

HISTORY OF THE COLORADO SCIENTIFIC SOCIETY 1882-2002

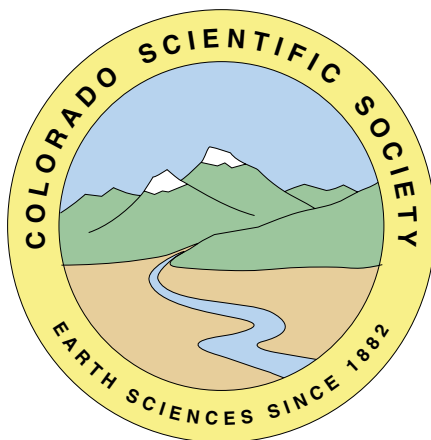
by

Edwin B. Eckel

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COLORADO SCIENTIFIC SOCIETY
Denver, Colorado 2003



Samuel Franklin Emmons

March 29, 1841 - March 28, 1911

Founder of the Colorado Scientific Society; Chief, Rocky Mountain Division,
U.S. Geological Survey; Father of modern geologic studies of mining districts.

Photo courtesy of U.S. Geological Survey.

Colorado Scientific Society

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FOREWORD TO 3RD EDITION, 2003

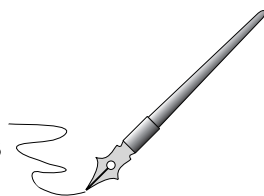


The third edition of the History of the Colorado Scientific Society adds 10 years to the Society's record. It relies heavily upon the first edition (1978), which was written by Edwin B. Eckel, and the 2nd edition, which was edited by M.N. Machette. The forward to the 2nd edition is included below because it gives a short history of Edwin B. Eckel. During the 10 years since the second edition, a number of important changes affected the society. These include a venue change for the monthly meetings to the American Mountaineering Center in downtown Golden (in the old Golden junior high school building, originally the high school building), and the evolution of the Internet. As such, the society has moved increasingly toward electronic dissemination of society information on its web site (<http://www.coloscisoc.org/>) and via E-mail distribution of the newsletter. Because of these and other changes, it was decided that an update was needed, and Marjorie Mac Lachlan headed up a committee to compile data for, and write the new edition. Committee members included Lisa Ramirez-Rukstales (graphics, photo copying), Margo Johnson (desktop publishing), Scott Lundstrom (writing and editing), Sherman Marsh (field trips, mineral names), Cyndi Rice (membership), Eric Erslev (science fair), Jack Murphy (mineral collection), Michelle Tuttle (Memorial Funds), Don Sweet-kind (finances), Bill Wingle (web site), Paul Belanger (outreach), Michael Machette (writing and editing), Wally Hansen (reviewer), Glenn Scott (fossil names), Marjorie Mac Lachlan (writing, editing), Jane P. Ohl (field trip photos), Robert Cobban (minerals), and Eric Erslev (Science Fair).

Tables updated in this edition include lists of officers, Emmons lecturers, Memorial Fund awards, field trips, and honorary members. New additions include lists of past President's awards, planets named for CSS members (only one so far, small planet "Pillmore"), Antarctic geographic features named for CSS members, and interviewees and interviewers for an interview column started in 2002 in the CSS newsletter. The Memorial and Endowment Funds are further explained and updated. Public education and outreach activities are updated, and biographies of William G. (Bill) Pierce and George L. Snyder are added in the section on Memorial Funds. Lastly, this edition is on the Society web site and is freely available to all interested.

Because the Colorado Scientific Society is the oldest scientific and technical organization in the Rocky Mountain region, it is very important that its history be updated periodically. Although many early society records were either not kept or have been lost, volunteers of the society more recently have kept better records, thanks largely to the evolving digital era. Our thanks go to all who helped compile and write this new edition, and to those who help keep records of Societies activities.

Eric P. Nelson, President 2003



FOREWORD TO 2ND EDITION, 1993



This second edition of the *History of the Colorado Scientific Society* adds 15 years to the Society's record and relies heavily upon the first edition (1978), which was written by Edwin B. Eckel. Ed Eckel was an eminent geologist, former employee of the U.S. Geological Survey, and active member of the Colorado Scientific Society. Ed retired after a long and full career with the USGS, lasting from 1930 to 1968, during which time he was founding father, as well as chief, of two new branches—the Engineering Geology Branch and the Special Projects Branch. He then undertook a completely new career, first as science editor of the Geological Society of America and then as its executive secretary. In 1974 he retired once again, this time to return to the USGS on special assignment to help co-revise the Survey's bible on technical writing modestly titled, *Suggestions to Authors of the Reports of the U.S. Geological Survey, Sixth Edition*.

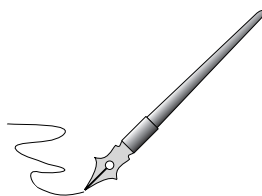
Ed was a recipient of the Department of the Interior's highest honor, the Distinguished Service Award, and was a fellow of the Geological Society of America, the Mineralogical Society of America, and the Geological Society of London. He was an honorary member and past president of the Colorado Scientific Society, which he joined in 1930.

Ed authored many scientific reports, including some major reference classics. Among these are his 399-page bulletin on *Minerals of Colorado—A 100-Year Record* and his report on the *Geology and Mineral Resources of Paraguay*. His last major project was a much-needed historical account of the Geological Society of America (Memoir 155), which he completed in 1982. Ed was born on January 27, 1906, in Washington, D.C., and passed away on September 28, 1989, in Denver, after a nearly 60-year-long career in geology and public service.

Ed's wish was that contributions made to the Colorado Scientific Society in his memory would go to the existing Memorial Funds. However, when contributions and pledges from his family and friends reached \$10,000, the Society established the Edwin Eckel Memorial Fund in January 1990. Since that time, the Eckel Fund has provided 5 student scholarship grants.

We dedicate this second edition of the *History of the Colorado Scientific Society* to our departed friend and colleague, Edwin B. Eckel.

Donald E. Trimble
Colorado Scientific Society
President, 1978



Michael N. Machette
Colorado Scientific Society
President, 1993



HISTORY OF THE COLORADO SCIENTIFIC SOCIETY

1882-2002

by

Edwin B. Eckel and others

Introduction

The Colorado Scientific Society is the oldest scientific and technical organization in the Rocky Mountain region. It was founded in Denver on December 8, 1882, only 6 years after Colorado had become a State, and only 3 years after the birth of the U.S. Geological Survey—three of whose employees were among the founders.

Now in its 120th year (2002), the Society is still alive, well, and youthful in its outlook and is still contributing to the enhancement of Earth-science knowledge, not only among its members, but in the community at large.

State of the Records

The quality of the Society's records varies greatly, corresponding directly with three periods of healthy growth and two of relative dormancy. The dormant periods, described in a later section, ended with revivals in 1929 and 1947. No complete record of the Society's activities exists. Moreover, passage of time and of people whose memories or private notes might have been helpful have left no possibility that the gaps in the record can ever be filled. The first 67 years (1882-1948) are admirably summarized by A.H. Koschmann in his paper titled "The Colorado Scientific Society, Its History and Objectives," in 1949. This brief history was printed in a small edition for distribution to the members, but it was not placed in the Society's *Proceedings* and is not a part of the permanent literature. We have chosen here to go back to some of his original sources, rather than to reprint Koschmann's history verbatim. This history would be even less complete than it is, however, were it not for many facts that he recorded while they were still available.

The Society's early years, 1882-1913, are recorded in summary form in the *Proceedings*, Volumes 1 through 10. These contain not only the scientific papers and talks that were presented at Society meetings, but abstracts of minutes that included activities, finances, and lists of officers and members. Unfortunately, the minutes and officers' reports for the years 1901 through

1904, though published, have not been preserved in the bound copies of Volume 7 that are accessible.

With Volume 11, which covers the years 1914-29, the practice of publishing reports of officers in the *Proceedings* was discontinued. Though the record for this period is almost a complete blank, we know that someone must have maintained a sense of loyalty and responsibility toward the group. This is shown not only by continued through sporadic publication of the *Proceedings* but by the fact that the Colorado Scientific Society was one of the charter members of the Colorado Engineering Council when it was organized in 1919. Moreover, a letter written in 1921, complete with a list of officers, appealed to members for revival of the Society.

Society records from its first revival in 1929 to the present are intact, although incomplete and unpublished. Although sketchy from 1929 through 1947, they improved greatly after the second revival in 1947 and have been increasingly thorough and detailed since. Consisting of minutes of all Council and regular meetings plus supporting documents such as reports by treasurers, auditors, and committees, they now are part of the archival files retained by the History Committee.

In summary, Society records are generally excellent from 1882 through 1913, nonexistent from 1914 through 1929, sketchy from 1930 through 1947, and excellent from 1947 through the present. The records through 1978, supplemented by Ed Eckel's memories and those of his colleagues from 1930 onward, constitute the source documentation on which this history is based; this revised text is based on records for 1979-2002 that were supplied by members of the 1993 and 2002 History Committees of the Society. The discontinuity of the records and the fact that more than half of them are single copies of handwritten or typewritten manuscripts, available for study only through the History Committee of the Society, explains the lack of citations to specific sources throughout this history.

FOUNDING AND OBJECTIVES OF THE SOCIETY

The following is from the *Proceedings, Colorado Scientific Society*, Vol. 1, p. XI-XIII, 1883 and 1884:

Meeting of Organization

"On the evening of December 8th, 1882, a number of gentlemen interested in the formation of a scientific association met in the rooms of the United States Geological Survey, in Denver, at the invitation of Mr. Samuel Franklin Emmons."

"Mr. Emmons, in stating the object of the meeting, said that it seemed to him that the time had come for those persons in Colorado who were interested in true science to unite in forming an association or society, whose immediate object would be to facilitate the interchange of scientific observations and ideas, and promote intercourse among the observers themselves. There should be some means of recording and publishing the many interesting and valuable facts which are daily observed in different parts of the State. This could be done through the medium of a society, and the opportunity thus afforded would no doubt act as a stimulus to some to pursue investigations in directions specially open to them."

"An informal discussion ensued in which the advisability of such a step was advocated, and it was agreed to proceed at once to form a permanent organization."

"The following named persons were unanimously chosen as officers for the first year:

President—Samuel Franklin Emmons

Vice-President—Richard Pearce

Secretary—Whitman Cross"

"It was further agreed that the association should be called *The Colorado Scientific Society*, and the following named persons, all residents of Denver, were enrolled as members:

Hermann Beeger	Whitman Cross
P.H. Van Diest	Anton Eilers
S.F. Emmons	J.B. Grant
Rev. H.M. Hart	Hon. N.P. Hill
W.F. Hillebrand	A.H. Low
Richard Pearce	A. Von Schulz"

"A committee on Constitution and By-Laws was appointed consisting of the president, vice-president and P.H. Van Diest, who were requested to report on the next Friday evening, the 15th instant, at the same place, to which date the meeting adjourned."

The second organizational meeting was held as scheduled on December 15, 1882 [though the printed abstract of minutes mistakenly indicates a date of December 5th]. At this meeting, the only business, aside from appointment of a Standing Committee, was adoption of a Constitution and Bylaws. These documents were altered many times through the years, but the statement of objectives survived virtually intact for 65 years. The original version read: "Its object shall be the promotion of scientific intercourse, observation and record in the State of Colorado....Among the means for attaining this end shall be periodical meetings of the Society, the reading of papers, the discussion of scientific subjects, the collection of scientific books and periodicals, special investigations into matters of public and scientific interest, and the publication of such parts of the proceedings as may be deemed expedient." This statement was soon amended to add "objects of scientific interest" to the items that were to be collected and preserved. In the 1977 version of the Constitution, the objectives are stated thus: "The objective of this Society is to promote knowledge, the understanding of science, and its application to industry. This objective shall be sought without intent of monetary gain to the Society.Among the means of attaining these ends, but not to the exclusion of others, shall be periodic meetings of the Society, the reading of papers, the discussion of scientific subjects, and investigation into matters of public and scientific concern."

This simplified definition of objectives came about through a series of evolutionary changes that began in 1948. Apart from obvious adjustment to semantic changes that had occurred since the 1880s, most changes merely recognize that the Society no longer maintains a library or a mineral collection and no longer publishes scientific papers. Incidentally, the disclaimer of a profit motive, though not included in the original Constitution, was clearly stated in the articles of incorporation that were filed with the Secretary of State on January 20, 1885. The chief objective of the Society—that of advancement of Earth sciences—remains much as the founders conceived it.

Founders' Biographies

Although not included in Eckel's original version of the Society's history, the following section highlights some of the achievements of the founders of the Colorado Scientific Society. These records have been gleaned from past proceedings of the Society, from published biographies of the founders, and from local news accounts.

Hermann Beeger (1820-1891), a metallurgist, came to Colorado in 1867 to work in Black Hawk for the Boston and Colorado Smelting Company. He was born

in Gadewitz, Saxony, and attended the Royal School of Mines at Freiberg between 1838 and 1842. Prior to coming to Colorado, Beeger worked in Spain and New Zealand. He spent his career in the United States working for the same smelting company, transferring to Alma, Colorado, and then to Boston, Massachusetts. He was superintendent of the company's Au-Cu alloy operations while in Boston, but returned to Denver after he retired.

Charles Whitman Cross (1854-1949) was an internationally known geologist. He graduated from Amherst College and from the University of Leipzig. He worked for the U.S. Geological Survey from 1880 to 1935, and as an associate in petrology at the Smithsonian Institution between 1920 and 1949. He was a member of the National Academy of Sciences, National Research Council, Geological Society of London, Washington Academy of Sciences, American Philosophical Society, Geological Society of Washington, and the Academy of Natural Science in Philadelphia. Cross was one of the four who developed the Cross-Iddinger-Pierson-Washington (CIPW) system of petrographic analysis.

Anton Eilers (1839-1917) was a mining engineer. He graduated from a mining school at Clausthal and the University of Goettingen, Germany. In Colorado he was the director of the American Smelting and Refining Co., general manager of the Colorado Smelting Co. at

Pueblo, and at a lead-silver-gold mine at Monarch. He built the Eilers Smelters at Leadville and Pueblo.

Samuel Franklin Emmons (1841-1911), an economic geologist, graduated from Harvard University. He later studied at the Ecole de Mines in Paris and at the Bergakademie in Freiberg, Germany. His career included work on the Geological Exploration of the Fortieth Parallel, the Comstock Lode (Nevada), Leadville, Crested Butte, and the Denver basin areas (Colorado), and on the Tenth Census Survey. Clarence King, first Director of the U.S. Geological Survey, appointed him as the geologist-in-charge of its Rocky Mountain Division, headquartered in Denver. In addition to his importance as founder and first president of the Colorado Scientific Society, Emmons was one of the founders and president, in 1903, of the Geological Society of America, and general secretary of the International Geological Congress in 1891.

He served as an officer in several other scientific organizations. Columbia and Harvard Universities honored him with D.Sc. degrees in 1909.

James Benton Grant (1848-1911), a metallurgist by training, studied at Iowa State Agricultural College and Cornell University in the U.S. and at the University of Freiburg in Germany. He was the superintendent of the Boston and Colorado Smelting Co. in Black Hawk. The Grant Smelter in Leadville was named for him. He



Founders of the Colorado Scientific Society

was well known for his career in public office as a governor of the State of Colorado and in education where he helped establish Manual Training High School in Denver, served as president of the Denver School Board, and as a trustee of the University of Denver.

Henry Martyn Hart (1838-1920), a leading churchman and popular writer on scientific subjects, was a graduate of Dublin University. He was ordained in the Episcopal Church by the Archbishop of Canterbury in 1863. He built the first Episcopal Cathedral in Denver; after it burned, he was instrumental in the building of St. John's Episcopal Cathedral where he served as rector. He wrote papers on chemistry, geology, and mineralogy.

Nathaniel P. Hill (1832-1900), a chemist, graduated from Brown University where he worked as a professor of chemistry. He was instrumental in solving problems on reducing refractory ores of Colorado. He founded the Boston and Colorado Smelting Co., which had a plant in Black Hawk. He worked as a mineralogist at the Argo Smelter near Denver. He worked with the United Oil Co. and the Durango Land Co. He was a member of the Territorial Council, a mayor of Black Hawk, a U.S. Senator from Colorado, and a member of the International American Monetary Committee.

William Francis Hillebrand (1853-1925), a chemist, studied at Oahu College in Hawaii, College School in Oakland, California, Cornell University in Ithaca, New York, and the University of Heidelberg, Germany. He returned to the U.S. in 1879 to work as an assayer in Leadville, Colorado, where he met S.F. Emmons, who offered him a position as chemist in the Rocky Mountain Division of the U.S. Geological Survey. In 1909, he became Chief Chemist of the Bureau of Standards in Washington, D.C., where he remained until his death. Between 1892 and 1910 he held the position as chairman of General Chemistry and Physics Department at George Washington University. His most important scientific achievement was the discovery of nitrogen in crystallized uraninite. Hillebrand was president of the American Chemical Society in 1906. He was elected to membership in the National Academy of Sciences in 1908.

Albert Howard Low (1855-1936), a chemist, graduated from the Massachusetts Institute of Technology (MIT) and received an honorary D.Sc. from the Colorado School of Mines where he headed the chemistry department. He also worked as an assayer and chemist at Boyd's Smelter in Boulder, at the California Smelter in Leadville, at the Argo Smelter near Denver, and at a smelter in Red Cliff. He was a partner in Von Schulz and Low, assayers and chemists, in Denver.

Richard Pearce (1837-1929), a mining engineer, was a native of Cornwall, England, who studied at the mining school at Truro and at the Royal School of Mines in London. He worked as a manager of a silver and copper mine at Swansea, Wales, in 1865, and later (1873) as a manager of the Boston and Colorado Smelting Co. of Black Hawk, Colorado. In 1887 he was manager of the Argo Smelter.

Pieter Hendrik van Diest (1835-1902), born in Edam, Holland, graduated as a mining engineer from Delft University in 1857. He was sent by the Dutch Government to inspect mines in Wales, Germany, Spain, and southern Russia. He lived in the Dutch East Indies for 11 years where he made surveys, explored for tin, and developed improved methods of smelting tin. His 12th year in the Indies was spent as the Governor General. After suffering from tropical diseases, he left the Indies for a more temperate climate. Van Diest was sent to Colorado by the Dutch company that owned the Caribou Mines in Boulder County, Colorado. Two years later he worked at the Sunshine Mine in Boulder County as a U.S. Deputy Mineral Surveyor and Mining Engineer. In 1876 he worked for the Pennsylvania Reduction Co. in Rosita, Colorado. He spent 14 years (1879-91) as Chief of the Land Department of the U.S. Surveyor General's Office in Denver.

Adolf von Schulz (1842-1924), a metallurgist and assayer, was a partner in the chemical laboratory of von Schulz and Low in Denver. He also worked as the assistant manager of Miner's Smelting Co. in Golden, and as an employee for N.P. Hill and H.R. Wolcott at Black Hawk and at the Argo Smelter near Denver. Von Schulz graduated from the University of Freiburg in Germany.

IN SICKNESS AND IN HEALTH

The Society's first 120 years comprised five distinct periods, three of healthy activity and two of inactivity and poor health during and immediately after World Wars I and II. As would be expected of any living organism, this Society gradually changed its character as it matured, but its instinct for survival was strong. It regained robust health after each period of sickness and looks forward enthusiastically to its second century of service to science.

The first healthy period extended from 1882 to 1911. It was one of almost continuous growth in membership, in activities, and in prestige. The great mining boom that dominated both the State's economy and the Society's interest during the 19th century lost momentum. By 1911, the Society had grown to nearly 300 members, with great diversity in interest. In an



KNOWN LIFE MEMBERS

1906	William J. Palmer
1909	John M. Callow
1912	George E. Collins John W. Richards Fred T. Williams
1913	J. Warner Edwards Mrs. B.F. House
1933	Albert H. Low William F.R. Mills

Arthur O. Ridgway (had paid for life membership 16(?) years before becoming an honorary member in 1949).

Dr. John W. Finch (may also have become a life member some time before he was elected as an honorary member in 1949).

apparent effort to serve all of its members better, five sections were established:

1. Technical Chemistry and Metallurgy
2. Economic Geology and Mining Engineering
3. Mechanical and Electrical Engineering
4. Irrigation and Civil Engineering
5. Pure Science

The records lack details on this experiment in diversification but the sections were active for at least 2 years.

Each specialized section had its own set of officers, and several of them held at least a few meetings of their own, but the parent society continued to function as a unit with regular meetings and publication of the papers presented. Four of the five sections eventually each became the nucleus of one or more local engineering societies that became affiliated with national societies. If the aim was to preserve the Colorado Scientific Society as a unit by this diversification, the experiment was a failure, but the Society did play an initial and vital part in development of a strong engineering and technical community in Colorado. Moreover, the experiment seems to have marked the end of an era when one society could aspire to serve all the sciences; from that time onward the Colorado Scientific Society restricted almost all of its interest to advancement of geology and the related Earth sciences.

The Society faded into relative obscurity just before World War I and came close to dissolution in the mid-1920s. It remained dormant until 1929 when the sleeper was awakened for the express purpose of publishing preliminary results of a new cooperative mapping program between the State, the mining industry, and the U.S. Geological

Survey. This healthy period lasted about 10 years, until the time when the Nation's energies were devoted to World War II and the Society again became dormant. The second revival, late in 1947, began a third healthy period that continues to the present day. This period has been marked by growth not only in membership but in breadth of geologic interests and in public service activities of many kinds. It has closely paralleled, of course, the remarkable growth of Denver as a center for Earth science activities in the Rocky Mountain region.

MEMBERSHIP

Membership has always been open to anyone who was interested in science and could afford to pay dues. Until recently, elections of members have been elaborate, with reviews of biographical summaries, publication of candidates' names and, finally, formal election by the Council.

Currently, categories of regular, corresponding, honorary, and student members are maintained. A complete list of the many hundreds of people who have joined and supported the Society during the past 5 years is maintained in a computer database, but records for the preceding 115 years are increasingly sketchy. Those interested in the history of Colorado geology would find scores of familiar names on the Society's rolls. These include not only many geologists who were, are, or will be nationally known for their scientific work, but college presidents, bankers, legislators, and industrial tycoons as well. Mine, smelter, and mill managers abound, of course, as do inventors. For example, the Brunton surveying compass, the Wilfley concentrating table, the Dorr classifier, and the Ainsworth analytical balance were all invented by Society members. Truly, the present and future members have a proud heritage.

In 1894, life memberships and life associateships were established, but these were not honorary titles. Instead, they merely permitted lifetime commutation of Society dues by payment of a lump sum of \$100 or more. Comparatively few members (see sidebar) took advantage of this opportunity through the years; the payments were accumulated and then used from time to time for purchase of additions to the library or the mineral collections, rather than being invested to form the nucleus of an endowment fund as some societies have done. According to our records, all life members and life associate members are now deceased.

For the first quarter century, Society membership rose steadily and rather uniformly from the original roster of 12 founders. Thus there were 31 members at the end of 1883, 70 by 1890, 120 by 1893, and an apparent high of about 300 by 1907. From 1908 until 1913, when the records were poor, membership dropped somewhat, but remained well above 200. By the 1920s the Society had entered a period of inactivity.

When the Society was revived in 1929 there were about 100 members. A few new U.S. Geological Survey employees were added during the next several years, but nearly all of the Society's members were loyal old timers whose names had remained on the rolls through the inactive period.

When the Society was again revived in December 1947, there were still more than 40 members on the rolls. Of these, 14 attended the reorganizational meeting, and 27 were interested enough to cast mail ballots for new officers. From 1948 onward the membership grew rapidly, reaching 200 by the mid-1950s and 300 in the early 1960s. By the spring of 1984, the total had reached an all time high of 548 members in all categories. There were some unaccountable drops in the curve, but these commonly were erased within a year or two.

In the 1980s, the energy recession struck Colorado heavily and resulted in the loss of jobs or transfer of large numbers of geologists. In the early 1980s about 33,000 geologists were employed in the Denver area. Five years later the number had dropped to about 13,000. The direct result to the Society was a sharp reduction in membership to a level below 400. In 1988, an active and imaginative membership committee enlisted over 80 new members in a single year. Continued poor employment opportunities for geologists in the late '80s and a national recession resulted, however, in a gradual drop to the current level of about 350 members.

The ups and downs in the membership curves reflect interactions among several factors, not all

of them easily assessed. Such things as the gradual change of Colorado's economy from a metal-mining base to the broader one of agriculture, petroleum production, mining, and recreation had obvious effects. So too had the proliferation of parallel but more specialized societies, and the increases or decreases in State and Federal governmental geologic activities. Perhaps more important than any of these factors, however, were the interest, imagination, and drive of successive sets of officers, membership committees, and program committees. Treasurers were particularly effective in controlling the official membership figures—some maintained inactive nondues payers on the rolls for years, others dropped delinquents in wholesale quantities.

During revision of the Constitution and Bylaws in 1992, the provision (Article I, Section 6) for expulsion of a member was eliminated on the basis that no one had ever petitioned for removal of another member and that no criteria were set forth as a basis for expulsion.

Acceptance of new members became more streamlined in 1993 when the Council revised the application form, dropping the requirement for sponsorship of a new member by two existing members. The scientific background of prospective new members continues to be reviewed by the Council, and the names of new members are published in the newsletter.

INFLUENCE OF U.S. GEOLOGICAL SURVEY

The Society has maintained cordial and mutually supportive relations with the U.S. Geological Survey from the beginning. Since 1947, in fact, Survey employees have tended to dominate Society affairs. The majority of its officers, members, speakers, and field-trip leaders have been USGS employees. So marked has this tendency been that many Earth scientists, both in and out of the Society, have come to believe that the Colorado Scientific Society is and always was an unofficial arm of the U.S. Geological Survey.

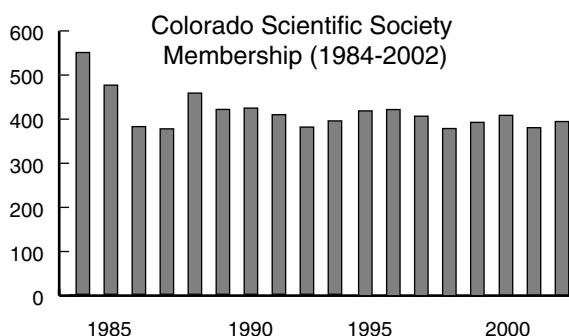
However, the prominence of USGS employees is a relatively recent development. True, the Society was conceived by a member of the U.S. Geological Survey and it was born in a Survey office. But of the 12 founders, only 3—Emmons, Cross, and Hillebrand—were Survey employees. Even this initial high proportion of three Survey to nine non-Survey members dropped as soon as active recruiting began and was never surpassed until 1947. For instance, on January 1, 1885, of 42 members, only 4 were USGS employees and 3 of these were soon transferred to Washington. The other members included 9 mining engineers and mine managers; 17 chemists, assayers, and metallurgists (3 of them smelter managers); 1 college president; 4 profes-

sors; 3 civil engineers; a State geologist; 1 minister; and the professions of 2 members are not known.

Again, though the chief aim of the 1929 revival was to provide a publication medium for preliminary U.S. Geological Survey reports, employees of that organization were in the minority until the 1947 revival in membership. The membership mix during the 1930s and 1940s was not unlike that of 1885.

More than to any other single factor, the Survey's post-1947 dominance in Society affairs is related to its choice of Denver as one of the three regional centers for its expanded activities and consequent growth in its scientific staff. Had there been no Colorado Scientific Society, something like it would surely have evolved in the late 1940s or early 1950s if only to meet the communication needs of the expanded USGS population.

