon (Pennsylvania) Folio 227, has been printed.

He collaborated with Willis in the preparation of the geologic map of North America (scale 1:5,000,000) that was printed in 1912 as a part of Professional Paper 71. This map was then the largest map ever issued by the U. S. Geological Survey, and it supplied a long-existing demand for a geologic wall map of the United States.

A geologic wall map (unpublished) of the United States was prepared by Stose in 1903 to form part of the Geological Survey's exhibit at the Louisiana Purchase Exposition in St. Louis, Missouri. Initial steps for the preparation of a geologic map of the United States to be published by the Geological Survey at a scale of 1:2,500,000 were taken in 1905 by Stose. These steps included the assembly of data, over

a period of many years, on maps of the States, mostly at a scale of 1:1,000,000. By 1927 much progress had been made in this work; published and manuscript geologic maps of many States prepared by the State and Federal geological surveys were available, as well as manuscript copy of a new base map of the United States. Thus, the actual compilation of the geologic map of the United States was begun in 1927. The engraving of geologic boundaries was started in 1931, and the printing of the map, which bears the date 1932, was completed by the U. S. Geological Survey in 1933, immediately prior to the sessions of the 16th International Geological Congress in Washington, D. C.

This map of the United States is a monumental contribution to the progress of geology and is our country's finest and foremost effort in multicolored geologic-map publication. It presents the results of more than 50 years of geologic exploration and mapping by American geologists. To Stose, its publication was the crowning event and reward of more than 25 years of teamwork, labor, and skill that he devoted to making the map. In recognition of this important event he was honored in 1933 by the Pick and Hammer Club of Washington, D. C., by the presentation of a medal in the form of a miniature replica of the map. To date, 30,095 copies have been printed by the Geological Survey—7000 in 1933; 5740 in 1950; 5085 in 1953; and 12,270 in 1960. The public's use of this map and the demand for the several reprintings constitute in reality a nation-wide tribute to Stose for his leadership and work in making this beautiful and wonderful map.

As a part of Stose's work in making the geologic map of the United States and as a part of his own geologic studies he prepared several State geologic maps, some of them in co-operation with other authors. These States and the dates of the publication of the maps, most of them at a scale of 1:500,000, are Wyoming (1925), Virginia (1928), Pennsylvania (1931), West Virginia (1932), Georgia (1939), Montana (1945). He was editor of many other State geologic maps, including Arizona (1924), Alabama (1926), Oklahoma (1926), New Mexico (1928), Arkansas (1929), Florida (1929), Kentucky (1929), Minnesota (1932), Colorado

(1935), Washington (1936), Texas (1937), and Kansas (1937).

After his field season in the Apishapa quadrangle, Colorado, in 1894, he returned to the West for two other field seasons. One of these was in 1899 when he assisted Waldemar Lindgren in a reconnaissance of parts of Idaho and Montana; in Lindgren's report (U. S. Geol. Survey Prof. Paper 27) he states "... I had also the valuable assistance of Mr. G. W. Stose, to whom especially many observations on the upper Bitterroot Valley are due." The other field season was in 1900 when Stose assisted Whitman Cross in a survey of the Engineer Mountain and Silverton quadrangles, Colorado.

Most of Stose's field studies were devoted to the geology of the Appalachians. Much of his work there was done under co-operative auspices of the U. S. Geological Survey and the State Geological Surveys of Pennsylvania, Maryland, Virginia, and Tennessee. His first field season in that region was in 1895 when he assisted J. A. Taff in the Buckhannon quadrangle and in a part of the Sutton quadrangle, West Virginia. In 1896, Stose assisted C. R. Van Hise in a study of the stratigraphy of the Ocoee rocks in eastern Tennessee, western North Carolina, northwestern Georgia, and northeastern Alabama. In 1898 Van Hise, Arthur Keith, and Stose visited the Mount Guyot quadrangle, Tennessee, to ascertain the relations there of the Ocoee series to the Paleozoic rocks of the Great Valley.

Stose's geologic work in Pennsylvania began in 1901 in the Chambersburg quadrangle, and he mapped much of southern and eastern Pennsylvania and much of Maryland in the next 30 years. He was joined in the field in 1906 and in later years by E. O. Ulrich for the purpose of fixing practical formational boundaries that would be indicated by lithologic criteria and at the same time mark important stages in the physical and faunal history of the region. Based on these studies Stose subdivided the Cambrian system in the Cumberland Valley into formations that are still recognized in Pennsylvania, Maryland, and northern Virginia.

During World War I his time was commanded by other duties that interrupted his work in Pennsylvania and also stopped until

peace time the publication of the geologic folios. Among these war-time duties he investigated the manganese resources of the southern Appalachians; he studied the geography of Virginia, West Virginia, Maryland, and Delaware; and he directed the preparation of maps of the United States and other countries for the use of the State Department and the Peace Commission, and for inclusion later in the Geological Survey's publication *World atlas of commercial geology*, which was printed in 1921.

After the war he resumed geologic work in Pennsylvania and Maryland. From his mapping and stratigraphic studies he proved that the Lower Cambrian sequence of limestone, dolomite, and shale containing the fossil-bearing Kinzers formation in the York, Lancaster, and Chester valleys is a southern facies equivalent in age to the Tomstown dolomite of the Great Valley. He recognized also the presence of the Taconic sequence in Pennsylvania during his study of the Martinsburg shale and overlying rocks.