The recent popular image of the Society as a sort of exclusive club for U.S. Geological Survey scientists is false, but difficult to dislodge. Every group of officers and committees elected since 1948 has made determined efforts to broaden both the Society's membership base and the scientific programs for monthly meetings to include discussions of more than pure geology. The membership base has indeed broadened, though very gradually, and not without vigorous recruiting efforts. Early in 1977, the officers were proud to announce that fully 40 percent of the members came from outside the U.S. Geological Survey. Nearly all of these were Earth scientists, but they represented the Colorado State Geological Survey, mining and petroleum companies, universities, and many other groups. This infusion of new blood is welcomed and gives reason for hope that the Society will continue to grow and prosper through the years with a diverse group of scientists. Currently, about one fourth of the members are employed by the U.S. Geological Survey.



These repeated efforts to broaden the interest in other scientific disciplines has met with mixed success. Including nongeologic titles on meeting programs often has resulted in lower than average attendance. Conversely, discussions of travel through geologically interesting regions often draws large audiences (more than 100 members and guests). Although we would like to broaden our program to include allied sciences, Earth scientists (like other scientists) seem to prefer to learn more about their own discipline than to dabble in the disciplines of others.

MANAGEMENT

Like nearly all societies, this one is managed by a group of officers, elected annually from the membership. Rules and customs have changed slightly from time to time, but the group, variously called the Executive Committee, Standing Committee, Council, or Board of Directors, has always included a president, secretary, treasurer, and councilors (six at present).

In the early days, curators had responsibility for maintaining the library and mineral collections. The elected officers, these curators, and numerous appointed standing and ad hoc committees, have always done most of the Society's work. All officials, elected or appointed, are unpaid volunteers, drawn from the membership. Significant management decisions or proposals are submitted to the membership for vote or ratification.

The Society owes much to its principal officers, as well as to the many councilors and committee members who collectively have been responsible for most of its accomplishments through the years. Its debt to the employers of its officers is also very real, not only for use of office facilities but for donation of much official time. A list of the principal officers (as complete as possible) follows. These officers are complimented by councilors, currently six who each serve overlapping 3-year terms; two new councilors are elected each year. Council meetings (at the present time, 3-5 each year) are attended by the officers, councilors, and selected committee chairpersons. Members who served as councilors are listed only for the past 12 years. At the present time, there are 12 committees: arrangements, best-paper award, field trips, fund raising, history, membership, memorial funds, newsletter, outreach (geologic road signs and other educational activities), program, publicity, and science-fair.

OFFICERS OF THE COLORADO SCIENTIFIC SOCIETY, 1883-2002

YEAR	PRESIDENT	FIRST VICE-PRESIDENT	SECOND VICE-PRESIDENT	TREASURER	SECRETARY
1883	S.F. Emmons	Richard Pearce	---	Whitman Cross	Whitman Cross
1884	Richard Pearce	Rev. H. M. Hart	---	Whitman Cross	Whitman Cross
1885	W.F. Hillebrand	P.H. Van Diest	---	F.F. Chisholm	F.F. Chisholm
1886	Richard Pearce	P.H. Van Diest	---	Whitman Cross	Whitman Cross
1887	P.H. Van Diest	W.P. Headden	---	Whitman Cross	Whitman Cross
1888	R.C. Hills	W.P. Headden	---	E.W. Rollins	T.W. Stanton
1889	Richard Pearce	Hermann Beegeer	---	O.J. Frost	P.H. Van Diest
1890	R.C. Hills	G.L. Cannon, Jr.	---	O.J. Frost	P.H. Van Diest
1891	W.P. Headden	G.L. Cannon, Jr.	---	O.J. Frost	Franklin Guiterman
1892	G.L. Cannon, Jr.	C.S. Palmer	---	O.J. Frost	Franklin Guiterman
1893	Anton Eilers (term completed by Frost)	O.J. Frost	A.S. Dwight	R.M. Hosea	Franklin Guiterman
1894	C.S. Palmer	J.B. Farish	A.S. Dwight	R.M. Hosea	Franklin Guiterman
1895	A.S. Dwight	Phillip Argall	A. Raht	R.M. Hosea	Franklin Guiterman
1896	Regis Chauvenet	T.A. Rickard	F.T. Freeland	R.M. Hosea	H. Van F. Furman
1897	W.L. Austin	Irving Hale	Franklin Guiterman	H.A. Vezin	L.J.W. Jones
1898	W.L. Austin	B.B. Lawrence	E. LeNeve Foster	H.A. Vezin	C.W. Comstock
1899	E. LeNeve Foster	J.A. Porter	E.B. Kirby	H.A. Vezin	C.W. Comstock
1900	E. LeNeve Foster	Frederick Knight	A.L. Collins	H.A. Vezin	C.W. Comstock
1901	E. LeNeve Foster	H. Van F. Furman	C.H. Livingstone	H.A. Vezin	C.W. Comstock
1902	?	?	?	H.A. Vezin	C.W. Comstock
1903	G.C. Hewett	?	?	H.A. Vezin	C.W. Comstock
1904	H.A. Lee	?	?	?	E.N. Hawkins
1905	A.G. Brownlee	Phillip Argall	T.E. Schwarz	G.L. Cannon, Jr.	E.N. Hawkins
1906	Phillip Argall	T.E. Schwarz	D.W. Brunton	G.L. Cannon, Jr.	W.A. Johnston
1907	T.L. Wilkinson	D.W. Brunton	James Underhill	G.L. Cannon, Jr.	W.A. Johnston
1908	T.L. Wilkinson	D.W. Brunton	E.N. Hawkins	G.L. Cannon, Jr.	W.A. Johnston
1909	Franklin Guiterman	?	?	J.W. Richards	W.A. Johnston
1910	Franklin Guiterman	?	?	J.W. Richards	W.A. Johnston
1911	C.W. Comstock	?	?	J.W. Richards	W.A. Johnston
1912	G.E. Collins	?	?	J.W. Richards	H.S. Parmelee
1913	G.E. Collins	?	?	J.W. Richards	H.S. Parmelee
1914	?	?	?	J.W. Richards	H.S. Parmelee
1915-20	[No records]	[No records]	[No records]	[No records]	[No records]
1921	W.F. Mills	W.A. Johnston	J.C. Evans	C.W. Henderson	R.W. Gordon
1922-28	[No records]	[No records]	[No records]	[No records]	[No records]
1929	J.W. Finch	?	?	?	C.W. Henderson
1930	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	G.H. King	C.E. Dobbin
1931	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	G.H. King	C.E. Dobbin
1932	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	G.H. King	C.E. Dobbin
1933	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	F.A. Aicher	C.E. Dobbin
1934	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	F.A. Aicher	C.E. Dobbin
1935	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	F.A. Aicher	C.E. Dobbin
1936	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	F.A. Aicher	C.E. Dobbin
1937	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	F.A. Aicher	C.E. Dobbin
1938	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	F.A. Aicher	C.E. Dobbin
1939	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	F.A. Aicher	C.E. Dobbin
1940	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	P.N. Moore	C.E. Dobbin
1941	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	P.N. Moore	C.E. Dobbin
1942	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	P.N. Moore	C.E. Dobbin
1943	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	P.N. Moore	C.E. Dobbin
1944	C.W. Henderson	M.F. Coolbaugh	R.D. Crawford	P.N. Moore	C.E. Dobbin
1945	W.P. Huleatt	M.F. Coolbaugh	J.W. Vanderwilt	P.N. Moore	C.E. Dobbin
1946	W.P. Huleatt	M.F. Coolbaugh	J.W. Vanderwilt	P.N. Moore	C.E. Dobbin
1947	W.P. Huleatt	J.W. Vanderwilt	M.F. Coolbaugh	P.N. Moore	C.E. Dobbin
1948	A.H. Koschmann	W.R. Hamilton	Fred Jones	W.M. Traver	Ogden Tweto

OFFICERS OF THE COLORADO SCIENTIFIC SOCIETY, 1883-2002—CONTINUED

The offices of First and Second Vice-President were combined into the office of Vice-President in 1949.

YEAR	PRESIDENT	VICE-PRESIDENT	TREASURER	SECRETARY
1949	A.H. Koschmann	H.A. Stewart	W.M. Traver	Ogden Tweto
1950	E.B. Eckel	T.H. Kuhn	W.M. Traver	Ogden Tweto
1951	E.B. Eckel	T.H. Kuhn	W.M. Traver	Ogden Tweto
1952	Ogden Tweto	V.L. Mattson	S.D. Hazen	J.F. Smith, Jr.
1953	G.M. Richmond	J.W. Adams	C.M. Harrer	J.F. Smith, Jr.
1954	H.A. Powers	R.U. King	C.M. Harrer	E.N. Hinrichs
1955	W.S. Twenhofel	B.F. Leonard, III	L.P. Buck	E.N. Hinrichs
1956	B.F. Leonard, III	D.J. Varnes	L.C. Huff	R.C. Pearson
1957	P.K. Sims	J.F. Smith, Jr.	J.C. Ratté	R.C. Pearson
1958	J.F. Smith, Jr.	Ernest Dobrovolny	J.C. Ratté	R.D. Miller

YEAR	PRESIDENT	VICE-PRESIDENT	TREASURER	SECRETARY
1959	T.A. Steven	R.P. Fischer	J.C. Ratté	R.D. Miller
1960	D.R. Crandell	M.R. Mudge	D.J. Young	R.E. Davis
1961	M.R. Mudge	R.J. Ross, Jr.	H.E. Simpson	R.E. Davis
1962	R.J. Ross, Jr.	L.C. Craig	H.E. Simpson	J.H. Irwin
1963	L.C. Craig	R.E. Davis	J.E. Case	J.H. Irwin
1964	R.E. Davis	J.H. Irwin	J.E. Case	A.B. Campbell
1965	A.B. Campbell	W.R. Hansen	P.A. Schneider	T.E. Mullens
1966	W.R. Hansen	R.C. Pearson	P.A. Schneider	T.E. Mullens
1967	R.C. Pearson	N.M. Denson	K.L. Pierce	B.H. Bryant
1968	N.M. Denson	W.C. Bradley	C.L. Pillmore	B.H. Bryant
1969	W.C. Bradley	G.R. Scott	C.L. Pillmore	P.W. Lipman
1970	G.R. Scott	S.S. Oriel	J.O. Maberry, II	P.W. Lipman
1971	S.S. Oriel	D.J. Varnes	J.O. Maberry, II	G.A. Izett
1972	D.J. Varnes	J.E. Harrison	J.O. Maberry, II	G.A. Izett
1973	J.E. Harrison	G.A. Izett	J.O. Maberry, II	J.E. Elliot
1974	G.A. Izett	W.M. Cady	J.R. Keith	J.E. Elliot
1975	W.M. Cady	J.W. Rold	B.M. Madsen	M.W. Reynolds
1976	J.W. Rold	G.L. Snyder	R.D. Brace	M.W. Reynolds
	(Councilors: Don Mabey, Kenneth Pierce, H. Roberta Dixon, Oza Rostad, Betty Skipp, Harry Tourtelot.)			
1977	G.L. Snyder	D.E. Trimble	R.D. Brace	M.J. Reheis
	(Councilors: Andrew Alpha, Richard Sheppard, Don Mabey, Kenneth Pierce, David Mackenzie, Harry Tourtelot.)			
1978	D.E. Trimble	J.O. Maberry, II	J.P. Ohl	M.J. Reheis
	(Councilors: Rudy Epis, Mitchell Reynolds, Andrew Alpha, Richard Sheppard, Don Mabey, Kenneth Pierce.)			

The office of Vice-President was retitled President-Elect in 1979.

YEAR	PRESIDENT	PRESIDENT-ELECT	TREASURER	SECRETARY
1979	D.R. Shawe	H.A. Tourtelot	J.P. Ohl	L.M. Carter
	Councilors: Charles Pillmore, Willis White, Rudy Epis, Mitchell Reynolds, Andrew Alpha, Richard Sheppard.)			
1980	H.A. Tourtelot	R.J. Weimer	J.P. Ohl	L.M. Carter
	Councilors: Edwin Post, Marjorie Mac Lachlan, Charles Pillmore, Willis White, Rudy Epis, Bruce Bryant (replaced Mitchell Reynolds).)			
1981	R.J. Weimer	R.C. Epis	R.M. Murphy	D.A. Coates
	(Councilors: Kenneth Holmes, William (Pat) Rogers, Edwin Post, Marjorie Mac Lachlan, Charles Pillmore, Willis White.)			
1982	R.C. Epis	D.B. Mackenzie	R.M. Murphy	D.A. Coates
	(Councilors: TLT (Trobe) Grose, Charles Naeser, Kenneth Holmes, William (Pat) Rogers, Edwin Post, Marjorie Mac Lachlan.)			
	William (Pat) Rogers.)			

OFFICERS OF THE COLORADO SCIENTIFIC SOCIETY, 1883-2002—CONTINUED

YEAR	PRESIDENT	PRESIDENT-ELECT	TREASURER	SECRETARY
1983	D.B. Mackenzie (term completed by Pillmore) (Councilors: James Muhm, Geoffrey Snow, Trobe Grose, Charles Naeser, Kenneth Holmes,	C.L. Pillmore	N.D. Naeser	T. Gafke
1984	C.L. Pillmore (Councilors: John Reed, Zell Peterman, James Muhm, Geoffrey Snow, Trobe Grose, Charles Naeser.)	B.H. Bryant	N.D. Naeser	J.R. Soule
1985	B.H. Bryant (Councilors: Vincent Matthews III, Jane Ohl, John Reed, Zell Peterman, James Muhm, Geoffrey Snow (Anson Mark replaced Vincent Matthews).)	M.W. Reynolds	C.F. Kluth	J.R. Soule
1986	M.W. Reynolds (Councilors: Christine Turner-Peterson, Peter Lipman, Anson Mark, Jane Ohl, James Muhm, Zell Peterman.)	T.L.T. Grose	C.F. Kluth	K.V. Evans
1987	T.L.T. Grose (Councilors: Stephen Olmore, Kathleen Johnson, Christine Turner-Peterson, Peter Lipman, Anson Mark, Jane Ohl.)	R.W. Fleming	D.C. Jonson	S.A. Sonnenberg
1988	R.W. Fleming (Councilors: K. Lee Shropshire, Robert Sweeney, Stephen Olmore, Kathleen Johnson, Christine Turner-Peterson, Peter Lipman.)	M.E. Mac Lachlan	D.C. Jonson	S.A. Sonnenberg
1989	M.E. Mac Lachlan (Councilors: Michael Machette, C.M. (K) Molenaar, K. Lee Shropshire, Robert Sweeney, Stephen Olmore, Kathleen Johnson.) (James Elliott replaced Stephen Olmore; Susan Bartsch-Winkler replaced Kathleen Johnson)	F.G. Poole	D.R. Nichols	K.J. Franczyk
1990	F.G. Poole (Councilors: Holly Stein, E. Allen Merewether, Michael Machette, C.M. (K) Molenaar, K. Lee Shropshire, Robert Sweeney)	G.S. Holden	D.R. Nichols	K.J. Franczyk
1991	G.S. Holden (Councilors: M.M. Coates, J.A. Murphy)	S.A. Sonnenberg	D.R. Nichols	J.L. Brown
1992	S.A. Sonnenberg (Councilors: M.M. Coates, J.A. Murphy, Erslev, N.D. Naeser)	M.N. Machette	D.R. Nichols	J.L. Brown
1993	M.N. Machette (Councilors: M.M. Coates, J.A. Murphy, E.A. Erslev, N.D. Naeser, M.C. Reheis, K.S. Kellogg)	J.C. Reed, Jr.	D.R. Nichols	G.N. Tempel
1994	J.C. Reed, Jr. (Councilors: E.A. Erslev, N.D. Naeser, M.C. Reheis, K.S. Kellogg, K.M. Haller, F.J. Adler)	S.M. Landon	P.L. Williams	D. Schleicher
1995	S.M. Landon (Councilors: M.C. Reheis, K.S. Kellogg, K.M. Haller, F.J. Adler, M.R. Hudson, S. Bartsch-Winkler)	R.F. Madole	P.L. Williams	J. A. Cappa
1996	R.F. Madole (Councilors: K.M. Haller, M.N. Machette, F.J. Adler, M.R. Hudson, L.R. Bader, J.A. Cappa, R.B. Wanty)	K.S. Kellogg	P.L. Williams	S.F. Personius
1997	K.S. Kellogg (Councilors: M.R. Hudson, L.R. Bader, J.A. Cappa, R.B. Wanty, M.L. Tuttle, W.D. Neese)	E. Erslev	M.N. Machette	S.F. Personius
1998	E. Erslev (Councilors: J.A. Cappa, R.B. Wanty, M.L. Tuttle, W.D. Neese, Eric Nelson, T. Ball)	K.L. Pierce	M.N. Machette	S.F. Personius
1999	K.L. Pierce (Councilors: M.L. Tuttle, W.D. Neese, E. Nelson, T. Ball, E. Evanoff, R. Jarrett)	M. Hudson	M.N. Machette	S.F. Personius
2000	M. Hudson (Councilors: E. Nelson, P. Calkin, E. Evanoff, S. Sonnenberg, S. Lundstrom, P. Weimer)	M. Tuttle	M.N. Machette	S.F. Personius
2001	M. Tuttle (Councilors: E. Evanoff, S. Sonnenberg, R. Fleming, S. Lundstrom, P. Calkin, G. Closs)	E. Nelson	M.N. Machette	S.F. Personius
2002	E. Nelson (Councilors: R. Fleming, S. Lundstrom, P. Calkin, G. Closs, J. White, J. McCray)	J. Cappa	D. Sweetkind	L. Finiol

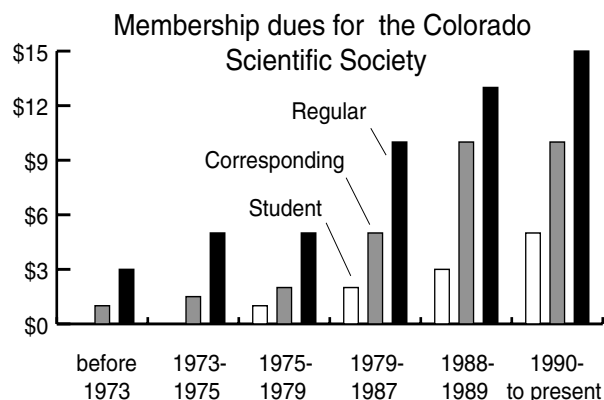
Finances

The Society has always been financed almost entirely by membership dues. Dues have ranged from \$2 to \$15 per year for regular members, the amount changing with publication activity in the years before 1955 and with other anticipated needs for money since then. During several long periods, when the Society was moribund or when manuscript publication was slow, dues were reduced or even suspended. The few modest cash gifts, as well as money received in commutation of dues from life members, commonly went to additions to the library or mineral collections. The only other significant source of funds was the Colorado Metal Mining Fund, which is mentioned in the section on publications.

Before 1988, the treasury was kept in checking and savings accounts and the balances ranged from as little as \$100 to as much as \$2,500. Back issues of the *Proceedings*, and two large specimens of rich gold ore, were carried on the books as assets for many years. As a result, in some years the net worth of the Society was more than \$20,000.

Such valuations were spurious, however, as estimates varied from one treasurer to another, and as most of the publication stocks were valued at retail sales prices. Finally, when an enlightened Council realized that the entire stock would never be sold at full price and that the Society was unlikely to recall and sell the gold specimens, these assets were written off the treasury books.

As with most small societies, treasurers' annual reports to the membership are audited by appointed committees. Money management has been conscientious, and no more than a few arithmetic errors have come to light throughout the years. As a nonprofit corporation, the Society pays no city, state, or federal taxes.



The balance in the Society's checking and savings accounts grew in the late 1970s and 80s to a high of a little over \$6,000 in 1985. Then the loss of members owing to layoffs and transfers of geologists, as well as the effects of inflation, caused a fairly rapid decline of the balance in the treasury to less than \$2,500 in 1989.

To maintain sufficient funds for activities and general operations, dues were increased in 1988 from \$10 to \$13 for regular members and again in 1990 to \$15; at the same time, dues for corresponding members were raised from \$8 to \$10 and for students from \$3 to \$5. Combined with cost reductions by changing meeting places and methods of printing the newsletter, the Society's operating budget improved greatly. By 1990, there were sufficient funds to establish an Endowment Fund by transferring \$5,000 from the checking. As a result, dues remain unchanged from 1990.

The Colorado Scientific Society Endowment Fund was started in 1990 at the suggestion of Barney Poole (1987 CSS President) in order to cover unanticipated increases in our operating expenses or to fund special activities. Between 1990 and 1993, the Treasurer of the Society invested this fund in bonds, preferred stocks, and mutual funds as per the suggestions of our financial advisor. In the past, CSS used the fund to conduct a membership drive, to sponsor student attendance on GSA field trips, and a variety of other activities not covered by the members' annual dues. CSS typically receives \$500-\$750 in donations to this fund each year.

The purpose of the Endowment Fund was to build reserves to the point that future dues increases would become unnecessary or, at least, less frequent. In 1993, the Endowment Fund's balance was about \$10,750. These funds are invested in collateralized mortgage obligation bonds (CMOs) of the Federal Government and in an open-ended GNMA (Government National Mortgage Association) mutual fund. Interest from these investments and new donations to the Endowment Fund are reinvested in the GNMA fund. By the early 1990's, the Society's total (yearly) revenues had increased to about \$25,000, a level which is a critical threshold for the Internal Revenue Service. The checking account, however, generally remains at a comfortable level of \$3,000 to \$5,000.

Upon the deaths of prominent members of the Society, generous donations in their memories allowed the Society to create memorial funds starting in 1983. Interest earned on these donations made to the funds are awarded each year to graduate students; these monetary awards help them continue their studies in those facets of geology that had been the life's interest of Ogden Tweto, Steven Oriol, Edwin Eckel, William

Pierce, and George Snyder. The memorial funds are treated more fully under *The Good Citizen*.

From Behind-the-Scenes Clerks to Computers

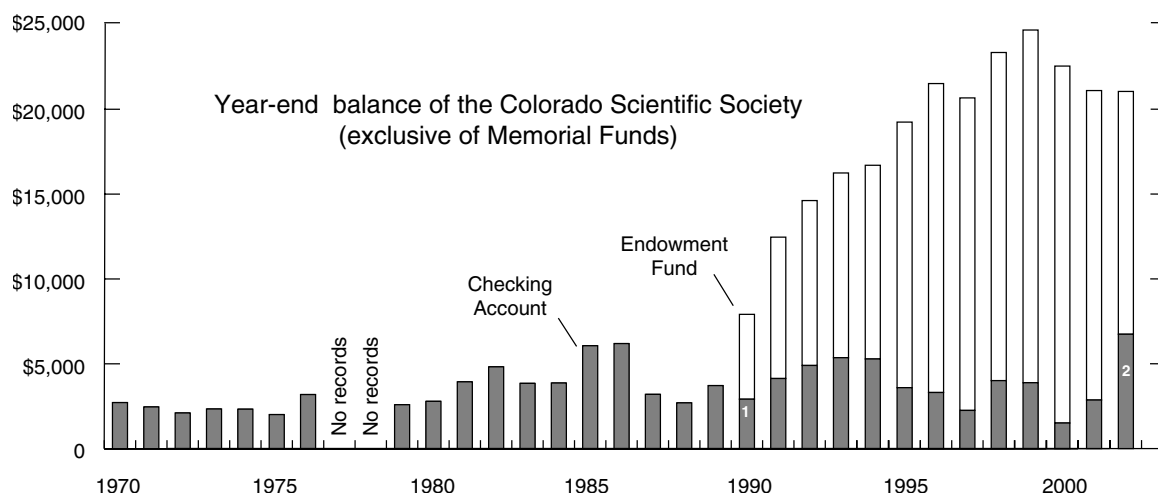
As is true of all societies, particularly those made up of scientists, much of the real work and much of the continuity of this Society was provided for many years by a long series of able but unheralded clerks. Working behind the scenes, few of their names have ever appeared on the records and to list those who are known would be unfair to the many anonymous ones. They are the ones who have kept the records, typed minutes and letters, filled orders for publications, mailed meeting notices, and have done all the other housekeeping chores that are necessary to keep even a small society alive.

In some of the early years, full-time secretaries were employed at salaries that seem pitifully small by today's standards (\$300 to \$580 per year in the early 1900s). These secretaries not only kept the records but maintained the library and the mineral collections. After their time, and possibly even earlier, most of the clerical work was done by the staff secretaries of one or another of the officers. Some of the work was done as a part of normal duties, but much was volunteered and done outside office hours. From time to time, wives of members have volunteered to perform the clerical duties; and some volunteers carried the burdens over long periods. Remuneration to the clerks has been consistently small as compared to the devotion, initiative, and labor on which the Society has depended so heavily. It has varied greatly, depending more on the whims of successive councils than on any other factor. Some secretaries have been paid on an hourly basis, but more often than not they have received year-end honoraria, plus the Society's thanks; honoraria have ranged from as little as \$5 to as much as \$50.

With the advent of personal computers, much of the laborious work formerly done by the Society's secretary, treasurer, and paid clerks has been automated. For example, from 1980 to 1989 Ed Post maintained the Society's membership list and printed mailing labels from his company's computer and, beginning in the mid-80s, the Society's newsletter was prepared using word-processors. To help reduce some of the clerk expenses, a subcommittee, established by the Council in 1988, recommended that many of the functions of the Society be consolidated and performed on a computer purchased or donated for this specific purpose. Two computers and a printer were donated by members and the Society entered the modern era of data management. The membership list and historical data currently are held in separate files in a data-base program from which mailing labels and a membership directory are prepared. A financial records program and a word processing program are used to keep check register records, prepare deposit slips, print budgets and treasurer's reports, and record investments of the Endowment Fund. Although these functions are time consuming, they currently are, and probably will continue to be, performed by one of the Society's members. An archive of the Society's written financial and membership records is maintained by the History Committee.

THE "HOMELESS" SOCIETY

In the terms of its business, such as correspondence, records, accounts, publication sales, and storage, the Society has never had a real home. It is not listed in city directories or telephone books, and its closest approaches to mailing addresses have been post office box numbers in Denver or Lakewood, or the addresses of its officers.



Notes: 1—Endowment fund established in 1989 with transfer of \$5,000 from Society's checking account.
2—Checking includes \$2,750 of outside funds for Road Sign project.

Business affairs have always been carried on in the offices or homes of one or more of its officers, principally its presidents, treasurers, and secretaries. In following this custom it has been no different from any other society that depends on volunteers for leadership and administration.

Aside from the public's occasional difficulties in communicating with the Society, the peripatetic nature of its "business office" presented no real obstacle to the smooth and economical running of the Society's affairs. The seemingly inevitable loss or attrition of some files as they pass from one officer to the next, or were stored in someone's office, has become a handicap to writing the history of the Society. The greatest loss, was a leather-bound record book started by S.F. Emmons, lost while the files were stored in the U.S. Geological Survey Field Records room at the Denver Federal Center. The need for office space, however, has been trivial compared to the need for two other kinds of space—rooms for the Society's book and mineral collections and rooms for its scientific meetings.

From the start, the founders had in mind the development of a geological museum and of a technical library that would serve not only the needs of the membership but would also be open to the citizens of a still comparatively raw frontier region. Both of these dreams were realized and both the library and museum collections contributed for many years to the intellectual growth of Denver and the surrounding region. As described on other pages, the need for both facilities eventually passed, but before it did, adequate housing for the collections was a recurring problem for the Society's management.

Though the book and mineral collections were eventually turned over to other custodians, the provision of adequate space for the monthly technical meetings, conveniently accessible, has posed a management problem since the birth of the Society and will probably continue as long as it exists.

During its first three decades, the Society lived in a variety of quarters in downtown Denver. Some of these were donated and some were rented. From time to time, excess space was sublet to other organizations. Nearly all of the temporary homes consisted of more than one room, so that regular meetings, library, and mineral collections all could be accommodated. Other places were found for special events, such as the 25th anniversary meeting of 1907, which was attended by 300 people.

During its first year, the Society met in the rooms of the U.S. Geological Survey, on the 6th floor of the Tabor

Block at 16th and Larimer in downtown Denver. In March 1884 it moved to rooms in the chambers of the Colorado Supreme Court where it stayed until April 1885; in May 1885, back to the U.S. Geological Survey office for one meeting; from June 1885 until May 1889 it met in the "Society room" of the Denver County Court House; from June 1889 to April 1894 it moved with its collections to the Denver High School; from May 1894 to March 1900 it rented a suite in the Boston Building at 17th and Champa Streets; then from April 1900 to March 1903 in the "Society rooms" of the Tabor Opera House Building; then from April 1903 to December 1907 in the Chamber of Commerce Building; then there was a move not well documented, but apparently to 1510 Court Place from 1908 to 1910; then in 1911 to 418 Boston Building.

Whether the library and mineral collections followed the Society in all these peregrinations is unknown, but in 1911 the mineral collections were moved to the North High School building, where they remained at least 3 years and were available to the public.

In 1914, and just before the written record of the Society became obscure, a new home was found. By action of the Board of Capitol Managers, the Colorado Scientific Society was granted free "permanent" use of a part of the newly completed Colorado State Museum at 14th and Sherman Streets. The 100- by 100-foot space so allotted was ample for housing the collections and for meetings. These quarters were presumably used for meetings until 1929. The mineral collections remained there, but the books were moved to the Denver Public Library in 1923. In 1929 the address was given as 428 New Post Office Building, then in 1930 through 1940 meetings were in the New Custom House.

Through the years, a single fruitless attempt to persuade the Society to build a home of its own was made. In his address as retiring president in 1908, Thomas L. Wilkinson had the temerity—and the vision—to propose that the Society buy two lots on Capitol Hill, in the area bounded by 14th and 20th Avenues and Sherman and Pennsylvania Streets. He presented architectural drawings of a proposed house, which, together with the land, was estimated to cost \$30,000. The property was to be financed by bonds purchased by Society members and friends. Interest and amortization of the bonds were not mentioned, but presumably they were to be paid off by application of rent money, which then cost \$1,200 per year. Perhaps Wilkinson's dream was inspired by S.F. Emmons, who had written a greeting to be read at the Society's 25th anniversary celebration in 1907. In it, Emmons had suggested that some of those who had profited from the Colorado mining

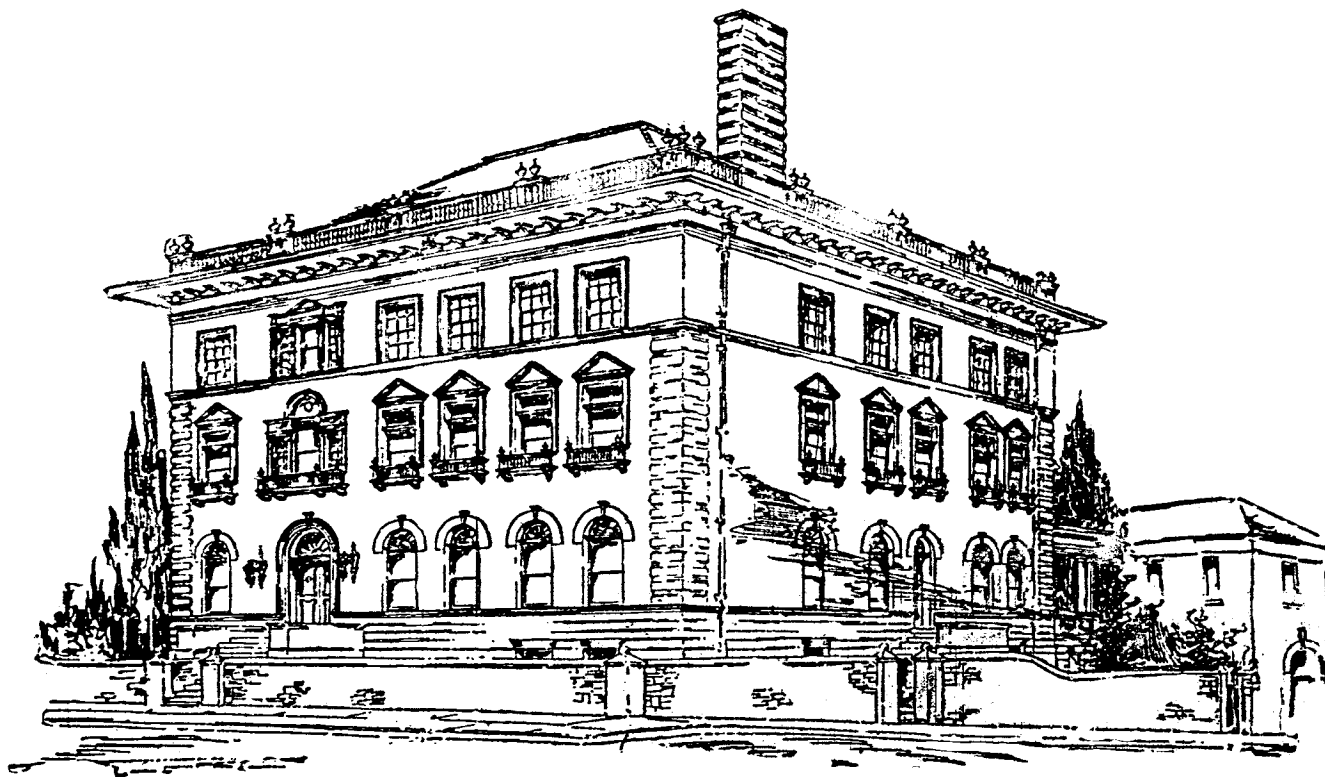
industry might wish to make substantial gifts to the Colorado Scientific Society, that it might better serve science and the public. In any event, the seeds sown by both Emmons and Wilkinson fell on infertile ground and nothing more was heard of their efforts.

From the revival of 1929 until the one of 1947, most of the business records of the Society were in the heads or files of the presidents and secretaries, J.W. Finch, C.W. Henderson, C.E. Dobbin, and W.P. Huleatt (with help, of course, from their staff clerks). Technical meetings were held in the auditorium of the Gas and Electric Building (Colorado Public Service Co.) at 15th and Champa and at various other places, including the 425 Denham Building, Denver.

The 1947 reorganization meeting was held at the Colorado Museum of Natural History (later to become the Denver Museum of Natural History, and currently the Denver Museum of Nature and Science), but regular technical meetings were moved to the University Club in Denver where they remained through September 1950. In October 1950 they were moved to the Petroleum Club, which was then on the second floor of the Edelweiss Restaurant on Glenarm Street. The April 1951 meeting was interrupted by smoke from

a fire in the Edelweiss kitchen. Meetings continued through March 1976 in the Petroleum Club even after it moved to its new building at 16th and Broadway. At both the University and Petroleum Clubs the Society was actually the guest of a sponsor who happened to be a member of the host club as well as a member of the Society. The generosity of these sponsors was commonly acknowledged at annual meetings, but they seldom received all the recognition they deserved.

For some time the Society had been trying to find a meeting place in Lakewood where most of the members lived. The population center of the membership had shifted westward from downtown Denver through the years. In April 1976 one meeting was held at the Knights of Columbus Hall in Edgewater. Finally in May 1976 a meeting room was found in the Holiday Inn at Colfax and Indiana Streets in Lakewood, and the Society meetings were held there until March 1978. In April 1978 the Applewood Inn became the home until December 1980. After that the meetings moved back to the Holiday Inn from February 1981 until December 1989. The Society then moved in 1990 in the Sheraton Hotel on Union Boulevard. In 1999, meetings were moved to the American Mountaineering Center in downtown Golden. This building originally housed



The University Club (Sherman St. and 17th Ave.)

Golden's high school and then junior high school. Most of these moves were made for economic reasons—less expensive rentals were important to the Society's exchequer.

Special events, such as the Emmons Lecture, past-presidents' dinner, and the annual family nights, which normally draw large audiences, were seldom held at the meeting sites, but were at convenient and attractive places where both meals and lecture facilities were available. In recent years, the Emmons Lectures have been given at the Green Center on the Colorado School of Mines campus in Golden.

SOCIETY EMBLEMS

Silver Gavel

A ceremonial silver gavel is the only one of the Society's many mineral specimens that has remained in its possession, and in use, through the years. It was presented to the Society in 1907 during the 25th anniversary meeting. The gavel was the gift of a long-time member, J.W. Richards, but the presentation to President T.L. Wilkinson was made in Richards' absence by E.N. Hawkins.

The gavel's body is an irregular mass of native silver from one of Colorado's mines, almost certainly the Mollie Gibson, in the Aspen district; it weighs 6 oz. troy. The handle, 5 oz. troy, was "gathered from ores of silver." It appears to have been hammered into shape, rather than cast. A photograph, published in the *Proceedings* at the time, shows that the gavel was tarnished and not particularly beautiful even in 1907; it is even less attractive now. In accepting the gift, the president said "May the decisions of the presiding officer of this Society, with this gavel his symbol of authority, always ring as true and clear as does this silver gavel." Presidents' voices still ring true, perhaps, but nowadays the gavel appears before the Society only at the annual meeting, where it is passed symbolically from outgoing to incoming presidents, most of whom store it in



The silver gavel

a dresser drawer or filing cabinet during their term of office.

Logo

A contest was held between May 17 and October 18, 1988, for an official redesign of the Colorado Scientific Society's logo. Nine entries were submitted by members of the Society members and their families. All were pictured in the November 1988 newsletter for popular vote by Society members. The design by Joan Harrison (wife of Jack Harrison, president in 1973) received the largest number of votes. Her design is shown in on the cover of this history and is pictured on the banner. In 1988-89, Bob Sweeney, a former historian for the Society, arranged to have the logo painted on paper and framed as a plaque to hang from the podium at each monthly meeting.

Paperweight

It has been a custom for more than 20 years to present a paperweight to each guest speaker at the monthly meetings. A logo created by Joan Harrison was executed in enamel and incorporated as a disk on squares of white marble for the Society's paperweight. The paperweights are manufactured locally in lots of one hundred. More recently, guest speakers receive a coffee mug with the society logo executed in enamel.

Banner

In May 1993, the Society obtained a banner for use at field trips and meetings. The banner has a colored version of the logo embroidered on a red field of cloth that measures 3 x 5 ft. It was designed by Lee-Ann Bradley, Bill Ellis, Kathy Haller, and Michael Machette, and was elegantly crafted by Jeanine Ellis. The banner has seen use at Society's booth at the U.S. Geological Survey Open House (May 1993) and on the spring and fall 1993 field trips. The logo has been modified slightly from previous versions to include a stream that flows from the mountains onto the plains.



Colorado Scientific Society Banner

SOCIETY HONORS

In the early years, the Broken Pick Award was commonly given at the same time as the Past Presidents' Award. Originally intended for the best informal communication delivered during the year, it came to be a reward for the longest, most rambling, or otherwise obnoxious discourse of the year. (In one case it was awarded to an abrasive member in the audience who talked to his companion throughout a speaker's presentation.) Its presentation tended to lighten otherwise dull and routine annual meetings and to alert members to some of their shortcomings as public speakers.

Prior to 1906 there was an A.B. Frenzel prize but little is known of its origin or character. In his report

for 1906, the secretary states that the Society had paid out the \$150 balance remaining in the prize fund.

Past-Presidents' Award

Since 1962, the Past-Presidents' Award has been presented at the annual meeting to the author of the best paper given during the preceding year; presidential addresses and Emmons lectures are excluded from consideration for this award. The awardee, who is selected by a committee of past presidents, is presented with a silver Revere-style bowl suitably engraved and with a traveling trophy—a wooden plaque with brass plates engraved with the name and the year of previous award winners.

PAST-PRESIDENTS AWARDS OF THE COLORADO SCIENTIFIC SOCIETY

(Presented for Best Presentation during the year)

- 1962—A.L. Brokaw, U.S. Geological Survey: Mineralization south of Ely, Nevada: Geochemical prospecting and structural mapping have revealed major mineralization coincident with a magnetic anomaly
—R.J. Weimer, Colorado School of Mines, and J.H. Hoyt: Callianassa major burrows, geologic indicators of littoral and shallow neritic environments
- 1963—L.C. Pray, Marathon Oil Co. and F.G. Stehli, Western Reserve University: Bone Spring bioherms, reefs or rubble, Permian of West Texas
- 1964—R.P. Sheldon, U.S. Geological Survey: Ancient trade wind belts and continental drift
- 1965—R. Armstrong and S.S. Oriel, U.S. Geological Survey: Tectonic development of the Idaho-Wyoming thrust belt
- 1966—H.W. Smedes, U.S. Geological Survey: Relation between faulting and volcanism near Butte, Montana
- 1967—C.R. Wilden, and R.W. Kistler, U.S. Geological Survey: Early Paleozoic orogeny in the Ruby Mountains, northeastern Nevada
- 1968—J.T. Andrews, Institute of Arctic and Alpine Research, University of Colorado at Boulder: Pattern and forms of post-glacial rebound in Arctic Canada
- 1969—W. Hamilton, U.S. Geological Survey: Plate tectonics and the western United States
- 1970—Capt. J.T. Neal, U.S. Army Airforce: Giant cracks in playas
- 1971—A.R. Zohdy, U.S. Geological Survey: Mapping basaltic aquifers in southern Idaho by deep electrical sounding
- 1972—E.E. Larsen, University of Colorado at Boulder: Nature of a geomagnetic reversal
- 1973—W.W. White, Climax Molybdenum Co. and W.B. MacKenzie, Mine Finders Inc.: Hydrothermal alteration associated with the Henderson molybdenite deposit
- 1974—K.L. Pierce, I. Friedman, and J.D. Obradovich, U.S. Geological Survey: Obsidian hydration dating of Yellowstone glaciations
- 1975—G.P. Eaton, U.S. Geological Survey: Deformation of Quaternary deposits in two intermontane basins of southern Arizona
- 1976—G.P. Eaton, H.J. Prostka, K.L. Pierce, and S.S. Oriel, U. S. Geological Survey: Cordilleran thermal anomaly
- 1977—T.W. Oelsleby, Marathon Oil Company: Geophysical investigations in Unaweap Valley, western Colorado
- 1978—C.E. Turner-Peterson and F. Peterson, U.S. Geological Survey: Facies controls in sandstone-type uranium deposits
- 1979—F. Royse Jr., Chevron Oil Company: Structural geology of the western Wyoming-northern Utah thrust belt and its relation to oil and gas accumulation
- 1980—D.A. Coates and C.N. Naeser, U.S. Geological Survey: Clinker and landform development in the southeastern Powder River basin
- 1981—C.M. Molenaar, U.S. Geological Survey: Stratigraphic relations of Nanushuk Group, a thick mid-Cretaceous deltaic sequence, and coeval slope and basal deposits, North Slope, Alaska
- 1982—R.L. Schuster, U.S. Geological Survey: Recent catastrophic landslides

- 1983—R.W. Hutchinson, Colorado School of Mines: Significance of tectonostratigraphic and compositional diversity in massive sulfide deposits
- 1984—C.D. Miller, U.S. Geological Survey: Recent developments in Long Valley California: assessment of potential volcanic hazards
- 1985—N.J. Silberling, U.S. Geological Survey: Mesozoic tectonic accretion in the western Great Basin
- 1986—D.A. Lindsey, U.S. Geological Survey: Laramide and Neogene structure of the northern Sangre de Cristo Range, Colorado
- 1987—D.R. Crandell, U.S. Geological Survey: Gigantic debris avalanche of Pleistocene age at Mount Shasta Volcano, California
- 1988—C.M. Molenaar (speaker), K.J. Bird, and L.B. Magoon, U.S. Geological Survey: Petroleum geology of the coastal plain of the Arctic National Wildlife Refuge, northeastern Alaska
- 1989—E.A. Erslev, Colorado State University, Fort Collins: Basement control of Rocky Mountain uplifts
- 1990—M.B. Goldhaber, U.S. Geological Survey: Rifts, elephant tracks, and the southeast Missouri lead belt
- 1991—S.M. Landon, Consultant: Comparison of the Midcontinent Rift, USA, and the East African Rift System
- 1992—M.L. Tuttle, U.S. Geological Survey: Understanding the 1986 Lake Nijos disaster, Cameroon West Africa
- 1993—S.T. Hasiotis, University of Colorado at Boulder: Crayfish and their burrows - the antiquity of behavior
- 1994—W.J. Harrison, Colorado School of Mines: Disposal of CO₂ in ocean basins
- 1995—T.J. Casadevall, U.S. Geological Survey: Active volcanos in the Goma Region, Zaire and their role in the Rwandan Refugee crisis
- 1996—J.T. Turk, U.S. Geological Survey: Risk in the Rockies
- 1997—J. Butler, NOAA: Climate monitoring and diagnostics: quantifying the source and sinks of atmospheric methyl bromide
- 1998—R. Clark, U.S. Geological Survey: The use of spectroscopy data for geological and environmental studies
- 1999—R.M. Kirkham, Colorado Geological Survey: Dissolution of evaporites causes widespread active collapse in west-central Colorado
- 2000—Art Snoke, University of Wyoming: Geological evolution of Tobago, West Indies
- 2001—Carol Finn, U.S. Geological Survey: Aerogeophysical measurements of collapse-prone hydrothermally altered zones at Mount Rainier volcano
- 2002—Dan Muhs, U.S. Geological Survey: San Dunes on the Great Plains and their not-so-ancient history

Honorary Membership

A new class of member—Honorary Member—was established by a change in the Constitution in 1894. Ever since, election to honorary membership has been the highest honor that the Society can bestow.

Whitman Cross and William Hillebrand were the first Honorary Members to be recorded, in 1896. By 1906, Honorary Fellow and Fellow classes had sprung up. Emmons, Hillebrand, and Cross are listed as Fellows in that year. Probably others of the founding fathers, were later elevated to honorary membership, but the records are incomplete. In 1907, there were 7 Honorary Fellows and 14 Fellows. By 1910 there were 15 Fellows in each of the two classes, but none of the names are known.

When the Society was revived after World War II the new Constitution provided for but two membership classes—Honorary Member and Member. Later, Corresponding and Student classes were established. As shown in the accompanying list, numerous honorary memberships have been bestowed since 1949.

Criteria for honorary membership have never been very clearly stated, though several councils have dis-

cussed them and tried to arrive at firm, workable definitions. Most of the proposed criteria have included the following points, though a glance at the list of honorees suggests that they have been somewhat loosely applied at times.

Criteria for Honorary Membership

1. Member of Society at the time of election.
2. Significant contributions to science in the Rocky Mountain area.
3. Active participation in Society affairs.

Notably, age is not one of the criteria. Presumably lifetime exemption from dues was the only tangible reward for the early Honorary Fellows. Beginning in 1949, and for some years thereafter, each honoree received a distinctive and highly attractive sheet of sterling silver, photoengraved, and encased in a leather folder; it was modeled on the Colorado School of Mines diploma of the period. More recently (since the late 1970s), the high costs of silver and of labor have forced new Honorary Members to be content with remission of dues, possession of an embossed paper certificate (suitable for framing), and the respect of their colleagues.

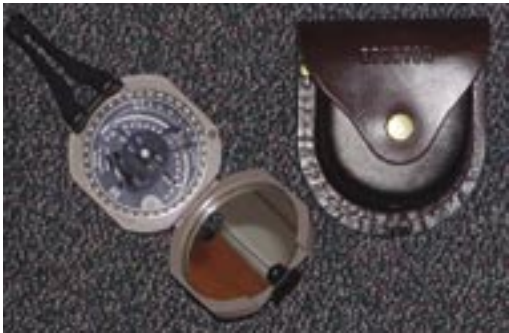
HONORARY MEMBERS OF THE COLORADO
SCIENTIFIC SOCIETY
(Incomplete prior to 1949)

1896	Whitman Cross, William F. Hillebrand	1974	Glenn R. Scott, Thomas A. Steven, David J. Varnes
1897	Peter H. Van Diest	1975	Thomas A. Hendricks, Richard M. Pearl
1897(?)	Arthur R. Wilfley	1976	Wallace R. Hansen, Benjamin F. Leonard, III
1902	Samuel F. Emmons	1977	Steven S. Oriel, Paul K. Sims
1905	Richard C. Hills	1978	William C. Bradley, John W. Rold
1906	Richard Pearce	1979	Norman M. Denson
1907	Regis Chauvenet, William P. Headden	1980	Dwight R. Crandell, Glen A. Izett
1909	George L. Cannon, Jr.	1981	Peter W. Lipman, Daniel R. Shawe, George L. Snyder
1911	Lucien I. Blake, Franklin Guiterman	1982	Bruce H. Bryant, Harry A. Tourtelot
1912	George E. Collins	1983	Marjorie E. Mac Lachlan, Edwin D. McKee
1913	Irving Hale	1984	Edwin V. Post, Reuben J. Ross, Jr.
	<i>Four charter members whose memberships had lapsed were reinstated as Honorary Members: Anton Eilers, H. Martyn Hart, Albert H. Low (life member), and A. Von Schulz</i>	1985	Jack E. Harrison
1933	William F.R. Mills	1986	Warren B. Hamilton
1949	John W. Finch, Arthur O. Ridgway	1987	Stewart R. Wallace
1951	Walter C. Mendenhall	1988	John D. Haun, John C. Reed, Jr.
1956	Paul Billingsley, Clark B. Carpenter, C.E. Dobbin, J. Harlan Johnson, Albert H. Koschmann	1989	Charles L. Pillmore
1957	Wilbur S. Burbank, Augustus Locke, Thomas S. Lovering	1990	Thomas L.T. Grose, Vera H. Sable
1960	Edwin B. Eckel	1991	David B. Mackenzie, Robert W. Fleming
1962	Clyde P. Ross (proposed in 1956, but not awarded until 1962).	1992	Forrest G. Poole
1965	James Gilluly, Ogden Tweto, John W. Vanderwilt	1993	Donald Nichols, Stephen Sonnenberg
1966	Howard A. Powers	1994	----
1970	Harald W.C. Prommel (elected but died before presentation.)	1995	Michael Machette
1970	Francis M. Van Tuyl(?)	1996	Frank Adler, Greg Holden, Susan Landon
1971	Gerald M. Richmond	1997	Richard Madole
1973	N. Wood Bass, Stanley W. Lohman, Robert J. Weimer	1998	Karl Kellogg, Lee Shropshire
		1999	Eric Erslev, Randy Schumann
		2000	Kenneth Pierce
		2001	Mark Hudson
		2002	Michelle Tuttle

Members Who Were Inventors

Four of the early members of the Colorado Scientific Society were famous for their scientific inventions. The following biographies of the inventors are from published biographies, Society proceedings, and local news accounts.

David W. Brunton (1849-1927) was a mining engineer. He invented the pocket transit, or Brunton compass, for miners and mining engineers; it has been used for many years by geologists doing geologic mapping. Brunton worked on the Toronto and Nipissing Railroad and at surveying and plotting several Colorado towns. He served as chairman of the board of engineers of the Moffat-Evans Tunnel Commission. He wrote a book on tunneling and published several papers on mining districts. Brunton was a member of several mining organizations in the U.S. and Britain. He was awarded medals for his achievements in the mining industry.

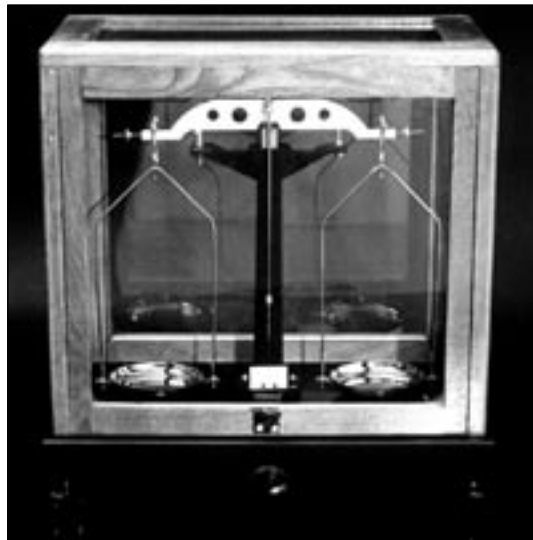


Brunton
Pocket
Transit

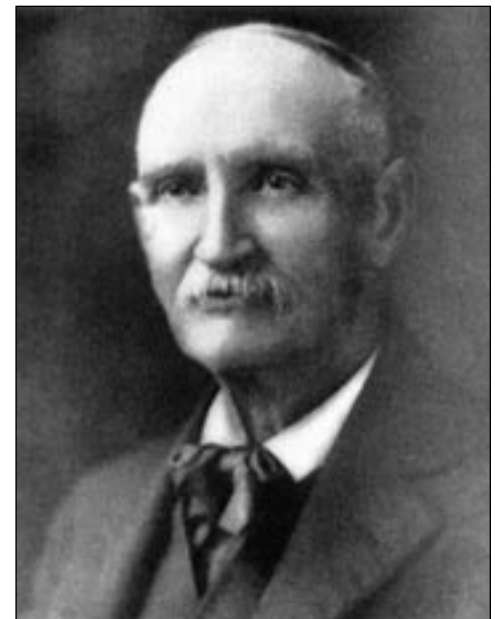


David W. Brunton

William Ainsworth (1850-1917), born in England, was a watchmaker and jeweler by trade. In 1875, he came to work in Central City, Colorado, but moved to Denver in 1877. After years of repairing balances used in assay work, he designed a sensitive short-beam assay balance. In 1876, he formed William Ainsworth & Sons, Inc., which specialized in surveying instruments and general scientific apparatus and pioneered the use of aluminum for fractional weights and riders. During World War I, manufacturing resources of his company were used by the Army and Navy.



Ainsworth
Balance



William Ainsworth

Arthur Redman Wilfley (1860-1927), born in Maryville, Missouri, was a miner, prospector, engineer, and mineral surveyor. He worked in Kokomo, CO, where he operated a smelter, and in Nogales, AZ, as the general manager of the West Mining and Milling Co. He invented the Wilfley ore-concentrating table in Arizona, but later moved to Denver as his business grew. He also invented a wet-gravity slime table, an ore roasting furnace, and a centrifugal pump for pulp mills. In addition, Arthur Redman Wilfley was an avid art collector.



Wilfley Table

John Van Nostrand Dorr (1872-1962), was born in Newark, New Jersey, and educated at Rutgers University. He was a chemical engineer, metallurgist and inventor. Dorr worked as a consultant primarily in metallurgy, but also in chemical, industrial, and sanitary engineering. He worked on the cyanidation and concentration of gold and silver ores. Dorr was a managing partner of Lundberg, Dorr, and Wilson from 1901 to 1913 and president of Dorr Cyanide Machinery Co., later known as the Dorr Co. and Dorr-Oliver, Inc. Dorr was a member of many scientific societies and was awarded several medals for his accomplishments. He held seven honorary degrees, including honorary doctorates from the South Dakota School of Mines, Michigan College of Mining and Technology, and Columbia University. He was the inventor of the Dorr Classifier, Dorr Thickener, and Dorr Agitator.