In 1930 and 1931 Stose with Anna I. Jonas, devoted several months to a reconnaissance of the southern Appalachians from Virginia to Georgia and Alabama, in the preparation of the geologic map of the United States. In Virginia, Tennessee, and North Carolina they discovered, among other major structures, the extent of the Holston Mountain overthrust and the Taylor Valley and Grandfather Mountain windows in that thrust sheet.

Interest in these structures led them in 1932 to begin detailed mapping in southern Virginia on the Gossan lead district, and to extend their mapping westward to and beyond the Mount Rogers quadrangle which they completed in 1944. Also during this period they worked in the adjoining parts of North Carolina and Tennessee. A part of the field expenses of the Stoses in 1943 and later years was financed by grants from the Penrose Bequest of The Geological Society of America.

From 1945 until 1953 George and Anna Stose concentrated their field work on stratigraphic and structural problems in Tennessee, North Carolina, and Georgia. They studied the relation of the Lower Cambrian Chilhowee group to the Ocoee series, and thus supplemented George's mapping of the northwestern

part of the Mount Guyot quadrangle in connection with his manganese investigation in the region during World War I. They mapped several windows in the Great Smoky overthrust block, including the Hot Springs window in North Carolina, that had not been recognized previously; and they traced this overthrust southward into Georgia where it becomes the Cartersville overthrust of C. W. Hayes. Also, they studied regional structural problems along and east of the Cartersville overthrust in Georgia; this work they did for the Georgia Geological Survey, in company with A. S. Furcron, geologist on the staff of the State Survey.

During the field work in the region of the Grandfather Mountain window in North Carolina (1939-1953), the Stoses lived at the Switzerland Inn on the Blue Ridge, which commands a view into the window. In 1950 when their mapping neared completion they gave a paper on the region at a meeting of geologists at Lexington, Kentucky. This paper, which was illustrated by maps, structure sections, and color slides, described the rocks exposed in the Grandfather Mountain window along a large dome in the Holston Mountain thrust sheet. The window is 25 miles southeast of the edge of the overthrust on the west side of Holston Mountain, Tennessee. In the paper they emphasized that this overthrust, among others, on the west side of the Blue Ridge welt is rooted in early Precambrian granite gneisses, which rim the window and which are mylonitized on the sole of the overthrust. Another paper, entitled *Folded low-angle overthrusts in the southern Appalachians*, was given by the Stoses at the November 1950 meeting of The Geological Society of America; it was published only in abstract. Owing to George's heart attack in 1953 and later illness, the report by George and Anna Stose on the Grandfather Mountain window has not been completed.

As illustrative of George's intense interest and remarkable vigor and endurance up to his early eighties, he celebrated his seventy-fourth birthday in 1943 by making a 2-day pack trip with Anna on the Appalachian Trail on the crest of the Bald Mountains of Tennessee and North Carolina. On all-day foot trips during the next 8 years he climbed Grandfather Mountain

including Calloway Peak, its summit, and many other mountains in the region and descended at several places into the gorge of the Linville River.

George Stose's bibliography lists two noteworthy maps that were compiled by him after his retirement from the U. S. Geological Survey. These are a geologic map of North America published in 1946 by The Geological Society of America, and a geologic map of South America published in 1950 by that Society. His bibliography ends with a report (Bulletin 72 of the Virginia Division of Mineral Resources) on the Gossan lead district, Virginia, which he and Anna completed in 1942 and which was published in 1957 under the direction of the late Marcellus H. Stow, Geological Consultant to the Director of the Department of Conservation and Development. The report contains a high tribute to George W. Stose as a geologist and contains his photograph as a frontispiece of the volume.

Stose's faithful devotion to duty and to geology constitutes a remarkable record that has been equaled by few. His zeal in the field and in the office always shone with the humble pride and joy of one doing noble service. His reports and maps are examples of high excellence in form and in contents that command scientific and public interest. As a fitting token of appreciation, Thomas B. Nolan, Director of the Geological Survey, presented to him its Scroll of Honor "in recognition of more than 50 years of efficient, dedicated and constructive public service."

The scientific societies of which he was a member included the American Association for Advancement of Science (Fellow); The Geological Society of America (Fellow, Councilor 1932-1934), Washington Academy of Sciences (Vice-President 1922), and Geological Society of Washington (President 1921).

He was actively interested in the civic, religious, and social life of his community, and was a member of the Cosmos Club of Washington, the MIT Club of Washington, and the local citizens association; for more than 60 years he was a member of the National City Christian Church, Washington, D. C., and of its predecessor the Vermont Avenue Christian Church. As a leader in his church he served in many

capacities including Sunday school superintendent, deacon, and President of the Official Board. He played an important role in planning and building the National City Christian Church.

George W. Stose loved life; he loved people; he was a friend to all who knew him; he constantly strove to help others. His radiant enthusiasm of enjoying life, helping others, and seeking and defending truth in all things brightened his years among us and brightened our lives. His life-long succession of good deeds and of contributions to geology will live; they take their place among the immortal things of earth.

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