Arthur Redman Wilfley



John Van Nostrand Dorr



Dorr Classifier

Other Honors

Since creation of the Society, fossils and minerals have been named after our members. Twenty-two new minerals have been named after members as shown on the accompanying list. Most of these minerals come from the Western United States, but there have been two discoveries in Mexico and another in Bolivia. Three early minerals named have been discredited; these are Beegerite, Guitermanite, and Vandiestite.

An even larger number of fossils have been names after our members. All together, 148 new fossils have been named after 39 members (see accompanying list). The most prolific attractor of fossil names among our members has been Timothy William Stanton, an invertebrate paleontologist with the U.S. Geological Survey in Denver. Twenty-eight fossils have been named for Stanton. The most recent naming is for a Tyrannosaur footprint discovered in 1980 by C.L. Pillmore.

MINERALS NAMED AFTER COLORADO SCIENTIFIC SOCIETY MEMBERS

MINERAL	FORMULA	NAMED FOR AND YEAR	LOCATION
Beegerite*	$Pb_6Bi_2S_9$	Hermann Beeger, 1881	Old Lout Mine, Ouray, Colorado
Ilesite	$(Mn,Zn,Fe)SO_4 \cdot 4H_2O$	Malvern W. Iles, 1881	Hall Valley, Park Co., Colorado
Guitermanite*	$Pb_{10}As_6S_{19}$	Franklin Guiterman, 1884	Zuni Mine, Silverton, Colorado
Emmonsite	$Fe_2(TeO_3)_3 \cdot 2H_2O$	Samuel Franklin Emmons, 1885	Tombstone, Arizona
Crossite	$2[Na_2(Mg,Fe^{+2})_3(Fe,^{+3}Al)_2Si_8O_{22}(OH)_2]$	Charles Whitman Cross, 1894	California
Pearceite	$9Ag_2S \cdot As_2S_3$	Richard Pearce, 1896	Marysville, Lewis and Clark Co., Montana
Vandiestite*	Complex	Pieter Hendrik Van Diest, 1899	Sierra Blanca [Peak], Costilla Co., Colorado
Rickardite	Cu_4Te_3	T.A. Rickard, 1903	Vulcan, Gunnison Co., Colorado
Weissite	Cu_5Te_3	Loui Weiss, 1903	Gunnison Co., Colorado
Hillebrandite	$Ca_2SiO_4 \cdot H_2O$	William Francis Hillebrand, 1908	Durango, Mexico
Kempite	$MnCl_2 \cdot 3MnO_2 \cdot 3H_2O$	James Furman Kemp, 1924	California
Penroseite	$PbSe \cdot Cu_2S \cdot (Ni,Co)Se_3$	Richard Alexander Fullerton Penrose, 1926	Bolivia
Loughlinite	$Na_2Mg_3Si_6O_{16} \cdot 8H_2O$	Gerald Francis Loughlin, 1947	Wyoming
Burbankite	$(Ca,Sr,Ba,Ce,Na)_6(CO_3)_5$	Wilbur Swett Burbank, 1953	Montana
Caswellsilverite	$NaCrS_2$	Caswell Silver, 1958	Norton County, Kansas
Brockite	$(Ca,Th,Ln)[(PO)_4(CO_3)] \cdot H_2O$	Maurice Rex Brock, 1962	Wet Mountains, Colorado
Antimonpearceite	$(Ag,Cu)_{16}(Sb,As)_2S_{11}$	Richard Pearce, 1963	Marysville, Lewis and Clark Co., Montana
Zellerite	$4[CaUO_2(CO_3)_2 \cdot 5H_2O]$	Howard D. (Whitey) Zeller, 1963	Lucky Mc Mine, Fremont Co., Wyoming
Metazellerite	$4[CaUO_2(CO_3)_2 \cdot 3H_2O]$	Howard D. (Whitey) Zeller, 1968	Lucky Mc Mine, Fremont Co., Wyoming
Billingsleyite	$Ag_7(As,Sb)S_6$	Paul Billingsley, 1968	East Tintic District, Utah
Polhemusite	$(Zn,Hg)S$	Clyde Polhemus Ross, 1978	Idaho
Benleonardite	$Ag_8(Sb,As)Te_2S_3$	Benjamin F. Leonard, III, 1986	Sonora, Mexico
Aheylite	$FeAl_6(PO_4)_4(OH)_8 \cdot 4H_2O$	Allen V. Heyl, 1986	Bolivia
Gillulyite	$Tl_2(As,Sb)_8S_{13}$	James Gilluly, 1991	Utah

*Discredited.

FOSSILS NAMED AFTER COLORADO SCIENTIFIC SOCIETY MEMBERS

- BASS, N. Wood, 1893-1979, geologist, USGS. Author of reports on central Kansas and Glenwood Springs area, Colorado, and on oil and gas.
Tragodesmoceras bassi Morrow—an ammonite.
- BOWN, Thomas M., vertebrate paleontologist, USGS.
Viverravis boweni Gingerich—a vertebrate.
Saghatherium boweni Rasmussen and Simons—Eocene hyracoid.
- CANNON, George Lyman, Jr., 1860-1922, school teacher in Denver, assistant geologist USGS. Author of many articles about the fossils near Denver.
Cissus? cannoni Knowlton—a plant.
Ficus cannoni Knowlton—a plant.
Miocidaris cannoni—an echinoderm?
Palmoxylon cannoni Stevens—a plant.
Rhamnus cannoni Knowlton—a plant.
- CRAGIN, Francis Whittemore, 1857-1937, paleontologist and professor, Colorado College; Colorado historian. Collected anecdotes from fur trappers and early settlers along the Arkansas River Valley.
Anisomyon cragini Twenhofel—a cap snail.
Craginaster Lambert—a genus of echinoid.
Craginia Stephenson—a gastropod genus.
Hipparion cragini Hay—a horse.
Serpula cragini Twenhofel—a worm.
Trigonia cragini Stoyanow—a lamellibranch clam.
- CROSS, Charles Whitman, 1854-1949, geologist, USGS, co-founder and charter member of Colorado Scientific Society. Author of reports on Cripple Creek, Rosita, and San Juan Mountains.
Asplenium crossi Knowlton—a plant.
Athyrium crossi (Knowlton)—a plant.
Dennstaedtia crossiana Knowlton—a plant.
Diplazium crossi (Knowlton)—a plant.
Fagus crossi Knowlton—a plant.
Ficus crossi Ward—a plant.
Juglans crossi Knowlton—a plant.
Nelumbo crossi Knowlton—a plant (same as *Nelumbium crossi* Knowlton).
Pinus aristata crossi (Knowlton) Cockerell—a plant.
Quercus whitmani Knowlton—a plant.
Quercus crossii Lesquereux—a plant.
- ELDRIDGE, George Homans, 1854-1905, geologist, USGS. Coauthor of monograph on geology of the Denver area.
Ficus eldridgi Knowlton—a plant.
- EMMONS, Samuel Franklin, 1841-1911, geologist, USGS. Cofounder and charter member of Colorado Scientific Society. Author of report on geology of Leadville, Colorado.
Cornus emmonsii Ward—a plant.
Cymbophora emmonsii Meek—a clam.
- Euestheria emmonsii* (Raymond)—a conchostraca.
Hardouinia mertonis emmonsii (Stephenson)—an echinoid (same as *Cassidulus emmonsii*).
Hypothyridina emmonsii (Hall and Whitfield)—a brachiopod.
- FIGGINS, Jesse Dade, 1867-1944, paleontologist, director, Colorado Museum of Natural Science (now, Denver Museum of Nature and Science), fossil vertebrates.
Yumaceras figginsi—a vertebrate?
- GEORGE, Russel D., 1866-1955, geologist and chief, Colorado Geological Survey.
Dryopteris georgei Knowlton—a plant.
- GILBERT, Grove Karl, 1843-1918, geologist, USGS. Author of reports on laccoliths of the Henry Mountains, history of Lake Bonneville, and the transportation of debris by running water. He was USGS chief geologist and one of America's foremost geologists.
Alula gilberti White—a clam.
Baculites gilberti Cobban—an ammonite.
Calycoceras (Conlinoceras) gilberti Cobban and Scott—an ammonite.
Inoceramus gilberti White—a clam.
Olenellus gilberti Meek—a triobite.
Sulcoretepora gilberti (Meek)—a bryozoan.
- GILL, James R., 1922-1972, geologist, USGS. Author of reports on stratigraphy and paleontology of Cretaceous rocks, and on uranium deposits.
Hoploscaphites gilli Cobban and Jeletzky—an ammonite.
- GILLULY, James, 1886-1980, geologist, USGS. Coauthor of a geology textbook.
Ostrea gillulyi Reeside—an oyster.
- HANLEY, John, 1946-1986, paleontologist, USGS.
Scenedesmus hanleyi Fleming—alga.
- HENDERSON, Junius, 1865-1937, paleontologist, University of Colorado.
Gonyodiscus hendersoni Russell—a gastropod.
Morella hendersoni (Cockerell)—a plant (same as *Myrica hendersoni*)
Ophryastites hendersoni Cockerell—an insect, Coleoptera.
Petrolestes hendersoni Cockerell—an insect, Odonata.
Phenacocladus hendersoni Cockerell—an algae.
Ponera hendersoni Cockerell—an insect.
Syrphus(?) hendersoni James—an insect, Diptera.
Zizyphus hendersoni Knowlton—a plant.
- HILLS, Richard Charles, 1848-1923, geologist, USGS. Reports on Trinidad-Walsenburg area.
Cyperacites hillsii Knowlton—a plant.
Polystichum hillsianum Hollick—a plant.

- IZETT, Glen Arthur, geologist, USGS. Author of reports on areas in Colorado, on the Tertiary-Cretaceous boundary, and on tephrochronology and geochronology.
Washakius izetti Honey—a primate.
- JACKSON, William H., 1843-1942, photographer of Hayden's Geological and Geographical Survey of the Territories. Famous frontier photographer and artist.
Populus jacksoni Knowlton—a plant.
- JENSEN, Fred S., geologist, USGS.
Baculites jenseni Cobban—an ammonite.
- JOHNSON, Jesse Harlan, 1892-1974, paleontologist and professor, Colorado School of Mines.
Dactylophyllum johnsoni Read—a plant.
Gyrodes johnsoni Reeside—a snail.
- KEEFER, William Richard, geologist, USGS.
Colpoclaenus keeferi Gazin—a vertebrate.
- LAKES, Arthur, 1844-1917, paleontologist and professor, Colorado School of Mines; geologist, USGS. Codiscoverer of first dinosaurs of the West at Morrison, Colorado.
Aspidium lakesii (Lesq.) Knowlton—a plant.
Carpites lakesii Knowlton—a plant.
Carpolithes lakesii Knowlton—a plant.
Cornus lakesii Knowlton—a plant.
Dryopteris lakesii (Lesq.) Knowlton—a plant (same as *Sphenopteris lakesii* Lesq.).
Ficus lakesii Knowlton—a plant.
Laurus lakesii Knowlton—a plant.
Agnolia lakesii Knowlton—a plant.
Nelumbium lakesianum Lesq.—a plant.
Nelumbium lakesii Lesq.—a plant.
Nelumbo lakesiana (Lesq.) Knowlton—a plant.
Neorthoblattina lakeii Scudder—an insect.
Poroblattina lakesii Scudder—an insect.
Viburnum lakesii Lesq.—a plant.
- LANDIS, Edwin Robert, geologist, USGS.
Paracompsoceras landisi Cobban—an ammonite.
- MAC LACHLAN, Marjorie Elizabeth Hindle, geologist, USGS.
Perissopliomera Mac Lachlani Ross—a trilobite.
- MAC NEIL, Francis Stearns, 1909-1983(?), paleontologist, USGS.
Quercus macneili Brown—a plant.
Turritella macneili Stephenson—a gastropod.
- MC KEE, Edwin Dinwiddie, 1906-1984, geologist, USGS; former professor at University of Arizona; former naturalist at Grand Canyon National Park. Foremost world expert on dune sands.
- Anisopyge mckeei*—Middle Permian trilobite.
Aulametacoceras mckeei—Middle Permian nautiloid.
Glossopleura mckeei—Middle Cambrian trilobite.
Kootenia mckeei—Middle Cambrian trilobite.
Linguella mckeei—Middle Cambrian brachiopod.
Peniculauris mckeei—Middle Permian brachiopod.
Pseudogastrioceras mckeei—Middle Permian ammonoid.
Rotodactylus mckeei—Lower Triassic reptile.
Septabrunsiina mckeei—Mississippian foraminifer.
- MEREWETHER, Edward Allen, geologist, USGS.
Euomphaloceras merewetheri Cobban, Hook and Kennedy—an ammonite.
- MOLENAAR, C.M., 1920-1990, geologist, USGS.
Cibolaites molenaari—an ammonite.
- MUDGE, Melville Rhodes, geologist, USGS.
Leioptegium mudgei Ross—a trilobite.
Micrantyx mudgei Gutschick—a microfossil.
- PEARSON, Robert Carl, geologist, USGS.
Libotoniuss pearsoni Wilson—a fish.
- PILLMORE, Charles Lee, geologist, USGS. Reports on Raton area of New Mexico and on K-T boundary.
Tyrannosauripus pillmorei (ichnogen. et. ichnosp. nov.) Lockely and Hunt—a dinosaur footprint.
- POOLE, Forrest Graham, geologist, USGS.
Palmatolepis poolei Sandberg and Ziegler—a conodont species.
Pseudoleperditia poolei Schneider—an ostracode species.
- ROSS, Clyde Polhemus, geologist, USGS.
Isomicraster rossi Cooke—an echinoid.
- ROSS, Reuben James, Jr., invertebrate paleontologist, USGS; professor, Colorado School of Mines.
Rossoceras Flower—a cephalopod genus.
Rossaspis Harrington—a trilobite genus.
Rossodus—a conodont genus.
- SANDBERG, Charles Albert, geologist, USGS.
Siphonodella sandbergi Klapper—a conodont.
- SCOTT, Glenn Robert, geologist, USGS. Reports on many areas in Colorado and New Mexico.
Baculites scotti Cobban—an ammonite.
Drepanochilus scotti Sohl—a snail.
Inoceramus scotti Walaszczyk—mollusk
Nigericeras scotti Cobban—an ammonite.
- SKIPP, Betty Ann Lindberg, geologist, USGS.
Skippella Mamet—a foraminifera genus.

STANTON, Timothy William, 1860-1953, invertebrate paleontologist, USGS. Specialist on the Cretaceous rocks of the Western Interior of the United States.

Barroisiceras (Forresteria) stantoni Reeside—an ammonite.
Cardium stantoni Wade—a clam.
Castalia stantoni Knowlton—a plant.
Chara stantoni Knowlton—an algae (charophyte).
Cinamomum stantoni Knowlton—a plant.
Coloboceras stantoni Anderson—plant.
Cophocara stantoni Anderson—an ammonite.
Cycadeoidea stantoni Ward—a plant.
Cymbophora stantoni (Arnold)—a clam.
Dimorphesia stantoni Wells—a coral.
Ficus stantoni Hollick—a plant.
Gastrolites stantoni McLearn—an ammonite.
Hardouinia stantoni (Clark)—an echinoid.
Haydenia stantoni Henderson—a mollusk.
Heminautilus stantoni Scott—a nautiloid.
Inoceramus stantoni Sokolow—a clam.
Lilloettia stantoni Imlay—an ammonite.
Macluritella stantoni Kirk—a gastropod.
Mesoneritina stantoni (White)—a snail.
Nemodon stantoni Gardner—a worm.
Nerinella stantoni Cragin—a gastropod.
Nilsonia stantoni Ward—a plant.
Nostoceras stantoni Hyatt—an ammonite.
Parahoplites stantoni Anderson—an ammonite.
Pecten (Chlamys) stantoni Hill—a clam.
Placentoceras stantoni Hyatt—an ammonite.
Plesiovasoceras stantoni Reeside—an ammonite.
Podocarpus? stantoni Knowlton—a plant.
Protodonax stantoni Vokes—a pelecypod.
Pseudamaura stantoni Cossman—a snail.
Ptychomya stantoni Conrad—a lamellibrach clam.
Pyrgulifera stantoni White—a snail.
Quercus stantoni Knowlton—a plant.
Salix stantoni Knowlton—a plant.
Sargana stantoni Weller—a gastropod (same as *Rapana stantoni* Weller).
Scaphites depressus Reeside var. *stantoni* Reeside—an ammonite.
Scaphites stantoni Reeside—an ammonite.
Sonneratia stantoni Anderson—an ammonite.
Sphenodiscus stantoni Hyatt—an ammonite.
Stantonella Wade—a gastropod genus.
Stantonoceras Johnston—an ammonite genus.
Stantonogyra silberlingi Stanton—a snail.
Tarrantoceras stantoni Stephenson—an ammonite.
Traskites (Stantonites) Hyatt and Smith—an ammonite genus.
Vitis stantoni Knowlton—a plant.
Vorticoceras stantoni Scott—a nautiloid.

TAYLOR, Michael E., invertebrate paleontologist, USGS.
Palaeobotryllus taylori Muller—a problematica, possibly a Tunicate.

TSCHUDY, Robert H., 1908-86, paleobotanist, USGS.
Scenedesmus tschudyi Fleming—alga.

VINE, James David, geologist, USGS.
Vinea Wolfe—a plant genus.

MINOR PLANET NAMED FOR COLORADO SCIENTIFIC SOCIETY MEMBER

Eugene Shoemaker named a minor planet that he discovered after Charles L. Pillmore of the U.S. Geological Survey. Minor planet Pillmore (4368) is orbiting in the outer asteroid belt on an unusual high-inclination orbit. It has an estimated diameter of about 35 km and is about 3,400 square kilometers in surface area.

GEOGRAPHIC FEATURES IN THE ANTARCTIC NAMED FOR COLORADO SCIENTIFIC MEMBERS

Several geographic features in Antarctica were named for geologists who are members of the Society and who did research there. The features are listed in the second edition of a volume published in 1995 by the United States Board on Geographic Names titled “Geographic Names of the Antarctic.”

BEHRENDT, John C., seismologist, U.S. Geological Survey. Behrendt Mountains

CARRARA, Paul E., geologist, U.S. Geological Survey. Mount Carrara

DOVER, James H., geologist, U.S. Geological Survey. Mount Dover

HAMILTON, Warren B., geologist, U.S. Geological Survey. Hamilton Cliff

KELLOGG, Karl S., geologist, U.S. Geological Survey. Kellogg Glacier

LIDKE, David J., geologist, U.S. Geological Survey. Lidke Ice Stream

NELSON, Willis H., geologist, U.S. Geological Survey. Nelson Peak

NUTT, Constance J., geologist, U.S. Geological Survey. Nutt Bluff

O’NEILL, John M., geologist, U.S. Geological Survey. O’Neill Peak

REYNOLDS, Richard L., geologist, U.S. Geological Survey. Reynolds Bench

ROWLEY, Peter D., geologist, U.S. Geological Survey. Rowley Massif

SCHMIDT, Dwight, geologist, U.S. Geological Survey. Schmidt Hills

WILLIAMS, Paul L., geologist, U.S. Geological Survey. Williams Hills

ACTIVITIES AND ACCOMPLISHMENTS

Scientific Meetings

From its inception, the Society was dedicated to diffusion of scientific knowledge by means of the spoken and written word. The spoken word, represented by orally presented, illustrated "papers" at regular meetings, has continued throughout its life. During the past two decades, since the cessation of publications, the monthly meetings have been the principal reason for continuation of the Society.

Meeting format has changed, but little since it was established by President Emmons in 1883. The Society holds nine evening meetings each year. Early in the year, usually in January, but occasionally in February, we invite a scientist from an out-of-town organization to give the Emmons lecture. The chief business is the presentation of one or more illustrated scientific talks. The talks are generally of professional quality, and summarize recent field or laboratory findings of the speakers. Their main purpose is to spread scientific knowledge, but they also help the speakers themselves, who can hone their skills in oral presentation and can benefit from often spirited discussion of their ideas by friendly but critical peers. This lecture series is commonly held in an auditorium on the Colorado School of Mines campus. It is large enough to hold Society members and professional geologists and geology students from nearby colleges. The Emmons

lecturer is invited by the President-Elect. The five regular monthly meetings feature two talks. One evening meeting is "Family Night" and one is "Student Night." Family Nights include a dinner and a guest speaker who talks about a scientific subject of general interest. Student Night is devoted to three talks given by graduate students from nearby colleges—usually Colorado School of Mines, Colorado State University, and University of Colorado. The object of Student Night is to promote an exchange of scientific ideas between our Society and future fellow scientists. The three students chosen are winners or the semi-finalists from competitions at local participating colleges. The student talks are judged by a Society panel, and first, second, and third place awards get monetary prizes. The December meeting is the annual business meeting: committee reports are read, the past-presidents award for best paper of the year is given, honorary memberships are awarded, the officers and councilors for the next year are elected, and the past-president gives his address. Monthly meetings are not held in June, July, or August (the summer months) when many geologists are doing field work.

With a few exceptions marking special events, attendance at regular meetings has paralleled the total membership, but in far smaller numbers. From 1883 through 1913, average attendance rarely exceeded 20 people and for many years it was 10 or fewer. This

"To-day is ours; what do we fear?
To-day is ours; we have it here.
Let's treat it kindly, that it may
Wish, at least with us to stay.
Let's banish business, banish sorrow;
To the gods belong to-morrow."
Cowley.

Menu

COTUITS		COCKTAILS
CELERY	OLIVES	CHERRY CREEK HIGBALLS
CLEAR TURTLE SOUP		NIERSTEINER GLOCK
BROILED LIVE LOBSTER	PARISIENNE POTATOES	CIGARETTES
ROAST LAMB		ROEDERER BRUT
SPAGHETTI AU GRATIN	GREEN PEAS	CORDIALS
LETTUCE SALAD		CIGARS
CAMEMBERT AND ROQUEFORT CHEESE TOASTED WATER CRACKERS		
COFFEE		

"Serenely full, the epicure would say,
Fate cannot harm me,—I have dined to-day."
—Smith.

"What cannot art and industry perform
When Science plans the progress of their toil!"
—Beattie.

Toasts

Toastmaster, *Thomas L. Wilkinson*

The Colorado Scientific Society *Philip Argall*
"Go on fair Science; soon to thee
Shall Nature yield her idle boast."

— ! ? — *Regis Chauvenet*
"One Science only will one genius fit,
So vast is art, so narrow human wit."

Science and War *Irving Hale*
"War its thousands slays
Science its ten thousands."

Auld Lang Syne

"So comes a reckoning when the banquet's o'er
The dreadful reckoning, and men smile no more."
—Gay.

Menu and program
from 1907 annual
banquet

apparent lack of interest is understandable when one remembers that a high proportion of the early members were in mining camps or outside of Colorado and maintained membership as a means of receiving the *Proceedings* regularly, thus keeping up with advances in the science. From 1949 to the late 1980's, average meeting attendance had rarely fallen below 50, and has approached or even far exceeded 100, for most of the years. In the past few years, meeting attendance has averaged 50-60, with the Emmons Lecture commonly drawing 150-250.

Titles and abstracts of presentations at meetings since 1994 are listed in the abstracts archive [link to web site] (see <http://www.coloscisoc.org/abstracts.html>).

S.F. Emmons Lectureship

Begun in 1962 by President R.J. Ross, Jr., the annual S.F. Emmons Lectures, named in honor of the founder Samuel Franklin Emmons, quickly became the highlight of the Society's activities and contributed much not only to its standing in the scientific world but to the intellectual growth of its members. Generally held in place of the January meeting, the lectures feature speakers who are recognized nationally or internationally as in the forefront of research in some important facet of Earth science. Almost without exception the Emmons lectures have been eminently successful in enriching the knowledge and interest of the large audiences that each has attracted. Speakers commonly are invited to the Past-President's Dinner, which is an annual gathering of past presidents, and current officers and councilors. The Emmons Lecturer commonly receives a modest honoraria and travel expenses for their courtesy in sharing their research results and philosophies.

COLORADO SCIENTIFIC SOCIETY EMMONS LECTURES, 1962-94

- 1962—Preston E. Cloud, Jr., University of California, Santa Barbara: Pre-Metazoan Evolution
- 1963—Aaron C. Waters, University of Washington: Contemporaneous Plutonic Invasion and Explosive Volcanism at Mount Rainier National Park
- 1964—J. Hoover Mackin, University of Texas: Hypothesis for the Geomorphic History of the Rocky Mountains
- 1965—Peter Misch, University of Washington: Structural Evolution of the Northern Cascades
- 1966—Clarence Allen, California Institute of Technology: Regional Faults and Great Earthquakes
- 1967—William W. Rubey, University of California, Los Angeles: Glide Tectonics in the Wyoming-Idaho Thrust Belt
- 1968—George C. Kennedy, University of California, Los Angeles: The Bulk Chemistry of the Continents
- 1969—Charles B. Hunt, Johns Hopkins University: Geologic History of the Colorado River
- 1970—Frederick J. Vine, Princeton University: Mesozoic Ocean Floor
- 1971—William R. Dickinson, Stanford University: Reading the Geologic History of Western North America in Terms of Plate Tectonics
- 1972—Robert M. Garrels, University of Hawaii: Post-Depositional Changes in Sediments as a Function of Time
- 1973—John C. Frye, Illinois State Geological Survey: Environmental Geology Program in Illinois
- 1974—Charles Meyer, University of California, Berkeley: Copper Deposits in Geologic History
- 1975—Henry W. Menard, Scripps Institute of Oceanography: Vertical Plate Tectonics
- 1976—Richard W. Hutchinson, The University of Western Ontario: Ore Deposits—Their Depositional Environments and Evolution Through Geologic Time
- 1977—Albert W. Bally, Shell Oil Company, Houston, Texas: Problems in Mountain Building
- 1978—John C. Crowell, University of California, Santa Barbara: Ancient Ice Ages
- 1979—J.M. Coleman, Coastal Studies Institute, Dept. Marine Sciences, Louisiana State University: Geological Aspects of Marine Slope Stability, Northwestern Gulf of Mexico
- 1980—Eugene M. Shoemaker, U.S. Geological Survey, Flagstaff: The Voyager Missions to Jupiter—First Look At Another Kind of Planetary System
- 1981—W.H. Hay, Joint Oceanographic Institutions: Geologic Exploration of Ocean Basins—New Concepts for Land-locked Geologists
- 1982—A. Pantelelyev, British Columbia Ministry of Energy, Mines, and Petroleum Resources: Metallogeny of the Canadian Cordillera—An Analysis of Mineralization in Mobile Terranes
- 1983—P.F. Hoffman, Geological Survey of Canada: A Precambrian Continental Margin and Its Destruction, Northwest Territories, Canada
- 1984—Richard Fiske, Smithsonian Institution: Krakatau 1883: A Classic Geophysical Event
- 1985—W.G. Ernst, University of California at Los Angeles: Prolotectonic Evolution of Northern and Central California—The Terrane Concept Revisited
- 1986—G.A. Davis, University of Southern California: Mylonitic Gneisses and Low-angle Detachment Faults—An Evolving Understanding of Continental Extension
- 1987—S.D. Scott, University of Toronto: Base Metal, Gold, and Petroleum Deposits of the Modern Pacific Ocean Floor and Their Ancient Analogs
- 1988—Robert E. Wallace, U.S. Geological Survey, Menlo Park: Rates of Processes and the Predictive Frame of Mind
- 1989—Maureen Steiner, University of Wyoming: The Geomagnetic Polarity Time Scale—Use and Abuse
- 1990—Randolph L. Kirk, U.S. Geological Survey, Flagstaff: Voyager 2 Encounter with Neptune and Its Active Satellite, Triton
- 1991—James M. Franklin, Geological Survey of Canada: Research on Seafloor Hydrothermal Systems
- 1992—William R. Dickinson, University of Arizona: Hydrocarbons and Metals in Foreland Systems
- 1993—Robert S. Yeats, Oregon State University and Institut de Physique du Globe de Paris: Active Faults at Sea—The Cascadia Subduction Zone
- 1994—G. Brent Dalrymple, U.S. Geological Survey, Menlo Park: The Age of the Earth
- 1995—Eugene and Carolyn Shoemaker, U.S. Geological Survey-Flagstaff and Lowell Observatory: The crash of the Shoemaker-Levy 9 comet on Jupiter

- 1996— Stephen C. Porter, Quaternary Research Center, University of Washington-Seattle: Hawaiian Glacial Ages
- 1997— B. Clark Burchfiel; Schlumberger Professor of Geology, Massachusetts Institute of Technology: Tectonic Evolution of the Eastern Tibetan Plateau—A Different Kind of Mountain Building
- 1998— Harry Y. McSween, Jr.; Head of Department of Geological Sciences, University of Tennessee—Evidence for Life in a Martian Meteorite (! or ?)
- 1999— Wallace Broecker, Columbia University, Lamont-Doherty Earth Observatory: A threat from the bipolar seesaw
- 2000— Douglas W. Burbank, Pennsylvania State University: Interactions of climate and tectonics on orogenesis
- 2001— Paul F. Hoffman, Harvard University: Snowball earth and early animal evolution
- 2002— John F. Dewey, University of California at Davis
Transtension in arcs and orogens

Annual Family Nights (Banquets)

One of the early activities of the Society that stands out brightly was the banquet, an annual event held in the Fall at one of the better local restaurants. The menu and program from the 1907 meeting, which is reproduced herein, attests to the elegance and importance of these banquets. A speaker, generally a Society member, gave a talk of general interest. The custom languished in the early 1900s. The dinner was revived by President Wallace Hansen in 1966, but the next three administrations did not continue this activity. In 1970, President Glenn Scott resumed the event at the Applewood Inn in Golden with an invited speaker who gave a talk about Mars. From that year on, the banquet meeting, now called Annual Family Night, has been a regular yearly event, a time for visiting with friends, enjoying good food, and listening to an interesting, usually nonscientific talk of interest to members and their families.

Publications

Proceedings

Diffusion of knowledge by means of the written word was represented by the Colorado Scientific Society through its publication called the *Proceedings*. These were formally discontinued in 1959 (though the last published paper appeared in 1956), after more than three-quarters of a century of usefulness to the scientific community.

Publication of the *Proceedings* began when the Society was formed; Volume 1 was not published until 1884, but it contains material beginning with the organizational meetings of 1882. From then until 1956, a total of 17 volumes was published. In all, these contained more than 350 papers and more than 6,300 printed pages. Some papers were accompanied by fold-out geologic maps, and a few maps and drawings were reproduced in color.

In the beginning, *Proceedings* volumes were published as units, in octavo, paperback format. Each volume contained not only all the papers presented before the Society during the preceding year or so, but minutes of the Council and regular meetings. By 1908, printing of entire volumes had been abandoned; instead, individual papers, consecutively paged and ready for binding, were issued as they came from the printer.

This practice, designed to save money and to provide more timely diffusion of knowledge, was followed thereafter, except that a single work, the *Glossary of Selected Geologic Terms*, constituted all of Volume 16. Volumes were numbered consecutively, and progressed from one number to the next whenever enough papers had been accumulated to form units suitable for binding by libraries or other recipients.

During the period 1929-53, publication of the *Proceedings* was partly supported by the Colorado Metal Mining Fund. This fund, financed by the mining companies, had been established to provide industry support for the cooperative mapping program between Colorado and the U.S. Geological Survey.

In partial return for the Fund's support, several papers that had been given before meetings of the Colorado Mining Association were accepted for publication in the *Proceedings*. Other than this partial support, the *Proceedings* series was always financed entirely by membership dues and by subscription income.

The great majority of the *Proceedings* papers are well written and on subjects of either transitory or permanent importance. The subject matter was always heavily weighted toward geology and mineralogy and to various aspects of the mining industry—ore deposits, mining, milling and metallurgical methods, and the like. During the first half century, however, there were many other papers on a surprisingly wide variety of subjects. They included discourses on lightning rods, civil engineering for railroads, chemistry, alfalfa culture, vitamins, and even Esperanto. Whether any such papers ever had much impact in the fields covered is not known, but those on geology and mining achieved places in the permanent literature and are still quoted in modern research papers.

Some of the earliest papers published in the *Proceedings* were preliminary reports on work by the U.S. Geological Survey, final reports on which were to be published later by the Survey. Papers on the geology of the Denver Basin and its newly discovered artesian water supplies, as well as those on Cripple Creek and several other mining districts, are good examples of this practice.

Volumes 12 through 17, which cover the period from 1929 through 1956, consist almost entirely of preliminary reports on U.S. Geological Survey work. Most of these were superseded, but some were never followed up by final reports, hence remain as the last published word on certain areas or subjects.

Virtually all of the papers that were presented orally at Society meetings from 1883 through 1928 appear in the *Proceedings*. Beginning in 1929 with Volume 12, some of the papers had been presented orally before publication, but most of the scores of papers presented at later meetings were never submitted to the Society for publication. This gradual change reflects changes in publication costs, time available for writing reports, growth of other outlets, and other factors.

The scientific impact of the *Proceedings* cannot be overstated. Bear in mind that only two of the American geologic journals that we know today were in existence when the *Proceedings* were launched. These were *Science* and the *American Journal of Science*, both of which carried some geologic papers, among many others from other disciplines. The U.S. Geological Survey had itself barely begun what were to become its world-renowned publications. The *American Geologist*, soon to be swallowed by the Geological Society of America's *Bulletin* series, was not to be born for another 6 years. In many ways, the *Proceedings* of the Colorado Scientific Society filled a real vacuum in the scientific reporting field. All in all, the Society can be proud of its very respectable contribution to the permanent fund of knowledge over a very long period.

The Glossary

A Glossary of Selected Geologic Terms, with Special Reference to Their Use in Engineering, by William Lee Stokes and David J. Varnes, was published in 1955 as Volume 16 of the *Proceedings*. It was to become at once a star in the Society's crown and an "albatross" about its neck.

Because of its semiencyclopedia format, the book came close to being an excellent basic text in applied geology. It has been used by countless students and practicing geologists and engineers and has appeared in many court rooms as authority for definitions of technical terms.

The Glossary was a U.S. Geological Survey product, and was originally intended for Survey publication. However, long before the manuscript was completed, it became all too apparent that the Survey staff contained hundreds of expert lexicographers and scientific specialists, each one of whom wanted a hand in formulating at least one definition.

Since agreement seemed unattainable within the authors' lifetimes, permission was sought and granted to seek other publishers. The Society's Council agreed to accept the manuscript, though with some misgivings. Bolstered by detailed studies of probable demand, several printers' cost estimates, and other factors, the Council ordered an edition of 6,000 copies. Some copies, including the 700 or so needed for members, subscribers, and exchanges, were cloth bound; some were paper bound, and some were left unbound for future use if needed. So large a print order was highly unusual and perhaps over optimistic for any technical or scientific book publication. It did result in comparatively low unit costs, however, and preliminary estimates indicated that the venture would turn a profit even if less than half of the edition was sold. Sales and income figures are unnecessary here, but it can be said that in the ensuing 20 years after publication the *Glossary* did no better than break even financially. Actual printing and binding costs were of course much higher than promised, costs of binding additional lots rose dramatically, and storage, distribution, and other costs also rose.

Though publication of the *Glossary* added significantly to the Society's glory, it was not without its problems. From the submission of the manuscript onward, hardly a meeting of the Council lacked some discussions that had to do with storage of the reserve stock, when and how many copies to bind, and various proposals aimed at increasing sales or otherwise disposing of remainders. Perhaps the most important problem raised by the *Glossary* had to do with the Society's tax status.

Sensing that the Society hoped for a profit from the *Glossary*, and even though all profits would have been plowed back into other publications, the Internal Revenue Service raised enough questions to require services of an attorney. The questions were eventually answered, and the Society regained its tax-free non-profit status, but not without significant costs in money, time, and emotions.

The *Glossary* sold well from the start and in the years to follow more than 4,600 copies were distributed. After an initial surge, sales fell off markedly. This was to be expected, but the longevity of the demand, even at a dwindling rate, could almost be termed phenomenal. Remaining stocks were turned over to the Colorado School of Mines in 1976 for sale. Sales were still continuing in 1977, mostly to college and graduate students, so that the *Glossary* continued to achieve its educational purpose.

The total sales and the long life of the *Glossary* were both remarkable achievements for any scientific or

technical publication. They were even more so when it is realized that the *Glossary* was a single reference book published by a local society known only for its small journal of scientific articles, and that the marketing effort, always minimal, was conducted by amateurs.

In many ways, the *Glossary* proved to be a fitting climax to a long and impressive publication history.

Death of a Journal

In 1959, the Society formally ceased publication of the *Proceedings*. Volume 17, no. 2, published in 1956, was the final issue. This cessation required rebates to subscribers for remaining issues of Volume 17 which had been promised, informational letters to exchanges, and notification to the Denver Public Library that it would have to make other arrangements for continuations of journals, hitherto received on exchange, that it still needed. Back stocks of *Proceedings* issues were retained for a few years, and vigorous efforts were made to reduce stocks by bargain sales to members and by other means. Finally, in 1965, the entire remainder of the *Proceedings*, except for the *Glossary*, was given to the Colorado School of Mines, with permission to dispose of it by sale or otherwise. By 1976 the entire stock had been exhausted. As mentioned earlier, remaining stocks of the *Glossary* were turned over to the School.

Thus ended the Society's long history as a publisher of scientific and technical papers. All that was left to do was to revise the Constitution by removing publications from the list of the Society's objectives. Abrupt though it seemed, the 1959 decision to get out of the publishing business was not made easily or quickly. After several years of mild unrest and dissatisfaction with the dwindling support of the program, a special committee, composed of some of the older and wiser members, studied the problem at length. The group's findings were summarized in a thorough and unbiased report to the Council but, alas, the committee itself was still divided as to whether the *Proceedings* should live or die. The Council, after weighing all arguments on both sides, finally imposed the death sentence.

Three major problems emerged during the discussions. They were: (1) lack of a continuing supply of proffered manuscripts, (2) lack of money for an enlarged publication program such as was needed to maintain the exchange program, and (3) lack of sufficient volunteer members who had the time, skill, and devotion to do all the necessary work, mainly persuading authors to submit papers, raising money, and seeing papers through the publication process. Most agreed that the first two problems could somehow be solved. The third one—lack of a visible supply of work-

ers—seemed insurmountable, and tipped the balance against continuation of the *Proceedings*.

The decision, painful though it was, was unquestionably the right one. The *Proceedings* had filled a need in the scientific literature, and with distinction, for three quarters of a century but it had outlived its usefulness. Preliminary reports of the U.S. Geological Survey, long the chief source of manuscripts, could now be published by the Survey itself, scientific specialization had burgeoned, and with it the growth of specialized journals, and authors sought broader audiences than could ever again be offered by a local journal of limited circulation.

Newsletter and web site

Since at least 1970, a monthly newsletter has been circulated to members for all months that meetings are held (currently the 9 months of the year outside of summer). From at least 1994 on, the newsletter has included abstracts of talks scheduled for the next meeting, announcements of other Society events and activities, such as field trips, grant awards, and elections; presidential prose; and other regional earth science news. The newsletter information since about 1995 has been available via and linked within the Society web site. Since 1999, the newsletter has been available by electronic (E-mail) distribution; currently about one half of the membership receive it in this form. The positions of the newsletter editor and webmaster are two of the most integrative and critical to the Society.

The CSS web pages went on line in March of 1997 thanks to the efforts of Randy Schumann who designed and maintained the site, and Lee-Ann Bradley who created the logos and graphics. Since then, the Society's website "www.coloscisoc.org" has been used to announce upcoming meetings, distribute the societies newsletter, act as a repository of abstracts for the monthly speakers, keep the societies members informed about geologic news of interest in the state, advertise and report on field trips, and announce meetings by other societies. Most recently, starting in the Spring of 2002, Paul Belanger started the Outreach area which discusses CSS community activities, and posts information about regional and world-wide topics of interest.

Library

In its statement of objective, the first revision of the Constitution contained a phrase, "the collection and preservation of scientific literature and objects of scientific interest." A parallel but related objective, that on publication of scientific papers, was dropped a few years earlier, but the requirement to collect and preserve books and minerals was not removed from the Constitution until 1976. By that time, both objec-

tives had long since become of only historic interest. Through the first half of the Society's life, however, the library was a vital force in that life—at the same time posing recurrent problems for successive sets of officers. Most of these problems had to do with provision of space for preservation and public use of the collections. They are described elsewhere in this history.

The founders took the stated objectives of the Society conscientiously. In consequence, accumulation of scientific and technical books, maps, and periodicals began at once. Cared for by dedicated volunteer or appointive curators, with the aid of salaried helpers for a good many years, the library grew rapidly. At first, most accessions came by gift but some were purchased from the meager treasury or from rare cash donations. As soon as publication of the *Proceedings* commenced, however, exchanges were established with other publishing groups; these grew in number and in quality with time, and gradually became the chief source of material for the library.

Despite its lack of a permanent home, the library multiplied, both in size and in use, not only by the members, but by the public. Records are incomplete, but during the early part of the 20th century, the library was used by 500 to nearly 2,000 people every year.

These figures may seem low to us now, but remember that the technically educated population was small at the turn of the century, and that available collections of technical literature were even smaller. True, the universities had libraries, but there were no public, institutional, or company libraries such as exist today. Any one of these would dwarf the pioneer Colorado Scientific Society library, but they all serve the same thirst for knowledge that characterized the Society's library patrons almost a century ago.

A momentous decision was made by the officers in 1923, during the period when the Society almost died. The Society itself survived, though barely, but the entire library was placed on loan for 10 years with the Denver Public Library. There it became the nucleus of the now outstanding Science and Technology Division. Terms for care, preservation, and use of the collection were worked out in detail with the library staff and agreed to by both parties on February 21, 1923. The 3,000-volume loan contained much rare and out-of-print material not accessible elsewhere.

The "10-year-loan" agreement of 1923 actually remained in force (and probably forgotten) until late in 1955. A revised agreement was signed by the presidents of the Society and of the Library Commission on December 12, 1955. The revision tightened some of the

language, but differed from the 1923 original agreement in only one important way; instead of imposing a time limit, the loan was made indefinite as to time.

The loan to the Denver Public Library involved not only the original collection, but also, by implication, all items to be received as a result of the Society's exchange agreements. These exchanges provided a rich source of accessions to the Library's Division of Science and Technology for many years. Even as late as 1959, when publication of the *Proceedings* had come slowly to a halt, 170 exchanges were still actively contributing their publications to the Library. Both foreign and domestic, these exchanges ranged from foreign national institutions, universities, museums, scientific societies, state geological surveys and bureaus of mines, to public libraries. Accessions from these sources saved the Denver Public Library from several hundred to several thousand dollars per year in purchase or subscription costs. The list of exchanges dwindled rapidly when the Society ceased publishing, and the Library had to make difficult decisions as to the items it felt had to be continued and as to sources of funds for these.

Late in 1977 the Society made a decision that had seemed inevitable for some years. It donated all rights to the book collection, including all exchange material, to the Denver Public Library.

Mineral Collection

The history of the mineral collection parallels that of the library. Governed by the same constitutional clause as the library, the founders began to assemble a mineral collection, with emphasis on ore minerals from Colorado mines, soon after the Society was formed. From that time forward the same problems of acquisition, space, cataloging, and general care faced successive curators. Both collections were loaned to other groups for many years, but eventually both were donated outright.

The travels of the mineral collection are difficult to trace in the Society's own fragmentary records, but thanks to the courtesy and patience of several others in poring through their own files, the following can be taken as a reasonably complete story. These friends are: Jack A. Murphy of the Denver Museum of Nature and Science and a CSS member, Judith Ann Heberling of the State Historical Society of Colorado, and John Shannon of the Colorado School of Mines Museum. In 1923, 21 meteorites, 3 or 4 mineral specimens, and a representative suite of rocks from the Leadville district were lent to the Denver Museum of Nature and Science, while R.C. Hills, Honorary member and past president of the Society, was serving as honorary Curator

of Geology at the Museum. Some of the meteorites are still on display.

The remainder of the Society mineral collection, except for one gold specimen to be described separately, was lent to the Colorado State Bureau of Mines between 1923 and 1925. In April 1946, this entire collection was donated outright to the State Bureau of Mines. In 1959, when the Bureau of Mines Museum became part of the Colorado State Museum, its collections became property of the State Historical Society. Finally, in 1965, the Society's collection, together with virtually all of the other rocks and minerals, was transferred to the Colorado School of Mines Museum. The Society's specimens are reported to have suffered some attrition from acquisitive students, but the bulk of the collection is intact in Golden and is still cataloged as a Colorado Scientific Society gift.

From its inception, the collection depended on gifts from members and friends for most of its growth, but some specimens were purchased from time to time. One of the purchases, for instance, was the Costilla meteorite, found on the north slope of Costilla Peak, 6 miles to the south of the Colorado-New Mexico line.

In 1894, Professor Henry Ward, founder of the famous Ward's Natural Science Establishment, paid the Society \$200 for a small part of the 78-pound specimen, and polished the sawed face of the remainder for the Society.

Another sale took place at about the same time. A large and excellent collection of plant fossils, jointly owned by R.C. Hills, who was a devoted Society member, and Professor John C. Newberry, was on display at Columbia University, New York. Newberry died, leaving his share to the university; Hills had donated title to his share to the Society. Unable to separate the specimens by ownership, the university offered to buy the Society's share. The offer was accepted, and the purchase added an unrecorded number of dollars to the funds available for specimen purchases.

When donated to the State Bureau of Mines, where it was intended to be displayed as a unit and plainly labeled as to its source, the Society mineral collection consisted of more than 700 specimens. Though especially rich in ore minerals from Colorado mines, it also contained many fine specimens of topaz, aquamarine, and other semiprecious gems, tellurides, zeolites, and other minerals that have made Colorado famous among mineralogists. It also contained good specimens from many other parts of the world, hence was invaluable to the hundreds of students and other users who visited the collection in the Society's rooms, or, later, in the State Bureau of Mines. Surprisingly, it contained

but few of the many type minerals first discovered in Colorado, some of them first described in the *Proceedings*, and some even named in honor of Society members.

In his presidential address of 1888, R.C. Hills expressed a hope for establishing a State natural history museum, with emphasis on economic geology. He complained that many fine Colorado specimens were going to the Eastern States and to Europe simply because there was no local museum other than the infant one possessed by the Colorado Scientific Society. Ironically, in 1908, and after the Denver Museum of Natural History had come into existence, there were mild grumblings within the Society that too many specimens were going to that institution, rather than to the Society.

Gold Specimen

During the late 1880s or early 1890s, John A. Porter, a Society member and member of Smuggler Union Consolidated Mining and Milling Company, donated an unusually large and rich specimen of gold ore, showing an abundance of native gold in white quartz. From the Smuggler Union Mine in Telluride, it originally weighed a trifle over 18 pounds. The specimen was exhibited at the Columbian Exposition in Chicago in 1893, and again at the Paris Exposition in 1900; both showings won medals for the Society. The specimen was insured for \$1,200 when it went to Paris; whether this figure was based on estimated intrinsic or specimen value is not known, but it must now have a value of many times that much.

When exhibited in Paris the specimen was sawed in two, the better to display its gold content; one piece weighed 12 lb. 1/2 oz. avoirdupois, the other was 6 lb. 1/2 oz. After residing in a bank vault for some years, the larger piece was placed on indefinite loan with the Denver Museum of Natural History (now called the Denver Museum of Nature and Science) in 1948 and the smaller one was lent to the Colorado State Bureau of Mines. In 1966 the smaller piece was recalled (because it was no longer on display) and was immediately lent to the Denver Museum of Natural History, together with the Exposition medals. Both parts of the original specimen still belonged to the Colorado Scientific Society until 1977; both are still on public display in the museum, now the Denver Museum of Nature and Science.

When, late in 1977, the Society donated its book collection to the Denver Public Library, it made a second important and generous gift to the people of Denver; it donated to the Denver Museum of Natural History (now called the Denver Museum of Nature

and Science) all rights to both gold specimens and all the other specimens that it had been holding on indefinite loan.

Field Trips

Field trips to mining districts and areas of geologic interest have long been an important part of the Society's scientific program. Unless many such trips went unrecorded, however, they were held only sporadically until the 1970's.

The first trips of which there is any record were in 1890, when groups of Society members visited the Georgetown and Boulder County mining districts. Both districts were very active at the time and the groups visited many mines, where they had the opportunity to discuss mutual interests with mine and mill operators, to collect specimens of ores and wall rocks, and to gain firsthand knowledge of Colorado's preeminent industry.

In 1892 there were no field trips because of the great depression, but one of the regular meetings was held in Pueblo, where a strong branch of the Society had sprung up. Beyond mention of the single meeting, nothing is known of the history of this offshoot. The 1895 field trip was to Cripple Creek, then at the height of its boom. Thirty-four members traveled by private railroad car for the 2-day excursion. The visitors were joined by 80 mine managers and other leading citizens to hear a series of papers on mining geology and to tour several of the mines.

In 1911, and in collaboration with faculty members of the Colorado School of Mines, a series of "practical talks" was held in Idaho Springs, Leadville, Telluride, and Ouray, all with active and productive mines. The format was repeated in 1912, with meetings in Central

City, Telluride, and Ouray. It can only be guessed that these meetings constituted a sort of educational extension program, that the audiences were drawn from local mines, mills, and smelters, and that the speakers brought with them news of recent developments in their fields of specialization. It appears to have been the Society's first attempt at outreach.

Field trips seem to have been abandoned shortly after 1912, as available records contain no mention of them until 1970. In that year President Glenn Scott, responding to a suggestion by Irving Friedman, revived regular field trips. Initially one, and since 1977 generally two, field trips have been held annually since they are very popular with the members and their guests. These field trips, commonly attended by about 40 people, are primarily for the enlightenment and recreation of Society members. Each trip involves intensive study of some geologic problem or special area, under the guidance of knowledgeable leaders.

The success of the field trips since 1970 can be attributed to the field-trip chairpersons and the leaders for each trip. The field-trip leader and numerous helpers compile field trip guides and arrange lodging and food for the participants. Since 1970, the Spring field trip has been typically a 1-day trip, whereas the Fall field trip may run 2-3 days. The majority of trips are within several hundred miles of Denver (see map of field trip destinations).

On occasion, the Society has co-sponsored field trips with other geological societies that have meetings in the region. For example, in 1988 the Society sponsored a number of one-half day field trips in the Denver area for the national meeting of the Geological Society of America.

1979



Dan Shawe looking at Petroglyphs, Fall, Utah
(at McKee Spring Draw)



Floating the Green River, Colorado-Utah
Dinosaur National Monument. This section
is called "Whirlpool Canyon" (named by J.W.
Powell)



A friendly dinosaur, Utah, at the quarry.



Leaders Lee Shrophire and Eric Erslev,
Wyoming

1998

A spectacular outcrop,
Wyoming



1999



June 19, 1999
Arkansas River



Our coal mine guide

2001



Splitting rock at the fossil fish quarry
west of Kemmeren, Wyoming



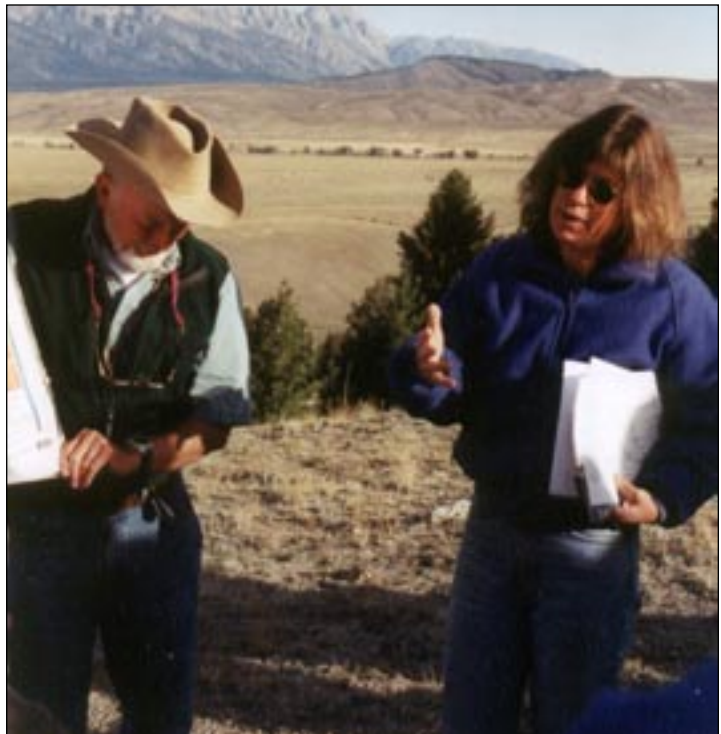
...and we find fish

2002



Our Tetons field trip participants and leaders

2002—Continued



Lisa and Jack tell it like it is.

2002

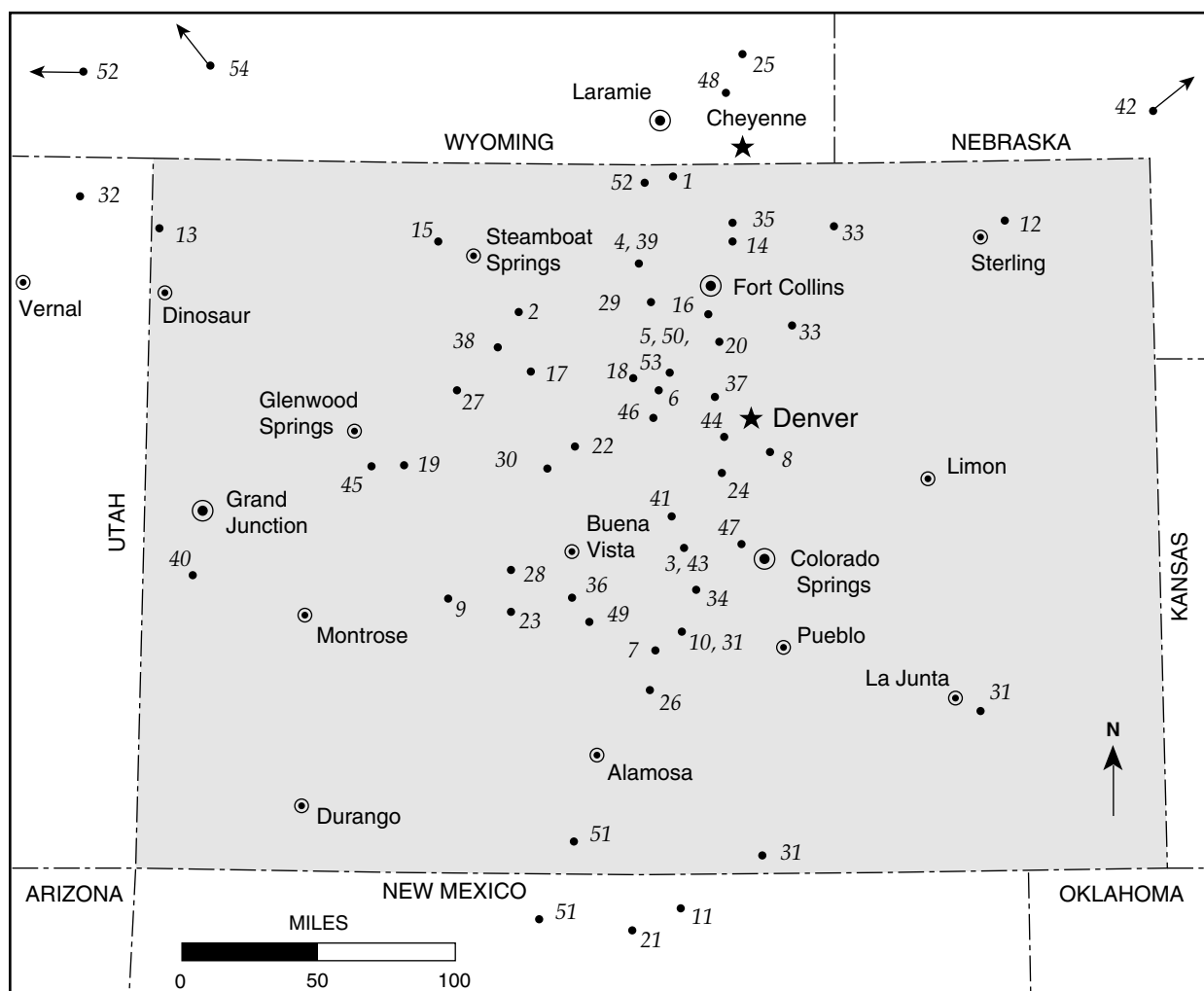


Men in boots—past and current presidents (Bryant, Reed, Nelson, and Pierce)

2002—Continued



Another beautiful day in the Tetons.



Map of Colorado Scientific Society field trip destinations, 1970-93

1. Fall, 1970	15. Fall, 1980	29. Spring, 1988	43. Spring, 1996
2. Fall, 1971	16. Spring, 1981	30. Fall, 1988	44. Fall, 1996
3. Fall, 1972	17. Fall, 1981	31. Spring, 1989	45. Spring, 1997
4. Fall, 1973	18. Spring, 1982	32. Fall, 1989	46. Fall, 1997
5. Spring, 1974	19. Fall, 1982	33. Spring, 1990	47. Spring, 1998
6. Fall, 1974	20. Spring, 1983	34. Fall, 1990	48. Fall, 1998
7. Fall, 1975	21. Fall, 1983	35. Spring, 1991	49. Summer, 1999
8. Spring, 1976	22. Spring, 1984	36. Fall, 1991	50. Summer, 2000
9. Fall, 1977	23. Fall, 1984	37. Spring, 1992	50. Summer, 2000
10. Spring, 1978	24. Spring, 1985	38. Spring, 1993	51. Fall, 2000
11. Fall, 1978	25. Spring, 1986	39. Fall, 1993	52. Summer, 2001
12. Spring, 1979	26. Fall, 1986	40. Fall, 1994	53. Spring, 2002
13. Fall, 1979	27. Spring, 1987	41. Spring, 1995	54. Fall, 2002
14. Spring, 1980	28. Fall, 1987	42. Fall, 1995	

COLORADO SCIENTIFIC SOCIETY FIELD TRIPS AND LEADERS, 1970-2002

- Oct. 10, 1970. Virginia Dale ring-dike complex: D.H. Eggler and W.A. Braddock (Univ. Colorado).
- Oct. 1, 1971. Following the route of F.V. Haydens (1869) "Trip to Middle Park:" G.A. Izett, R.B. Taylor, and Ogden Tweto (USGS).
- Sept. 15, 1972. Florissant, Cripple Creek and environs: R.C. Epis (Colorado School of Mines), R.B. Taylor, G.R. Scott, G.B. Gott, and J.H. McCarthy, Jr. (USGS).
- Sept. 13, 1973. Glacial history and geomorphic evolution of Rocky Mountain National Park: G.M. Richmond, D.E. Trimble, and G.R. Scott (USGS).
- April 19, 1974. Lyons Sandstone from Lyons to Morrison, Colorado: T.R. Walker (Univ. Colorado), J.C. Harms and R.J. Weimer (Colorado School of Mines).
- Sept. 20, 1974. Precambrian geology of the Front Range west of Denver—Central City, Blackhawk, Idaho Springs, to Berthoud Pass: R.B. Taylor, P.K. Sims, and G.R. Scott (USGS).
- Sept. 11-12, 1975. Geology of Canon City and Wet Mountain Valley, Silver Cliff, Colorado: R.B. Taylor, W.N. Sharp, and G.R. Scott (USGS).
- April 23, 1976. Critical aspects of the stratigraphy of part of the Tertiary-Upper Cretaceous sedimentary fill in the Denver basin: G.R. Scott, G.A. Izett, P.E. Soister, and L.W. McGrew (USGS).
- April 15, 1977. Canon City area: G.R. Scott (USGS), and R.C. Epis (Colorado School of Mines). [Rained out.]
- Oct. 8-10, 1977. Hard rock trip in the Gunnison area (Gunnison, Cochetopa Park, Powderhorn, and Black Canyon), Colorado: J.C. Olson, W.R. Hansen, T.A. Steven, G.R. Scott, and B.H. Bryant (USGS).
- April 14, 1978. Canon City embayment: G.R. Scott (USGS).
- Sept. 28-29, 1978. Vermejo Park, New Mexico (stratigraphy, geologic structures, landforms, coal operations, and historical aspects of the region): C.L. Pillmore (USGS).
- May 18, 1979. Cenozoic geology of the Sterling area, Colorado: G.R. Scott, G.E. Lewis, and N.M. Denson (USGS).
- Sept. 21-23, 1979. Dinosaur National Monument, Green River boat trip from Echo Park to Split Mountain, Utah: W.R. Hansen and D.R. Shawe (USGS).
- April 23, 1980. Pennsylvanian, Jurassic, Cretaceous, and Tertiary of the Fort Collins area: F.G. Ethridge and J. Dolson (Colorado State Univ., Fort Collins).
- Sept. 18-20, 1980. Precambrian, Tertiary, and Pleistocene of Steamboat Springs and area to north to Hahns Peak and east to Cowdrey: G.L. Snyder and R.F. Madole (USGS), and J.R. King (Anaconda Co.).
- May 23, 1981. Laramide structures of the northern Front Range and Denver basin, Fort Collins to Lyons: Vincent Matthews, (AMOCO, Denver, Colorado).
- Sept. 11-12, 1981. Structural evolution of the central Rockies (Denver to Vail and return): T.L.T. Grose (Colorado School of Mines), assisted by Ogden Tweto (USGS), W.W. Mallory (USGS, retired), S.R. Wallace (consultant), and R.J. Weimer (Colorado School of Mines).
- May 22, 1982. Centennial bus trip through the Idaho Springs and Central City mining districts: W.H. White (Climax Molybdenum Co.), G.S. Holden (Colorado School of Mines), P.K. Sims (USGS), and others.
- Oct. 1-3, 1982. Overview of the varied geology and mineral resources of west-central Colorado in the Glenwood Springs-Aspen region: B.H. Bryant and V.L. Freeman (USGS), J. Campbell (Fort Lewis College), and J.R. Donnell (consultant).
- May 21, 1983. Geologic hazards in the Denver area (Road log from Denver Federal Center to Marshall, Colorado. The Boulder-Weld coal field and some environmental considerations of burning, subsiding coal mines): J.R. Herring, (USGS).
- Sept. 23-25, 1983. Southern Colorado-Northern New Mexico (Raton Basin, Questa Caldera, Taos Plateau, Spanish Peaks): Art Bookstrom, organizer. C.L. Pillmore, G.R. Scott, P.W. Lipman and J.C. Reed (USGS), and R.W. Leonardson (Union MolyCorp), Phil Molling (consultant), Chuck Zimmerman (Climax), and J.D. Vine (consultant).
- May 19, 1984. Depositional evidence of Laramide uplift in the Colorado Front Range—Denver to Fairplay: B.H. Bryant (USGS) and others.
- Sept. 15-16, 1984. Rocks of the Upper Arkansas River valley, Colorado: G.R. Scott and R.B. Taylor (USGS).
- May 18, 1985. Late Cretaceous-early Tertiary rocks of the Front Range, Denver-Colorado Springs: Dave Morse (Chevron), G.R. Scott (USGS), J.M. Soule (Colorado Geological Survey), D.J. Varnes (USGS).
- June 20-22, 1986. The continental core exposed in the Hartville uplift and central Laramie Mountains of southeast Wyoming: G.L. Snyder (USGS).
- Sept. 20-21, 1986. Late Paleozoic sedimentation and Laramide tectonics of the Sangre de Cristo Range: D.A. Lindsey (USGS).
- May 5-6, 1987. Geology of mineral resources of Central Colorado: J.C. Reed, Jr. and B.H. Bryant (USGS), Tommy Thompson (Univ. Northern Colorado), John Karachewski (Colorado School of Mines), P.K. Sims (USGS), S.R. Wallace (consultant), and G.G. Snow (AMAX). [Conducted as field trip for Geological Society of America regional meeting in Boulder.]
- Sept. 12-13, 1987. The Oligocene Mt. Aetna cauldron and Cenozoic tectonic framework of the Sawatch uplift and northern Rio Grande rift: J. Shannon, E. Nelson, and D. Sweetkind (Colorado School of Mines).
- May 7, 1988. Bedrock, surficial, and structural geology, and natural history of area between Denver and Rocky Mountain National Park: W.A. Braddock (Univ. Colorado), G.M. Richmond and R.F. Madole (USGS), and D.R. Stevens (Rocky Mountain National Park).
- Sept. 25-25, 1988. Geology and mineral resources of central Colorado: Introduction and log by J.C. Reed, Jr., and Bruce Bryant (USGS); stops by T.L.T. Grose (CSM), P.K. Sims (USGS), A.A. Brookstrom, D.W. Beaty, W.W. Mallory, B.H. Bryant, and J.C. Reed, Jr. [Conducted as dry run for Geological Society of America field trip in Denver, Oct. 1988).
- April 8-9, 1989. Dinosaur bones [collected near Cañon City], [dinosaur] trackways [in the Purgatoire valley, Colorado], and extinction [the Cretaceous-Tertiary boundary of the Northern Raton basin, Colorado]: Martin Lockley (Univ. Colorado at Denver), Nancy Prince (Jacobs Engineering Group), and C.L. Pillmore (USGS).
- Sept. 22-24, 1989. Eastern Uinta Mountains, Colorado and Utah: W.R. Hansen (USGS, retired).
- May 5, 1990. [High Plains of northeastern Colorado]: R.F. Madole (USGS) and S.L. Forman (Univ. Colorado).
- Sept. 13-14, 1990. Road log and trip guide to the stratigraphy, structure, and geomorphology of the Colorado Springs and Canon City areas, Colorado: G.R. Scott (USGS, retired).

- May 18, 1991. Geology of the Cache la Poudre River and adjacent areas northeast Front Range, Colorado: W.D. Nesse (Univ. Northern Colorado), with contributions by J.A. Murphy (Denver Museum of Natural History), and K.D. Hopkins and K.L. Shropshire (Univ. Northern Colorado).
- Sept. 6-8, 1991. Early Proterozoic volcanogenic sequences in central Colorado: J.C. Reed (USGS) and K.L. Shropshire (Univ. Northern Colorado).
- May 2, 1992. Urban engineering and environmental geology—Denver metro area field trip: S.M. Landon (consultant) and W.P. Rogers (CGS), coordinators; Rich Andrew, D.C. Noe, W.P. Rogers, and J.M. Soule (CGS); G.R. Scott and Richard Van Horn (USGS); Brandon Gilmore, Jeb Love, and Elizabeth Pottendorf (CDOH); Michael West (consultant); and Ed Weakly (Alpha Minerals).
- June 5-6, 1993. Geology and archeology of northern Eagle County: Kevin Black (State Archeologist), R.F. Madole (USGS), and John Harms (consultant).
- Sept. 25, 1993. Geology and Ecology of Rocky Mountain National Park: W.A. Braddock (Univ. Colorado), J.C. Cole (USGS), and Jeff Maugans (Rocky Mountain National Park).
- Sept. 30- Oct. 2, 1994. Uncompahgre Plateau Scenic Loop: C.M. “K” Molenaar (USGS).
- May 14, 1995. Geology of the Porcupine Cave Site and South Park, Colorado: Don Rassmussen and Steve Sonnenberg.
- May 18, 1996. Florissant Fossil Beds National Monument and part of the Thirtynine Mile Volcanic Field, Colorado: Emmett Evanoff (Univ. of Colorado).
- October, 1996. Three 1/2 day local trips for Geological Society of America National Meeting in Denver, Colorado. Various CSS members.
- May 17-18, 1997. Active geologic collapse related to salt dissolution in the Glenwood Springs area, Colorado: Robert M. Kirkham (CGS), Bruce H. Bryant (USGS), and Randal K. Streufert.
- Oct. 4, 1997. Geological aspects of environmental management of the Clear Creek watershed, Colorado: Carl Norbeck.
- May 16, 1998. Geological highlights of the Colorado Springs area, Colorado: Eric Leonard, Paul Myrow, and Christine Sidoway (Colorado College).
- Sept. 19-20, 1998. The Cheyenne Belt—A middle Proterozoic structure in the southeastern Wyoming and some geologic highlights of north-central Colorado: Ted Ball and others.
- June 19-20, 1999. The geologic history of the Arkansas River valley, Colorado and river rafting through Browns Canyon. Glenn Scott and Jack Murphy.
- June 10, 2000. Geology of some mineral deposits of Boulder County, Colorado: William Atkinson
- Sept. 30 - Oct. 2, 2000. Narrow gauge train from Antonito, Colorado to Chama, New Mexico with stops at the gold placers at Fairplay, Colorado and Great Sand Dunes National Monument: Sherman Marsh.
- Aug. 17-19, 2001. Snowy Range/Medicine Bow Mts, Woming; Kemmer, Wyoming fossil fish; P&M coal mine, Flaming Gorge, Utah; and the American Soda Nahcolite Mine, Colorado: William Atkinson and Jack Edwards.
- May 11, 2002. Lyons Quarries: Ted Walker (Univ. of Colorado), John Harms (CSM), Ed Larson (Univ. of Colorado).
- Sept. 20-23, 2002, Jackson Hole, Wyoming: Ken Pierce, Jack Reed, and Lisa Morgan (USGS)

Centennial Meeting in China

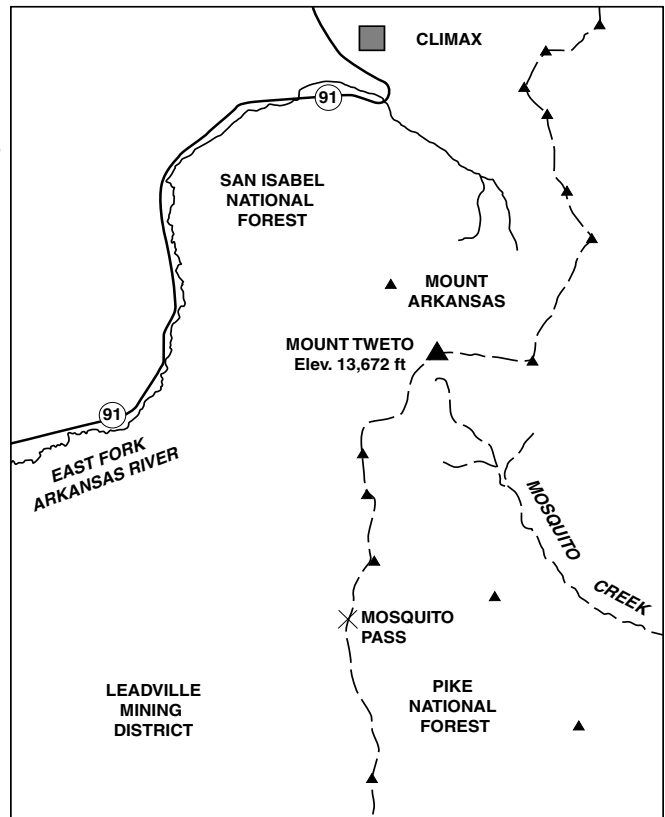
About 1978, when Chinese leaders began lifting restrictions on cultural exchanges between its nation and the rest of the world, the 100th anniversary of the Colorado Society was approaching. It occurred to one of the officers that a geological exchange by means of meetings in The People’s Republic of China would be one interesting way to commemorate this Society event. Between April 30 and May 23, 1982, members of the Society and their spouses and friends celebrated the 100th anniversary by visiting China and Hong Kong. Because more than 40 people signed up for the trip, co-leaders Jane P. Ohl and Mary H. Miller revised the itinerary to allow for two groups. Both groups flew to Beijing, with a one-night stopover in Tokyo, for 3 days of meetings and ministry tours with upper-echelon Chinese geologists. At the technical sessions in Beijing, held at State Guest Houses 9 and 10, 11 talks and three poster sessions were presented to 19 Chinese invitees. A reception, dinner, and a slide show were held May 4 in Guest House 11 for the Chinese guests.

The itineraries of Groups A and B are shown on the map of China. At Wuhan, Weimer, Neilsen, and De Chadenedes repeated their Beijing talks at the request of the Chinese geologists who had attended the sessions in the capital city. Weimer also was asked to give a second talk—on coal basins in plate tectonic settings. Later, at Chongqing, Shacklette, who had made arrangements to meet with scientists from the Institute of Geochemistry and the China Society of Mineralogy, Petrology and Geochemistry, held another successful meeting between Society members and Chinese scientists. However, Group A did not neglect the sights. They also visited the buried terra cotta armies at Xi’an, the 2000-year-old lady at Changsha, and the Gorges of the Yangtze River. Group B duplicated A in visiting the Great Wall near Beijing and the buried army at Xi’an. Separately, Group B visited the Mineral Resource Research Institute of China at Nanjing and the Paleontologic Institute at Nanjing University. Group B also visited Hangzhou, Shanghai, and Guilin (Kweilin)—site of the famous karst topography depicted in many artworks. Both groups were reunited at Guangzhou (Canton), where they visited the South China Seas Geological Investigations Institute. From there, the two groups went by train to Hong Kong for a luxurious final weekend.

Naming of Mount Tweto

In 1986 a group of Ogden Tweto's friends petitioned the Board on Geographic Names of the U.S. Geological Survey for permission to name a peak in the northern part of the Mosquito Range after him. Ogden, a long-time U.S. Geological Survey geologist, was elected president in 1952 and honorary member in 1965. He was renowned for his geologic studies, especially those in the State of Colorado. The Board agreed to the name Mount Tweto. The peak has an elevation of 13,672 ft and spans the Lake-Park County boundary about 5 miles south of the open pit at the Climax Mine in the Climax 7 1/2 degree quadrangle. Mount Tweto overlooks the area where Ogden spent a major part of his career.

On August 13, 1988, 55 relatives and friends of Ogden hiked 3 miles to the summit of Mount Tweto to officially dedicate the mountain. A brief ceremony at the top included placement of a plaque, a recounting by Bruce Bryant, of Ogden's work in the area and remarks of appreciation by Ogden's son John and daughter Barbara. Four of Ogden's grandchildren also made the climb. Additional climbs were made on the second and fifth anniversaries of the dedication of Mount Tweto.



Tweto Family

Mount Tweto 1988



Mount Tweto

COLORADO SCIENTIFIC SOCIETY PRESENTATIONS IN BEIJING, WUHAN, AND CHONGQING

- Shacklette, H.T., Botanist, U.S. Geological Survey. Trace elements in plants—Variations in element content of fruits and vegetables from different areas of the United States.
- Lentz, P.A., Computer Analyst, Scientific Software Corp. Computers in geoscience—Designing a computerized data base for geoscience applications.
- Wheeler, R.L., Geologist, U.S. Geological Survey. Suggested origin of some intraplate earthquakes, southeastern United States.
- Weimer, R.J., Professor of Geology, Colorado School of Mines. Sandstone reservoirs for petroleum.
- Nielsen, R.L., Consulting Geologist, Nielsen Geoconsultants, Inc. Recent development in the study of porphyry copper geology—A review.
- Schmidt, R.A.M., Geologist/Paleontologist, Anchorage Community College. Environmental geology of the Alaska pipeline.
- Wells, J.D., Geologist, Managing Director, Minerals Exploration Coalition. Exploration and mining of the Public Lands of the United States.
- De Chadenedes, J.F., Petroleum Geologist. Eruption of Mt. St. Helens.
- Kupfer, D.H., Geologist, Louisiana State University (ret.) Structural geology of the Gulf Coast, with an emphasis on depositional growth and times of deformation.
- Curtis, G.R., President, Gold Cup Exploration Inc. Gold Cup breccia pipe near Central City, Colorado.
- Mytton, J.W., Geologist, U.S. Geological Survey. Coal in the San Juan Basin, northern New Mexico.
- Christiansen, A.C., Geologist, U.S. Geological Survey. *Poster:* U.S. Geological Survey maps and other publications.
- Kupfer, R.L., Geologist (ret.) *Poster:* River deltas—Mississippi, Rhone, and Rhine.
- Miller, M.H., Geologist, U.S. Geological Survey. *Poster:* Mineral resource assessment—Rolla 1 degree x 2 degree quadrangle, Missouri.
- Ohl, J.P., Geologist, U.S. Bureau of Mines. *Photographic slide show* of Denver, the State of Colorado, and other areas in the Western United States.

THE GOOD CITIZEN

In many ways and with little public knowledge, even among the membership, the Society has, throughout its life, contributed to the welfare of the community.

Political Activities

During the past 45 years the Society avoided any direct role in political or lobbying activities, local or otherwise, in keeping with its tax-exempt status. This reluctance springs from the fact that Federal and State employees, who make up a significant part of the membership, are subject to rigid restrictions on their political activities (for example, the Hatch Act). Because the Colorado Scientific Society has felt that it could not speak officially for its members as a body, it has preferred to depend on the personal judgments of its uninstructed representatives on the Colorado Engineering Council and on various ad hoc committees formed jointly with other politically conscious societies. For example, when the need for revival of the long-defunct Colorado State Geological Survey was being considered in 1966, the Society did not sign the positive

petition to the legislature. Its voice was heard, however, through representation on a joint committee with the Association of Engineering Geologists, the American Institute of Professional Geologists, and the Rocky Mountain Association of Geologists. The committee's favorable recommendation resulted in formation of the State Geological Survey. When, in 1968, the Director of the Colorado Department of Natural Resources sought recommendations for a State Geologist to head the new Survey, the Society again refused because of possible conflict of interest. Instead, it worked through the same joint committee that had made the original recommendation to the legislature. With other groups, the Society was proud to contribute toward a plaque in Red Rocks Park commemorating the re-establishment of the Colorado Geological Survey and in welcoming its staff to membership.

In earlier days, and in a simpler way of life, the Society had no such restrictions or inhibitions as to its activities. Its early efforts toward establishing a Colorado Academy of Science, and a Museum of Natural History, as well as a continuing struggle to find a home in the State Capitol or one of the courthouses are described elsewhere. In 1891, the Society played a very active part in formulating a bill establishing a State (Colorado) Bureau of Mines and Economic Geology. This bill led directly to formation of the Colorado Bureau of Mines in 1895, and of the first Colorado Geological Survey in 1908. (In 1907 the Society had joined with the Western Association of Technical Chemists and Metallurgists to recommend a State geological survey to the legislature.)

Again, in 1899, the Society did not hesitate in petitioning the Colorado congressional delegation, asking support for a bill to provide for a Division of Mines and Mining within the U.S. Geological Survey. Though the Society's direct influence on this legislation is unknown, such a Division was indeed established; but it was destined to split from the U.S. Geological Survey in 1910 and it became the U.S. Bureau of Mines.

As one more example of its political awareness, in 1913 the Society's representatives took part in two active and powerful committees. One of these drafted a set of Uniform Mine Accident Laws, the other worked toward a thorough revision of the State mining laws.

State Academy of Sciences Proposed

The early history of the Society was marked by several attempts to form a Colorado Academy of Sciences, in which the Colorado Scientific Society was evidently intended to play a leading part. In his inaugural address in 1883, and again in his address as retiring president, S.F. Emmons presented a strong case for an



CSS visitors to China, 1982

Group A, left to right. Back row—William G. Haag, Elizabeth T. (Betty) Simpson, Howard E. (Ed) Simpson, Wallace M. Cady, J. Francois De Chadenedes, Michael Ohl, Jane P. Ohl, and Robert J. Weimer.

Middle row—Richard L. Nielsen, Helen R. Cady, Inge Nielsen, Alease Dawson, Mary L. Little, and Lisa Chan.

Front row—William S. Dawson, Sylvia J. Arbelbide, Hansford T. (Hans) Shacklette, Ruth Weimer, and Ann C. Christiansen. Photographed at Nanhu Hotel, outside of Gunagzhou (Canton).



Group B, left to right. Back row—Barbara L. Curtis, James W. Mytton, Russell L. Wheeler, R. Kirk Batzer, Kiyoto Futa, Graham R. Curtis, J.R. (Whitey) Bozman.

Middle row—John D. Wells, Ruth L. Bozman, Wenonah H. Bergquist, Peggy A. Lentz, Donald H. Kupfer, person from Nanjing Paleontological Institute.

Front row—Caroline (Toni) A. Watkins, Ruth J. Wells, Romaine L. Kupfer, Jane Myers, W. Bradley Myers, Ruth A.M. Schmidt, and person from Institute. Hidden behind Kupfer and Myers is Phyllis B. Amos. Missing were Claire B. Davidson, Calvin M. Miller, and Mary H. Miller.



Faces in the crowd.

China
1982



Boat trip up the Wuxia Gorge.



Map of Colorado Scientific Society excursion to The People's Republic of China showing itineraries of Groups A and B, April 30-May 23, 1982. The base map, which is incomplete to the west and north, is redrawn from National Geographic, July 1991.

academy. To be modeled on the National Academy of Sciences, it would have acted as scientific advisor to the State government and as a forum and gathering place for outstanding Colorado scientists. Incidentally, but much on Emmons' mind, such an academy would have provided a permanent home, possibly with financial support from the legislature, for the infant Colorado Scientific Society. Emmons' plea came to naught. In fact, when in 1885 a strong move developed among other groups to form an academy, the Colorado Scientific Society voted not to act as a sponsor.

But the idea did not die easily. In his 1886 presidential address, P.H. Van Diest revived Emmons' earlier plea and urged the Society's support. Perhaps the lack of personal support from Emmons, W.F. Hillebrand, and Whitman Cross, all of whom had by then been recalled to Washington, explains why Van Diest's plea was ignored.

Again, in 1892, President George L. Cannon, Jr., deplored the growth of rival associations at the Colorado School of Mines, University of Colorado, and Colorado College. As a part of his argument, Cannon revived the proposal for a State academy (no doubt to be built around the Colorado Scientific Society as a nucleus).

Colorado has never had an academy of its own, and the need for such an organization at the State level would seem to be even less now than it was in the last century. Many years after the hopeful proposals were made by Emmons and others, the Colorado-Wyoming Academy of Sciences came into being. The Colorado Scientific Society has cooperated with it from time to time in various ways, but this academy is very different in purposes and makeup from the one envisioned by Emmons.

The Society as Host

The public is, of course, always welcome at the regular technical meetings (though in the beginning local nonmember residents were restricted to one visit per year!). Depending on the subject matter, variable but significant numbers of nonmembers regularly take advantage of those opportunities to learn more about some facet of science.

As early as 1891 the Society entertained the 5th International Geologic Congress by providing a visit to nearby smelters, a drive through Denver, and a dinner for the delegates. The American Institute of Mining Engineers was similarly entertained in 1896. In 1912 and 1913, the Society hosted the 8th International Congress of Applied Chemistry, the International Geographic Society, and the American Electrochemical

Society. In most cases, the part of the host was to lend its meeting rooms and to arrange a banquet.

No similar opportunities to play host are recorded for many years, possibly because most meetings of national and international groups were growing so rapidly that a small local society could not supply very meaningful assistance. In 1965, however, the Society was one of several cosponsors for a major international meeting, the INQUA (International Association for Quaternary Research) Congress in Boulder. Also, in both 1960 and 1976, and in concert with local departments of geology and several other societies, it took the lead in hosting annual meetings of the Geological Society of America. For the 1960 meetings, it shared expenses with GSA and the Rocky Mountain Association of Geologists for guidebook preparation.

Colorado Engineering Council

The Colorado Engineering Council, designed to promote the best interests of the scientists and engineers of Colorado and of its constituent societies, was founded in 1919. The active Council consists of a representative and an alternate appointed annually by each member society, but past representatives are considered Council members for life and are welcome at all Council functions.

The Colorado Scientific Society, represented by Lewis B. Skinner and Harry J. Wolf, was one of eight founding societies. The number of associated societies has grown through the years, largely because of increased specialization. Of the eight charter societies, six survived through 1976, though several had changed their names. Constituent organizations numbered 25 at the end of 1976; 14 others had dropped out at one time or another because of mergers, changes of interest, or deaths of societies.

Continuation of the Society's membership in the Engineering Council was discussed repeatedly by successive Society officers—particularly whenever the Engineering Council dues were raised. Although the Society contributed much to the Council's work, in 1980 the Society found that the \$100 per year dues exceeded the benefits received and so it withdrew from the Colorado Engineering Council.

Among the many Engineering Council activities in which the Society took active part for many years was its sponsorship of Science Fairs and the provision of many speakers for Council luncheons and dinners and for Career Days in Colorado high schools. Society representatives helped choose recipients of the Council's silver medals to outstanding engineering students, and have advised and assisted the Denver Public Library



Plaque in Red Rocks Park.

in acquisition of scientific and technical books. This last activity was a natural privilege for Society representatives because its library formed the nucleus of Denver Public Library technical collections. Because reservations about conflict-of-interest, the Society played less active parts in the Council's important role as advisor to State and local governments.

Two of 13 recipients of the Council's prestigious Gold Medal Awards have gone to Scientific Society members—Arthur O. Ridgway (1940) and J. Harlan Johnson (1969)—and 3 members (Edwin B. Eckel, 1974; Truman H. Kuhn, 1976; and John W. Rold, 1977) received its Honor Award. Several members, too, have had the rare privilege of carving or serving turkey at the Council's annual Christmas reunions.

PUBLIC EDUCATION ACTIVITIES-OUTREACH

Since the 1947 revival, the Society has contributed heavily, in both effort and money, to many community educational affairs through the work of active and imaginative committees. Such activities have been aimed, not at self-aggrandizement, but at adding to public awareness and appreciation of our natural surroundings. A few examples of the many outstanding accomplishments in public education are described here. The idea of placing sturdy and rustic geologic markers ("signs") along significant roadside outcrops was first introduced by President Wallace Hansen in

1966. In cooperation with the Colorado Division of Transportation and the Denver Mountain Parks, markers prepared in the Highway Department shops were strategically set along Alameda Parkway and at various places in Red Rocks Park. Most of them survived several years of weathering and vandalism.

Several explanatory plaques subsequently were prepared in 1971 to describe the remarkable section of sedimentary rocks exposed at the Interstate Highway 70 road cut through the hogback just west of Denver. Today, many motorists, and students of local school classes and colleges, visit this site annually and gain a new understanding of their world. Trails and signs were constructed by the State Department of Highways, but the concept, research, and design were produced by the Society's Committee on Education and Public Relations. In 1993, the Society and the State Department of Highways renovated the signs along Interstate Highway 70. Signs on the south side had been removed by landslides and degradation and will not be replaced. Beginning in 2001, the Geologic Sign Committee has refocused on creating and installing new signs at newly chosen strategic geologic overlooks in Jefferson County. Plans include color and weather-proof materials. The committee is working with the Rocky Mountain Association of Geologists and the American Association of Petroleum Geologists in this outreach effort.

From time to time the Society has advised local public-television producers on programming that concerns earth science. It has also, on request, advised the Emily Griffith Opportunity School as to its science curriculum. The geological display along the trails of the fragile tundra preserve near the top of Mt. Evans was another gift to the public, this done at the request of the Denver Botanical Gardens.

Assistance to the public schools, particularly those of Denver and of Jefferson County, in cultivating interest in natural sciences, has long been a major activity. Assistance has taken many forms—field trips for science teachers, preparations of trail guides, marking of geologic features in the school system's mountain camps, talks to indoor and outdoor classes, and aid to Boy Scout troops in preparing for merit badges on natural history subjects. These are only a few of the means by which Society members have attempted to pass on their understanding and love of geology and nature to the next generation.

Colorado State Science Fair

Acting both in concert with the Colorado Engineering Council and later on its own, the Society has regularly provided strong support to the Colorado-Wyoming Science Fair, which later became the Colorado Science Fair. These fairs are held yearly in the spring on the campus of Colorado State University in Fort Collins.

The goal of our participation has been to encourage students to participate in earth science projects and to help foster their life-long interest in the earth sciences. The students who come to the state fair are the winners of local high school science fairs held earlier each year throughout the State of Colorado. The Society has traditionally provided 2-4 judges chosen from the membership to evaluate student projects for awards from the Society. Two projects usually are chosen from both the junior and senior year student projects. Recent winners have been given Colorado Scientific Society paperweights and cash prizes ranging from \$50 to \$100.

Student Night

Since the publication of the last history of the Society, we have made annual an event that earlier had been an occasional activity. Student Night was initiated by Past President Charles Pillmore in 1984, and became an annual event in 1996. Each fall, usually in October or November, the Society hosts "Student Night". The Society believes that this event promotes the exchange of ideas between our members, local college and university professors, and their students who one day may be our fellow scientists. Undergraduate- to Ph.D-level

students chosen to give talks at the Society's Student Night meeting are the winners of competitions held by local geology departments. Student competitors usually come from Colorado School of Mines, University of Colorado, Colorado State University, or Northern Colorado University, although the competition is open to all colleges in Colorado. Prior to Student Night, the 3 students who win the local geology department competitions must each submit an abstract of 200 words or less that is published in the newsletter for the month of Student Night. Each student is asked to give a 15 to 20 minute presentation to Society members. Each talk is judged by a panel of 3-4 Society members, and this panel selects the first, second and third place (or honorable mention) presentations. Monetary awards are given to each participant at Student Night.

Memorial Funds

Since 1984, the Colorado Scientific Society has established five memorial funds that are supported by the gifts of members and friends. Income from the funds is provided to graduate students to support research in earth sciences.

As a result of generous contributions by family, friends, and Society members, each of these funds has grown substantially since its inception. As of December 1, 2002, the total market value of our Memorial Fund investments was about \$186,500.

The Memorial Funds have honored the following individuals and primary objectives:

Ogden Tweto (1984): Field-based earth-science research in Colorado and adjacent areas;
Steven Oriel (1986): Geologic studies of the Idaho-Wyoming thrust belt and associated topics;
Edwin Eckel (1990): Engineering geologic studies in the United States;
Bill Pierce (1994): Studies of the Heart Mountain Fault, Wyoming, and associated problems;
George Snyder (1998): Studies of Precambrian igneous/metamorphic geology and basement tectonics in the Rocky Mountain region.

The principal dollars that are donated to each fund are invested in a conservative mix of bonds and preferred corporate stocks that are managed for the Society by an investment firm. The goal of these investments is to protect our principal and generate interest income. We use only interest generated from the Funds to finance our Memorial Fund awards. Since 1996, the Society has awarded grants that total between about \$8,000 and \$11,000 each year.

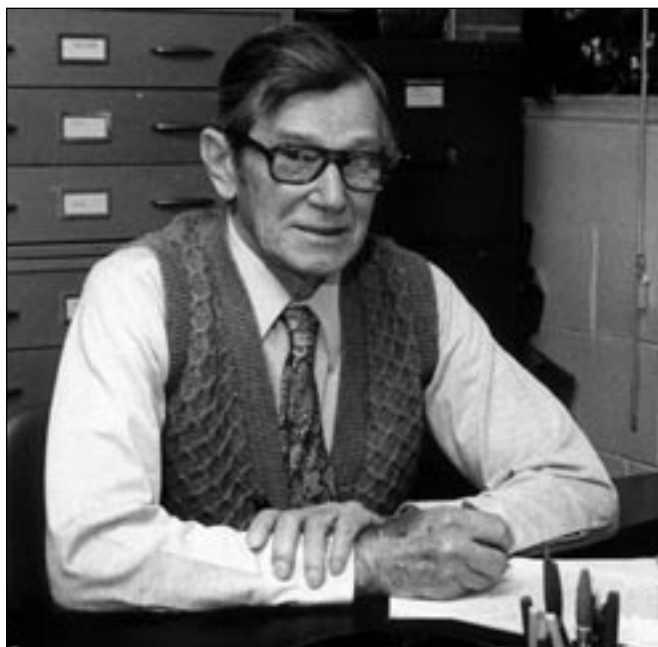
By early 2000, Memorial Fund accounts reached the point where they generate enough interest income

to support an average award of \$800 for each student grant.

Over the past 19 years, the Society has awarded 143 scholarship grants for a total of almost \$107,000 (see table p. 55). As a result of fund contributions, the number and dollar amount of awards have generally increased each year (see table below). However, our long-term goal is to increase the average amount of individual grants to at least the \$1000 level (it was \$795 in 2002).

Ogden Tweto Fund

Ogden Tweto earned his B.S. and M.S. degrees from the University of Montana in 1934 and 1937, respectively, and his Ph.D. in geology from the University of Michigan in 1947. He began work for the U.S. Geological Survey in 1940. After 20 years of field-related research, almost all of which was in Colorado, he served as Chief of the Southern Rocky Mountain Branch, in Denver, 1961-65, and as Assistant Chief Geologist for Economic Geology, in Washington, D.C., 1965-69. His numerous publications ranged from detailed geologic maps to papers on subjects ranging from Precambrian to Tertiary geology, and from tectonics to ore deposits. He compiled the Geologic Map of Colorado, a monumental effort, and, in later years, focused his attention on the Precambrian basement rocks of Colorado and the various episodes of deformation. Ogden received the Distinguished Service Award from the Department of Interior in 1970.



Ogden Tweto

Ogden died November 23, 1983. Charles Pillmore, then Acting President of the Colorado Scientific Society, and Steven Oriel discussed ideas for a memorial to Ogden. They felt that a fund to aid student research in Colorado would be a fitting memorial. Paul Sims, a long-time colleague of Ogden, concurred. Paul then contacted the Tweto family, who approved the concept.

Pillmore wrote draft guidelines for a memorial fund and submitted them to the Council. The proposal was conceived, planned, and approved just 4 days after Ogden's death. At this time the Council consisted of four officers (see previous listing) and six councilors (T. Grose, K. Holmes, C. Naeser, N. Naeser, C. Pillmore, and P. Rogers). The guidelines were approved by the Council on November 27, 1983 (see guidelines at end of this report).

An announcement, a policies and procedures statement, an application form (using a Geological Society of America application form as a guide), and a student appraisal form (to be filled out by a faculty member) were designed. This package is sent to designated universities and colleges and to those individual applicants requesting them.

In December 1984 the name of the Memorial Fund was changed to "The Colorado Scientific Society Memorial Fund, Established in Honor of Ogden Tweto" to encourage contributions to the fund in the name of other deceased members and friends; if information is provided, appropriate notification of such contributions will be sent to the families of those in whose honor the donation was made.

In 1986, following a recommendation of the Memorial Fund Committee, the Council approved a policy that any newly proposed fund established in a person's name must accumulate principal of \$10,000 within 3 years in order to become a viable fund. It was also recommended that an unnamed fund be established to receive those contributions that do not add up to \$10,000 in 3 years, but are donated in a specific person's memory. Instead, these donations now are divided among the existing named funds.

In 1989, because of increased demand for grants and falling interest rates, R.W. Fleming (Memorial Funds Committee Chair) formed a subcommittee (George Snyder and F.G. "Barney" Poole) to review investment alternatives. They recommended that the endowment be transferred from a mutual fund to investment in Government Insured Mortgage funds, known as Ginnie Maes (GNMA). The Memorial Fund Committee agreed and the transfer was made in May 1989. Since then, yields from these investments have ranged between 11% and 5%.

Steven S. Oriel Fund

Steven Oriel received his B.S. degree from Columbia University and his M.S. and Ph.D. degrees from Yale University. After a brief period with an oil company, he served with the U.S. Geological Survey as a field geologist specializing in structural and regional geology. He spent most of his career in mapping the geology of the Idaho—Wyoming thrust belt. From 1972 until his death on July 6, 1986, he was chief and coordinator of the Snake River Plain project in eastern Idaho and western Wyoming. Steve was especially interested in working with students and spent a great deal of time advising and teaching graduate students working on the thrust belt.

Late in his career, Steve was chairman of the North American Commission on Stratigraphic Nomenclature and editor of a new Stratigraphic Code, published in the American Association of Petroleum Geologists Bulletin in 1983. Steve received the Distinguished Service Award from the Department of Interior one year before he died.

The Steven Oriel Fund was initiated in July 1986. The fund became a separate account in April 1989. The Oriel Fund follows the general guidelines of the Tweto fund.



Steven Oriel

Edwin B. Eckel Fund

Born in Washington, D.C., Edwin B. Eckel earned his undergraduate degree in chemical engineering from Lafayette College. He then switched from chemistry to geology and received his M.S. from the University of Arizona in 1930. Later he took additional graduate work at the Colorado School of Mines while working for the U.S. Geological Survey. After joining the U.S. Geological Survey in 1930, the first half of his career was devoted to investigations of mineral deposits in the western United States. In 1945, Ed started the U.S. Geological Survey Engineering Geology Branch and became known as “an international leader in the field of engineering geology” (citation from his 1965 Distinguished Service Award from the U.S. Department of the Interior). In 1961, Ed was appointed Chief of the U.S. Geological Survey Special Projects Branch, newly created to help meet the nuclear test requirements of the Atomic Energy Commission and the Department of Defense. After retiring from the U.S. Geological Survey in 1968, he became Editor-in-Chief and then Executive Director of the Geological Society of America in Boulder, CO, before returning to the U.S. Geological Survey from 1974 to 1984 assist its editorial staff and to work on the sixth edition of *Suggestions to Authors*.

Ed died September 28, 1989; his wish was that any contributions made in his memory should go to the Colorado Scientific Society Memorial Fund. Following the policy regarding establishment of a new fund, the Edwin Eckel Memorial Fund was established in



Edwin Eckel

January 1990, when contributions and pledges reached \$10,000. The Eckel Fund follows the general guidelines of the other funds.

The Bill Pierce-Heart Mountain Fund

William G. (Bill) Pierce was born and raised in South Dakota, graduating in 1927 from the University of South Dakota. He started his career at the U.S. Geological Survey in 1929 as a summer field assistant while receiving his M.S. (1929) and Ph.D. (1931) degrees from Princeton University. His earlier years with the USGS focused on fuels-related projects in Montana, eastern Colorado, and southwestern Kansas. In 1935, Pierce was assigned to work on the complex geology of northwestern Wyoming. An inquisitive “love affair” with the Heart Mountain fault then began. He masterfully documented and interpreted this low-angle fault, demonstrating that blocks of Paleozoic limestone about half a mile thick had slid rapidly over distances of tens of miles into the Big Horn Basin during Eocene time. During his tenure of 47 years as an USGS geologist and administrator, Pierce also made major contributions to the Nation’s need for sound geologic information about fuel resources, the occurrence of critical minerals, and the constraints on potential disposal of radioactive wastes in sedimentary basins.

Pierce’s keen perception of geologic relations and his scientific craftsmanship are reflected in the approximately 90 published reports and maps that he authored or coauthored. He was a longtime Fellow of the Geological Society of America and a member of numerous other national and local scientific societies. He received the Distinguished Service Award of the Department of Interior in 1965.

Bill Pierce died January 31, 1994 at age 89. The Bill Pierce-Heart Mountain Fund was started in the Spring of 1994 with a \$10,000 donation from the trust of William G. and May Bell Pierce and augmented with a final \$30,000 donation in 2000. The first grant was awarded in 1995. The Bill Pierce-Heart Mountain Fund follows the general guidelines of the other funds.

The George Snyder Memorial Fund

George Leonard Snyder was born and raised in Kingston, New York. He graduated from high school in 1945, then entered the U.S. Navy and trained as a pilot. After World War II, Snyder attended Dartmouth College, graduating Cum Laude with a B.A. degree. In 1952, he received a M.S. degree in geology from the University of Chicago. Snyder began his 42-year career with the U.S. Geological Survey in 1949 as a summer field assistant while going to college. He spent his summers mapping geology in the Aleutian Islands, Ken-



William Pierce



George Snyder

tucky, Connecticut, Colorado and, finally, Wyoming. He was a Chief of the Denver Publications Unit and later served two years as the Deputy Assistant Chief Geologist for the USGS in Washington, DC.

Snyder was known nationally and internationally for his work in Precambrian geology. A self-proclaimed goal reflected in his work was “squeezing maximum goodies per acre out of a reluctant Nature.” He was president of the Colorado Scientific Society in 1977 and a member of the Geological Association of Canada. He was a frequent leader of Society field trips dating back to the 1970s. He also was instrumental in helping establish the Society’s Memorial Funds investment policies in the 1980s.

George died August 16, 1998 at the age of 71. The George Snyder Memorial Fund was started in October 1998 with generous donations from his children’s trust, Arthur French, the Mobil Oil Foundation, and other family and friends. The first grant was awarded in 1999. The George Snyder Fund follows the general guidelines of the other funds.

2002 Value of Memorial funds.

The principal in the five memorial funds has grown to just over \$186,500. The percent ownership as of February, 2002 was as follows: 27.1% Tweto Fund, 18.8% Oriel Fund, 13.2% Eckel Fund, 10.3% Snyder Fund, and 30.6% Pierce-Heart Mountain Fund. In 1984, 15 schools were contacted for graduate-student applicants; in 1993 about 100 schools were contacted; and in 2002, 200 schools were contacted. In 1984, all applicants were from Colorado and in 2002, 26 applications were received from 18 schools across the US, Greece, and Canada.

The award money (interest) available for awards has risen from a low of \$650 in 1986 to a high of \$11,190 in 1999 (see table, page 54). The Tweto Fund has funded nearly 70 proposals for a total of almost \$50,500. The Oriel Fund has funded nearly 36 proposals

for just over \$26,800. The Eckel Fund has funded nearly 25 proposals for a total of almost \$17,000. The Pierce Fund has funded 7 proposals for a total of about \$8,100. The Snyder Fund has funded almost 7 proposals for a total of \$4,525.

The average dollar amount for individual awards has ranged from a minimum of \$325 in 1986 to a maximum of \$933 in 1999. Because of declining interest rates in the late 1980’s, 1990’s and early 2000’s, it is hoped that contributions to the funds will continue to grow in order to help more students with their graduate study costs, which have been rising with inflation.

IN CONCLUSION

As the Colorado Scientific Society enters the twenty-first century, it can look back over many decades of genuine contributions to science and to the community. It has disseminated scientific knowledge by both spoken and written word; it has inspired many scientists, students, and others to deeper study of the world around them; it has given much, intellectually and materially, to the community; and it has embarked on an growing scholarship program under its Memorial Funds. Most important of all, perhaps, it has kept pace with the times. Starting life as a pioneer in a pioneer region, it has grown with the community, adjusting to expanding population and wealth, to new ways of life, and to enormous growth in scientific knowledge.

Today, as the Society continues through its second century, it looks forward confidently to the future. Its activities and form cannot be predicted in detail, but it seems certain to continue as an active society that will serve as a gathering place and information exchange center for Earth scientists of different bents.

Colorado Scientific Society
May 2003
Lakewood, Colorado

Memorial Funds Grant Program

Number of Awards
(Partial grants co-sponsored by 2 funds)

Year	Tweto	Oriel	Eckel	Pierce	Snyder	Total
1984	3					3
1985	3					3
1986	2	0				2
1987	2	1				3
1988	1	1				2
1989	2	1				3
1990	3.5	1.5	0			5
1991	4	2	1			7
1992	5	2	2			9
1993	4.5	1.5	2			8
1994	5	2.5	2.5	0		10
1995	5	2	2	1		10
1996	4	3	2	2		11
1997	4	3	2	1		10
1998	5	3	3	0		11
1999	5	3	1	2	1	12
2000	4	3	2	1	2	12
2001	4	3	2.5	0	1.5	11
2002	3.5	3	2.5	0	2	11
Total	69.5	35.5	24.5	7	6.5	143

Amount of Awards (\$)
(* No research proposals received this year)

Tweto	Oriel	Eckel	Pierce	Snyder	Total (average per grant)
1,300					1,300 (433)
1,050					1,050 (350)
650	0				650 (325)
1,700	400				2,100 (700)
900	450				1,350 (675)
1,940	530				2,470 (823)
2,910	1,190	*0			4,100 (820)
3,100	1,500	650			5,250 (750)
3,500	1,890	1,270			6,660 (740)
3,030	1,290	1,000			5,320 (665)
3,590	1,600	1,450	*0		6,640 (664)
2,900	1,400	1,200	850		6,350 (635)
2,900	1,800	1,300	1,900		7,900 (718)
3,900	2,400	1,750	1,700		9,750 (905)
3,545	2,100	1,972	*0	*0	7,617 (692)
3,975	2,500	1,500	2,465	750	11,190 (933)
2,710	2,900	1,550	1,200	1,250	9,610 (800)
3,450	2,475	1,625	*0	1,225	8,775 (798)
3,400	2,400	1,650	*0	1,300	8,750 (795)
50,450	26,825	16,917	8,115	4,525	106,832 (747)

GUIDELINES FOR THE COLORADO SCIENTIFIC SOCIETY'S MEMORIAL FUNDS

Title—The Ogden Tweto Memorial Fund (and others).

Purpose—To support graduate-student research in Colorado geology. Awards will be restricted to graduate students.

Administration—A committee, under the general guidance of the Council, is charged with the administration of and has responsibility for organizing the fund, checking IRS rulings, investing or depositing the money, establishing qualifications for the candidates, preparing and distributing announcements, reviewing award candidate's proposals, and selecting award recipients.

Committee members were to be past presidents or former council members of the Society, although this requirement is not strictly followed. The first year's committee consisted of a chairman and two members appointed by the president. The treasurer of the Society served as treasurer of the fund, but since 1985 the committee has had a separate treasurer for the Memorial Funds. In succeeding years, the chairman is to be replaced by the most recent past president of the Society, who appoints two new members, keeping the committee at its full complement of five members. Committee members serve for 2 years. Each committee will have two new members, two continuing members, and a past president as chairman. The treasurer is appointed by the chairman.

The amount of money awarded and the number of awards given are determined by the amount of earnings generated by the invested funds.

At the May meeting each year, the chairman is responsible for announcing to the Council the awards and the amounts awarded. A full financial report, concerning the money earned by the fund, is to be presented to the Society at the annual business meeting in December.

More detailed guidelines were worked out at the first fund committee meeting on February 7, 1984, and recast as follows:

1. The Society will obtain a letter from the IRS confirming that the Society is a tax-exempt organization.
2. Donations to the fund will sustain an endowment fund. Dividends (or interest) earned from the endowment constitute the "yield." Only the yield can be used for the awards and the entire yield must be awarded each year (as required by the IRS).
3. Donations to the fund may be invested in a way that results in appreciation (or depreciation) of the principal. (All committees, through 1993, have believed that the principal must be preserved in its entirety and, therefore, have used only very conservative investments for the principal.)
4. It was decided to invest fund contributions in the Kemper Money Market Fund in Chicago, Illinois. A passbook savings account at First Bank of Westland, Lakewood, Colorado, will hold small donations until accumulated amounts are large enough to transfer to Kemper.
5. It was at first agreed that there would be insufficient yield to make an award in 1984. It was later decided, however, that contributions earmarked for 1984 awards would be accepted; thus, the first awards were made in the spring of 1984.
6. Rudy Epis suggested that a flier describing the Tweto Fund Award be distributed to potential applicants and donors to the fund. Margaret Snyder (wife of George Snyder, CSS president in 1977) did the artwork for the flier.

The Committee agreed on the following terms for the Tweto Fund awards:

1. The purpose of the awards will be to promote earth sciences in Colorado and adjacent States. Priority will be given to projects in Colorado and to projects that stress field-based studies, in particular those that involve mapping.
2. The awards will be open to studies in any field within the earth sciences.
3. The awards will be open to students from any accredited university or college.
4. Awards from the fund will be nondiscriminatory.
5. The committee will be responsible for receiving and reviewing all applications, with the option of calling for outside reviewers when appropriate.
6. Tentative dates were established: March 1 as the deadline for receipt of applications, and April 1 as the date for announcement of the awards and recipients.

COLORADO SCIENTIFIC SOCIETY MEMORIAL FUND AWARDS, 1984-2001

[* Chair of committee; ** Treasurer of committee]

YEAR & COMMITTEE	AWARDEE & SCHOOL	FUND & AMOUNT	TITLE OF STUDY
1984 P.K. Sims* S.S. Oriel R.C. Epis N.D. Naeser**	James Shannon Colo. School of Mines	Tweto \$500	Geology and mineral potential of the Mount Aetna cauldron complex, Chaffee and Gunnison Counties Colorado
	William Elder Univ. of Colo.—Boulder	Tweto \$500	Cenomanian-Turonian (Cretaceous) boundary event extinctions—The paleoecology of an oceanic anoxic event
	Linda Neff Colo. State Univ.	Tweto \$300	Gold-quartz veing system, Gold Brick District, Gunnison, Colorado
1985 C.L. Pillmore* S.S. Oriel R.C. Epis J.W. Rold C.W. Naeser N.D. Naeser**	William Berry Colo. School of Mines	Tweto \$400	Intrusion, metamorphism, and anatexis at deep levels in calc-alkaline plutonic system, Gore Range, Colorado
	Drummond Earley, III Univ. of Minn.		Structral and petrographic studies of the Proterozoic basement, Gold Brick Mining District, Gunnison County, Colorado
	Valois Shea Univ. of Colo.—Boulder		Mineral paragenesis of the ore-bearing veins at the White Raven Mine, Ward, Colorado
1986 B.H. Bryant* J.W. Rold C.W. Naeser R.C. Pearson R.J. Ross N.D. Naeser**	Eric Hetherington Univ. of Minn.	Tweto \$350	Structural analysis of Proterozoic rocks, Gunnison County, Colorado
	John Karachewski Colo. School of Mines	Tweto \$300	Depositional systems and paleogeography of the Pennsylvanian Minturn Formation, central Colorado trough
1987 M.W. Reynolds* R.C. Pearson R.J. Ross R. Brace J.E. Harrison M.W. Reynolds**	Paul Decker Univ. of Wis.—Madison	Tweto \$900	Structural style and mechanics of intense gravitational deformation, Absaroka Volcanic Supergroup, Wyoming
	Michael Duffin Univ. of Ill.—Urbana	Tweto \$800	Sedimentologic relations between depositional facies and silicate diagenesis in the Brushy Basin Member of the Morrison Formation, Colorado
	Maya Elrick Va. Polytechnic Inst. & State Univ.	Oriel \$400	Carbonate cycle development in Lower Mississippian shelf-to-basin deposits, northern Rocky Mountains
1988 T.L.T. Grose* R. Brace J.E. Harrison F.G. Poole M.W. Reynolds**	Lee Riciputi Univ. of Wis.—Madison	Tweto \$900	An integrated study of radiogenic and stable isotopes of the San Juan Volcanic Field, Colorado, and its implications for petrogenesis and crustal growth
	James Coogan Univ. of Wyo.	Oriel \$450	Latest Cretaceous and Tertiary stratigraphy of Bear Lake Plateau, Wyo., Idaho, and Utah
1989 R.W. Fleming* J.E. Elliott F.G. Poole G.L. Snyder T.L.T. Grose V.H. Sable**	George Langstaff Colo. School of Mines	Tweto \$940	Archean geology of the Granite Mountains, central Wyoming
	William Little Univ. of Colo.—Boulder	Tweto \$1,000	Fluvial response to rapid basin subsidence and the development of foreland uplifts—Kaiparowits Formation (Upper Cretaceous), south-central Utah
	Alan Lester Univ. of Colo.—Boulder	Oriel \$530	Temperature and fluid conditions marginal to a cool- ing pluton—The Audubon-Albion stock, Front Range, Colorado

COLORADO SCIENTIFIC SOCIETY MEMORIAL FUND AWARDS, 1984-2001—CONTINUED

[* Chair of committee; ** Treasurer of committee]

1990 M.E. Mac Lachlan* G.L. Snyder T.L.T. Grose J.C. Reed, Jr. R.J. Weimer V.H. Sable**	Laurie Dutton Baylor Univ.	Tweto \$450 Oriel \$370	Structural interpretation of the Horse Center anticline, western margin of the Big Horn basin, Wyoming
	Cinda Graubard Univ. of Calif.— Santa Barbara	Tweto \$820	Origin and tectonic significance of Middle Proterozoic granitoids in Colorado and history of motion along the Idaho Springs-Ralston Creek shear zone of the central Front Range
	Eric Hiatt Univ. of Colo.—Boulder	Tweto \$820	Quantitative analysis of regional sedimentary cycles— A case study using the Phosphoria rock complex, Wyoming
	Lesli Wood Colo. State Univ.	Tweto \$820	Base-level fluctuations and their effect on fluvial depositional systems
1991 F.G. Poole* J.C. Reed, Jr. R.J. Weimer D. Mullineaux A.R. Palmer V.H. Sable**	Jeralyn Brodowy Mont. State Univ.	Oriel \$820	Structure and neotectonics of the eastern Three Forks basin, southwest Montana
	Joseph Allen Univ. of Kentucky.	Tweto \$800	Early Paleozoic synsedimentary tectonics of central Colorado—Interaction of a basement shear zone and pre-Pennsylvanian sedimentation
	Gregg Crandall Rice Univ.	Tweto \$600	Fluvial influence on high-frequency sedimentary cycle geometry—The transision from strandplain to deltaic deposition in the Cretaceous Point Lookout Sandstone, San Juan Basin, Colorado
	Barbara Munn Virg. Polytechnic Inst. and State Univ.	Tweto \$800	Migmatization of deep crustal rocks, northern Front Range, Colorado
	Timothy Wawrzniec Univ of Minn.	Tweto \$900	Thermal, chemical, and mechanical effects of mid-Tertiary intrusives on regional structures near Taylor Peak, Gunnison County, Colorado
	Jeffrey Phillipone Univ. of Calif.— Los Angeles	Oriel \$600	Kinematics and timing of deformation, and thermal history of part of the Lewis allochthon and Cabinet Mountains, northwestern Montana
	George Lambert Texas A&M Univ.	Oriel \$900	Origins and destruction of fracture porosity in carbonate rocks
	Lisa Zaffran Ariz. State Univ.	Eckel \$650	Earth fissure development in Apache Junction, Arizona
1992 G.S. Holden* D. Mullineaux A.R. Palmer R.W. Fleming B.H. Bryant V.H. Sable**	Brian Currie Univ. Rochester	Tweto \$800	Depositional architecture, provenance and sequence stratigraphy of the nonmarine Jurassic-Cretaceous Cordilleran foreland basin, northwestern Utah, northwestern Colorado
	Bradley Ilg Northern Ariz. Univ.	Tweto \$700	Proterozoic orogenic history in the Grand Canyon— Window into the character of Proterozoic crust under the Colorado Plateau
	David Malone Univ. of Wisconsin	Tweto \$500	Mechanisms, kinematics, and spatial relations of chaotic deformation, lower Wapiti Formation, Absaroka Volcanic Supergroup (Eocene), Wyoming
	James Montgomery, Jr. Univ. of Kentucky	Tweto \$500	Basement fault-related stratigraphic controls on internal structures that contribute to curvature of thrust belts
	Laurel Shastri Univ. of New Mexico	Tweto \$1,000	Proterozoic geology of the Los Pinos Mountains, central New Mexico—Interrelationships between plutonism, deformation, and metamorphism
	Jason Hicks Yale Univ.	Oriel \$1,000	The radiometric calibration of the magnetic polarity time scale for the Campanian and Maastrichtian

COLORADO SCIENTIFIC SOCIETY MEMORIAL FUND AWARDS, 1984-2001—CONTINUED

[* Chair of committee; ** Treasurer of committee]

1992—Continued	Timothy Paulsen Univ. of Illinois	Oriel \$890	Structural geometry of the American Fork Canyon transverse zone, Wasatch Mountains, Utah
	Lauren Hammack Colo. State Univ.	Eckel \$570	Hydraulics of debris flows and floods at Warm Springs Rapids on the Yampa River, Colorado
	Wendy Anne Meyer Northern Ariz. Univ.	Eckel \$700	Neutralization of sulfate and immobilization of heavy metals from acid rock drainage—Natural processes occurring in the Rocky Mountain alpine streams, La Plata Mountains, Colorado
1993 S.A. Sonnenberg* R.W. Fleming B.H. Bryant T.L.T. Grose F.G. Poole V.H. Sable**	Lisa Finiol Colo. School of Mines	Tweto \$700	Constraints on melting processes, Colorado Front Range
	Joe Denny Gregson Colo. State Univ.	Tweto \$770	Regional tectonic implications of structures within Dinosaur National Monument
	Stephen T. Hasiotis Univ. of Colo.—Boulder	Tweto \$210, Oriel \$690	Redefinition of the Scoyenia Ichnofacies—Late Cretaceous and Paleocene ichnology, sedimentology, paleohydrology, and paleoecology in the Book Cliffs
	Ancheng Ma Univ. New Mexico	Tweto \$600	Early Eocene micromammals in the San Jose Formation, San Juan Basin, New Mex.
	Roberta H. Yuhas Univ. of Colorado—Boulder	Tweto \$750	Landscape response to Holocene climate change—Evidence from remotely sensed data and ground-based studies in northeastern Colorado
	Genet Ide Duke S. Dak. School of Mines and Technology	Oriel \$600	Geochronology and geochemistry of Tertiary intrusives in the northern Black Hills, South Dakota and Wyoming
	Joni J. Hadden Boise State Univ.	Eckel \$500	Implications of lake level elevation changes of Ancient Lake Idaho—Western Snake River Plain, Idaho
	Gail Marie Snyder Univ. of Denver	Eckel \$500	Comparative analysis of geomorphic features in high and low human impact watersheds on Pikes Peak, Colorado
	Timothy L. Clarey Western Michigan Univ.	Tweto \$575	Fluid migration through a highly fractured crystalline crystalline body—A computer-generated example from the basement core of a Rocky Mountain foreland uplift
	Steven T. Hasiotis Univ. of Colo.—Boulder	Tweto \$700	Redefinition of the Scoyenia Ichnofacies—Late Cretaceous and Paleocene ichnology, sedimentology paleohydrology, and paleoecology in the Book Cliffs.
1994 M.N. Machette* T.L.T. Grose K.L. Pierce F.G. Poole S.A. Sonnenberg V.H. Sable**	James R. Rougvie Univ. of Tex. at Austin	Tweto \$650	Metamorphic fluid flow in the northernmost Park Range of Colorado: Regional significance and effects on porphyroblast nucleation and growth kinetics
	Timothy S. White, Penn. State Univ.	Tweto \$500	An examination of the Turonian Carlile Shale of Colorado and its lateral time-equivalent strata in Utah—Onshore-offshore patterns in organic matter type and preservation from a dominantly regressive episode of an epicontinental seaway
	Yu-Xing Zhou Texas A&M Univ.	Tweto \$700	Provincialism of palynomorphs from the Late Carboniferous sediments of the Ancestral Rockies: A response to paleoclimatic change
	Richard G. Hoy Purdue Univ.	Oriel \$500	Deformation of alluvial-fan conglomerates—The structural history of the central Bighorn Mountains and Powder River Basin, Wyoming

COLORADO SCIENTIFIC SOCIETY MEMORIAL FUND AWARDS, 1984-2001—CONTINUED

[* Chair of committee; ** Treasurer of committee]

1994-Continued	Kristine A. Smith Utah State Univ.	Eckel \$300	Stratigraphy, sedimentation, and tectonics of the Salt Lake Formation (Cenozoic) of southern Cache Valley, Utah
	Robert S. Leighty Ariz. State Univ.	Oriel \$700	Structural and magmatic record of a mid-Miocene tectonic transition, central Arizona
	Amy M. Hosokawa Colo. School Mines	Oriel \$500	Evaluation of transportation and utility construction problems on expansive soils and heaving bedrock based on investigations of the Pierre Shale, Jefferson County, Colorado
	Pedro J. Morales Purdue Univ.	Oriel \$450	Study of unstable lacustrine clay deposits (quickclays) in area of Finger Lakes, New York
1995 M. Machette* K. Pierce S. Sonnenberg C. Pillmore G. Snyder M. Machette**	Joe Denny Gregson Colo. State Univ.	Tweto \$750	Laramide kinematics across the Colorado Plateau/Rocky Mountain Foreland Boundary [Colo.-Wyo]
	James R. Rougvie Univ. of Texas at Austin	Tweto \$600	Metamorphic fluid flow in the northernmost Park Range of Colorado—Regional significance and effects on porphyroblast nucleation and growth kinetics
	Tim F. Wawrzyniec Univ. of New Mex.	Tweto \$500	Transpressional kinematics of the Elk Range Thrust sheet and the Castle Creek structural zone, Pitkin and Gunnison Counties, Colorado
	Roland Rueber Colo. State Univ.	Tweto \$500	Volcanic stratigraphy of the Iron Mountain region, north-central Colorado
	Andro K. Wohlgenant Univ. of Wisconsin	Tweto \$500	Investigation of the Reef Creek detachment fault, northwestern Wyoming, in light of new evidence for a debris-avalanche origin
	Susan Dougherty Montana State Univ.	Oriel \$700	Relations between thrust evolution and conglomerate deposition in the Upper Cretaceous Beaverhead Group, Red Conglomerate Peaks, Southwestern Montana-Idaho
	Casey E. Kipf Montana State Univ.	Oriel \$700	Characterization of basement-involved thrust faulting in the Beaverhead Mountains, Sevier orogenic belt, southwest Montana and east-central Idaho.
	Merri Lisa Formento-Trigillio Univ. of New Mex.	Eckel \$600	Post-Laramide tectonic history and neotectonic deformation of the Nacimiento Uplift, northern New Mexico
	William H. Schulz Purdue Univ.	Eckel \$600	Pyroclastic-flow mechanics and deposits
	Kristina C. Sprietzer Western Michigan Univ.	Pierce \$850	A paleomagnetic test of rotation of the Heart Mountain thrust/slide block
1996 S. Landon* C. Pillmore G. Snyder D. MacKenzie John Rold M. Machette**	Nicholas A. Bulloss Univ. of Minn.	Tweto \$910	Fluid-rock interaction in the White Rock Stock contact aureole
	Jennifer R. Crews Univ. of Colo.	Tweto \$890	Biological response to Milankovitch climate cycles in a greenhouse world and across the Cenomanian-Turonian mass extinction boundary
	Tim F. Wawrzyniec Univ. of New Mex.	Tweto \$550	Translation or rotation?—Kinematics east of the Colorado Plateau, Huerfano Park, Colorado

COLORADO SCIENTIFIC SOCIETY MEMORIAL FUND AWARDS, 1984-2001—CONTINUED

[* Chair of committee; ** Treasurer of committee]

1996-Continued

Mat Wilson, Bowling Green State Univ.	Tweto \$550	Fluid history of the southern margin of the Silverton Caldera, southwestern, Colorado
David C. Adams, Mont. State Univ.	Oriel \$600	Timing, geometry, and kinematics of late-Cenozoic normal faulting, southern Teton Range, Jackson Hole, Wyoming
Kurt N. Constenious Univ. of Ariz.	Oriel \$700	Structural interaction of the Charleston-Nebo allochthon and the Uinta Arch, central Utah
David M. Palleiko, Boise State Univ.	Oriel \$500	Fault kinematics of the Pioneer thrust fault, Pioneer Mountains, south central Idaho
Sarah Johnson, Purdue Univ.	Eckel \$700	Debris-flow deposits of the Columbia River Gorge
Kelly E. Keighley Utah State Univ.	Eckel \$600	Structural and hydrogeological characteristis of deformed bedrock aquifers—Summit County, Utah
Margaret M. Hiza Oreg. State Univ.	Pierce \$700	Geochemistry and geochronology of the Absaroka- Gallatin Volcanic Supergroup, NW Wyoming and SW Montana
John J. Walsh Columbia Univ.	Pierce \$1,000	The Heart Mountain fault zone—A criterion for distinguishing slide blocks from rooted low-angle normal faults

1997

R.F. Madole*
G. Holden
S. Landon
D. MacKenzie
J. Rold
M. Machette**

Brian K. Alers, Colo. School of Mines	Tweto \$900	Multi-stage deformational history of early Proterozoic Cu-Zn, and Zn-Pb-Ag, volcanogenic sulfide mineratization at the Cinderella and Bon Ton mines, Maysville, Chaffee County, Colorado
Andrey Bekker, Va. Polytechnic Inst. and State Univ.	Tweto \$1,000	A combined sedimentological and geochemical analysis of the Nash Fork Formation, Medicine Bow Mountains, Wyoming—Evidence for a rise of oxygen in the Paleoproterozoic atmosphere
Stan P. Dunagan Univ. of Tennessee	Tweto \$1,000	Epicontinental carbonate lake sedimentation and paleoenvironments of the Morrison Formation (Upper Jurassic) Colorado—Understanding variations in paleohydrology and paleoclimatology
William. Jay Sims Univ. of Kentucky	Tweto \$900	Fault-boundary geometry and kinematic history, and stratal architecture of the northern part of the Central Colorado trough
Thomas J. Kalakay Univ. of Wyom.	Oriel \$1,000	Structural and thermochronologic study of the Pioneer batholith, southwest Montana: A test of the critical taper wedge model in the Sevier orogen of southwest Montana
Paul C. Murphey Univ. of Colo—Boulder	Oriel \$1,000	Stratigraphy and depositional history of the upper Bridger Formation (middle Eocene) of southwestern Wyoming, and systematics of the Bridgerian Ischyromyidae (Mammalia, Rodentia)
Caleb J. Pollock Univ. of N. Carolina	Oriel \$500	Structural relationship of high-angle reverse faults and thrust faults in a Laramide uplift—Sierra Nacimiento, New Mexico
Brendan R. Fisher Radford Univ.	Eckel \$1,000	Geologic map and hazard inventory in the Interstate 77 corridor of the Valley and Ridge Province, Virginia

COLORADO SCIENTIFIC SOCIETY MEMORIAL FUND AWARDS, 1984-2001—CONTINUED

[* Chair of committee; ** Treasurer of committee]

1997—Continued	Kris Zumalt Colo. School of Mines	Eckel \$750	A preliminary characterizaion of the hydrogeology and hydrogeochemistry of the wetlands in North Star Nature Preserve, Pitkin County, Colorado
	John J. Walsh Columbia Univ.	Piercet \$1,000	The Heart Mountain detachment—A criterion for distinguishing gravity slide blocks from rooted low-angle normal faults
1998 K. Kellog* G. Holden S. Landon B. Poole J. Reed M. Machette**	Paul Wisniewski Univ. of New Mex.	Tweto \$945	Incision rates and knickpoint migration of the Canadian River, northeastern New Mexico
	Jason C. Ruf Colo. State Univ.	Tweto \$800	Fracture analysis of the northern San Juan Basin using both shear fractures and joints
	Janet L. Bertog Univ. of Cincinnati	Tweto \$700	High resolution stratigraphic correlation of the Late Cretaceous Pierre Shale using bentonitic beds
	Derek Sjostrum Dartmouth College	Tweto \$600	Fault kinematics, geometry and timing of the Poncha Pass transfer zone, northern Rio Grande Rift, Colorado
	Cassandra L. Dippold Kansas State Univ.	Tweto 500	Geochemistry of ferricretes as an indication of pre-mining water quality and Holocene climate in historically mined areas of the Rocky Mountains
	Thomas J. Kalakay Univ. of Wyoming	Oriel \$800	Structural and thermochronologic study of the Pioneer batholith, southwest Montana—A test of the critical taper wedge model in the Sevier orogen of southwest Montana
	Michael P. O'Connell Mont. State Univ.	Oriel \$700	Relative timing and mechanisms of emplacement of the Phillipsburg batholith, western Montana
	Mark A. Hespenheide Mont. State Univ.	Oriel \$600	Thrusting and magmatism—A possible modification of the critical-taper wedge model
	David Mitchell Univ. of New Mexico	Eckel \$1,000	Modeling long-term rates of incision of four New Mexico streams using a field-calibrated stream power law
	Andrew B. Dunn New Mexico Tech Inst.	Eckel \$572	Hydrogeologic investigations of ground water flow in and adjacent to a stablized, deep-seated landslide near Costilla Reservoir, Taos County, New Mexico
1999 E. Erslev* S. Landon B. Poole J. Reed C. Robinson M. Machette**	Emily P. Hunt Univ. of Denver	Eckel \$400	Fire-related sedimentation on alluvial fans—Buffalo Creek and Spring Creek, Colorado
	Margaret McMillan Univ. of Wyoming	Tweto \$1,000	Late Cenozoic exhumation of the central Rocky Mountains
	Michael Poland Ariz. State Univ.	Tweto \$1,000	Dike geometry and emplacement in the shallow subsurface
	Trista Thornberry Colo. State Univ.	Tweto \$675	A characterization of pseudotachylite fault rocks from ancient, mid-crustal seismic activity along a multiply reactivated basement fault, the Homestake shear zone, central Colorado
	Janet Bertog Univ. of Cincinnati	Tweto \$600	High-resolution correlation of the transgressive phase of the Claggett Cycle using bentonite stratigraphy

COLORADO SCIENTIFIC SOCIETY MEMORIAL FUND AWARDS, 1984-2001—CONTINUED

[* Chair of committee; ** Treasurer of committee]

1999—Continued	Nicole Bolay Colo. State Univ.	Tweto \$700	Spatial relationships of Laramide deformation in the southern Rocky Mountains
	Shelley Judge Ohio State Univ.	Oriel \$1,100	Structural analysis of the Wasatch Monocline, central Utah
	Carole Dehler Univ. of New Mexico	Oriel \$900	Basin evolution and carbon isotope stratigraphy of the Proterozoic Chuar Group, eastern Grand Canyon
	William Phelps Univ. of Calif.— Riverside	Oriel \$500	Effects of ecological selectivity on recovery community restructuring—A paleoecological comparison study of Late Devonian and early Carboniferous limestones of the Rocky Mountains
	Horatiu Cobeanu Univ. of Tex. at Dallas	Eckel \$1,500	An environmental and geotechnical investigation of landsliding related to oil production in the eastern Carpathian Mountains, Romania
	Aubrey Zerkle Univ. of Ill. at Urbana	Pierce \$1,500	Cathodoluminescence petrographic and geochemical constraints on the cause of the Heart Mountain detachment, Wyoming
	Colin Shaw, Univ. of N. Mex.	Snyder \$750	Kinematic evolution of the Homestake shear zone—Assembling the lithosphere of Colorado
2000 C. Pilmore* R. Fleming S. Lundstrom J. Reed C. Robinson M. Machette**	Jake Armour Mont. State Univ.	Tweto \$600	Existence and potential controls on a Late Holocene (neoglacal) advance in the southern Sangre de Cristo Mountains, New Mexico
	Timothy Farnham Univ. of Colo.—Boulder	Tweto \$500	Geochemical and sedimentological variability of a paleosol sequence at the Paleocene—Eocene transition in the Denver Basin
	Annie McCoy, Univ. of New Mexico	Tweto \$710	Deciphering the tectonic history and importance of the Colorado Mineral Belt
	Margaret E. McMillan Univ. of Wyoming	Tweto \$900	Late Cenozoic exhumation of the central Rocky Mountains (second-year funding)
	Amanda DiUlio Colo. State Univ.	Oriel \$900	Regional thrust kinematics in west-central Wyoming and the origin of Jonah Field
	Shelley Judge Ohio State Univ.	Oriel \$1,000	Structural analysis of the Wasatch Monocline, central Utah (second-year funding)
	Malka Machlus Columbia Univ.	Oriel \$1,000	Orbital forcing of Eocene climate—A field study of the Green River Formation, the Green River Basin, Wyoming
	Melissa Crane Univ. of Colo. at Denver	Eckel \$900	A geographic information systems analysis of rockfall hazards in Clear Creek Canyon, Colorado
	Cal Ruleman Mont. State Univ.	Eckel \$650	Late Quaternary slip rates on range-bounding normal faults, North Arm of the Yellowstone Tectonic Parabola, Southwest Montana
	Thomas A. Douglas Dartmouth College	Pierce \$1,200	Mineralization at the New World, Horseshoe, and Sunlight mines, Montana—Relating hydrothermal fluids with Heart Mountain faulting

COLORADO SCIENTIFIC SOCIETY MEMORIAL FUND AWARDS, 1984-2001—CONTINUED

[* Chair of committee; ** Treasurer of committee]

2000—Continued	Stephen T. Allard Univ. of Wyo.	Snyder \$650	Mid-crustal response to Proterozoic arc-continent collision, central Laramie Mountains, southeastern Wyoming
	Benjamin Fruchey Univ. of Wyoming	Snyder \$600	Constraints on the Archean Evolution of the Wyoming craton—U/Pb geochronological and structural study of the Rattlesnake Hills, central Wyoming
2001 M.R. Hudson B.H. Bryant S. Lundstrom R. Fleming M. Machette	Abby West Howell Colo. State Univ.	Tweto \$1,500	Paleozoic structures of the Sacramento Mountains Otero County, New Mexico and implications for ancestral Rocky Mountain tectonics
	Kurt L. Frankel Lehigh Univ.	Tweto \$900	Post Laramide tectono-geomorphic evolution of Sierra Nacimiento, southern Rocky Mountains, New Mexico
	Richard S. Barclay Univ. of Florida.	Tweto \$450	Floral change and rates of recovery at a new K-T boundary section in the Denver basin of Colorado
	Zachary St. Jean Mont. Tech.	Tweto and Oriel \$500	Geologic mapping of Tertiary and Quaternary deposits in the Ruby Dam area, SW Montana
	Amanda B. Fisher Colo. State Univ.	Oriel \$1,000	Geometries and kinematics of Laramide basement-involved anticlines
	Cornel Olariu Univ. of Texas	Oriel \$900	Study of terminal distributary channels from delta-front deposits, integrating outcrop data with GPR data, Panther Tongue sandstone, Utah
	Cal Ruleman Mont. State Univ.	Eckel and Oriel \$650	Mid-Pleistocene to Holocene tectonic activity along the Madison Range fault, southwest Montana (second-year funding)
	Cristina Millan Ohio State Univ.	Eckel \$700	Geology and origin of intrusion brecciation on Red Cone Peak, Park County, Colorado
	John G.V. Van Hoesen Univ. of Nevada	Eckel \$600	The paleoclimate and late Quaternary glacial chronology of Great Basin National Park, Nevada
	Eric T. Goergen Univ. of Montana—Columbia	Snyder \$875	Evaluating the timing of Paleo-Proterozoic reworking of the SE margin of the Wyoming Archean province in the Laramie Range of southeastern Wyoming
2002 M.L.W. Tuttle* M.R. Hudson B.H. Bryant E. Erslev R.F. Madole D. Sweetkind	Joseph P. Kopera Univ. of Mass.	Snyder and Tweto \$700	Tectonic history of 1.7 Ga quartzites in the southwest United States—An application of monazite dating with electron microprobe
	Jessica Allen Univ. of Georgia	Tweto \$1,000	The sequence stratigraphy of the Harding Sandstone
	Ben Kennedy McGill Univ.	Tweto \$970	The roles of faults at Lake City Caldera, San Juan Mountains, Colorado and how they relate to the deeper structures and intrusions of Ossipee Ring complex, New Hampshire
	Erin Phillips New Mex. Inst. Tech.	Tweto \$1,000	The nature of resurgence in the Valles Caldera, Jemex Mountains, New Mexico
	Caroline Harris Northern Ariz. Univ.	Oriel \$1,180	P-T paths and thermal modeling from the Albion Mountains, southern Idaho—Implications for hinterland deformation of the Sevier orogeny

COLORADO SCIENTIFIC SOCIETY MEMORIAL FUND AWARDS, 1984-2001—CONTINUED

[* Chair of committee; ** Treasurer of committee]

2002—Continued	Elizabeth Langenburg Utah State Univ.	Oriel \$420	Middle Cambrian parasequences in the Wheeler Formation—Faunal response to sea-level oscillations and high-resolution chemostratigraphy of the House Range embayment
	Laura Net Univ. of Texas—Austin	Oriel \$800	Diagenesis and reservoir quality of the eolian Nugget/Navajo Sandstone
	Isaac Larsen Utah State Univ.	Eckel \$600	Linking bedrock geology, precipitation, and hillslope processes in Dinosaur National Monument
	Paul Petersen Utah State Univ.	Eckel \$600	Finding thresholds for gully erosion of archaeological sites, Grand Canyon National Park—An empirical prediction analysis
	Amanda Ault Ariz. Univ.	Eckel and Tweto \$880	What is the nature of fluvial strath terraces?
	Benjamin Grosser Univ. of N. Carolina	Snyder \$660	Petrology and geochemistry of the Wildcat Gulch syenite—Comparison with the Tolvar Peak granite and the Powderhorn carbonatite complex
	Melissa Noble Colo. State Univ.	Snyder \$640	Structural history of the Gore Fault system, Eagle County, Colorado

