

SCIENCE MARCHES ON

Celebrating one hundred years of Colorado genius. By Zeke Scher

JUST BEYOND OH BE JOYFUL GULCH, across from Gunsight Pass in Gunnison County, Colorado, rises 12,392-foot Mount Emmons, the summit overlooking the town of Crested Butte from the northwest. The peak was once called Mount Irwin, for a nearby pioneer mining town, and government records fail to disclose who applied the Emmons name and when.

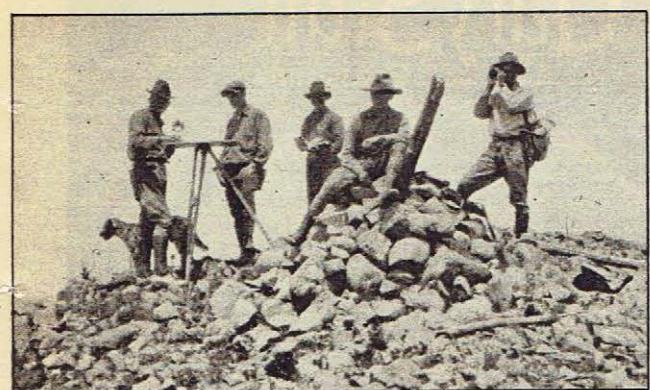
During Colorado's territorial days and early statehood, members of the Western survey teams and, later, field crews of the U.S. Geological Survey (USGS) assumed the prerogative of inventing place-names for their new regional maps. Whether they were displaying their loyalties or expediency demanded decisions more urgent than ingenious, the result is that many of Colorado's highest mountains carry the names of surveyors and their supervisors.

Ogden Tweto, a professional descendant of those early-day Western surveyors and author of the new Colorado Geologic Map, offers an educated guess that George Eldridge in the 1880s named the mountain at Crested Butte for his boss, Samuel Franklin Emmons.

Who was Emmons and why was he entitled to a Colorado mountain? A century later he still isn't a household name, but this week several hundred Coloradans will gather to lift one to old S.F. Emmons and celebrate the 100th anniversary of a remarkable organization he founded that helped "make" Colorado.

The Colorado Scientific Society — Emmons was first president — was the first and, for many years, only group of professionals in the region that felt obliged "to promote knowledge, the understanding of science and its application to industry." Despite its longevity and the fact that its work has touched the lives of almost all residents since 1882, the Colorado

(Top) Geologist J.B. Eby photographed this USGS survey crew atop Bears Ears Mountain in July 1923 as they mapped northwestern Colorado. (Center) This motorized crew surveying Routt County in the 1920s set up a USGS camp in California Park within Routt National Forest. (Bottom) C.L. Nelson, topographic engineer right, and recorder J.B. Wilson, survey from Pinon Mountain the Naturita area of southwestern Colorado's Montrose County in 1914





Scientific Society is little-known outside of a comparatively small number of earth scientists.

It should be known because:

- ✓ Its 3,000-volume collection of books originated the Denver Public Library's science and technology department nearly sixty years ago.
- ✓ Its mineral collection is the mother lode of the Colorado School of Mines Museum and also is a bonanza in the Denver Museum of Natural History.
- ✓ Its members' inventions, in many areas of engineering but particularly in the mining industry, solved major scientific problems and helped create worldwide leadership for American manufacturing.
- ✓ Its 17 volumes of *Proceedings* provide a fasci-



Mount Emmons, overlooking Crested Butte, Colorado, was named for the Colorado Scientific Society's founder, and first president, Samuel Franklin Emmons, left.

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in column below.]

public knowledge at such geologic sites as Red Rocks and the "20-million-year walk through the landscapes of the past" (the colorful strata cut for Interstate 70 near Golden); in judges and awards for annual Colorado high-school science fairs; in monthly Denver-area lectures on major scientific issues, ranging from Colorado volcanoes and dinosaurs to nuclear waste and Creationism.

The society's role of scientific leadership, undoubtedly reduced in recent decades by a proliferation of specialized professional groups, is directly in keeping with its birthing. As Leadville, Aspen and other mining towns boomed across the Colorado Rockies in the early 1880s, Denver became the headquarters for a large number of scientists, engineers and educators.

In 1879, the USGS was created and its director in Washington, Clarence King, sent his top economic geologist to supervise the Rocky Mountain Division in Denver. That was Emmons, no stranger to the West.

A Boston native (born 1841) and Harvard graduate, Emmons added geology training in Europe before joining King in 1867 for the U.S. government's "40th Parallel" exploration of the West — from the Pacific Coast to the Colorado Front Range. For the next ten years, Emmons climbed over, studied and mapped the region.

On occasion, he helped make national headlines, like in 1872's "Great Diamond Swindle." Two "diamond prospectors from Wyoming" deposited a bag of gems for safekeeping with the president of the Bank of America in San Francisco. The banker took the bait, learned of the diamonds' "source" and started negotiations to purchase the property — just south of the Wyoming line in northwestern Colorado Territory.

In May 1872, a group of New

nating panorama of scientific thought from the pioneer decades of Colorado to modern times, including a major reference work, *Glossary of Selected Geologic Terms*.

✓ Its subsections in chemistry and in mechanical, electrical and civil engineering shortly after the turn of the century produced spinoff technical societies that continue today as adjuncts of national organizations.

✓ Its continuing educational programs enrich

York investors, associates of the San Francisco banker, got off the Union Pacific Railroad at Rawlins, Wyoming, transferred to horses and rode off to the southwest with their guide. After four days, the guide led them to the diamond fields — at the foot of Dome Mountain (later to be known as Diamond Peak). The investors were delighted to find not only diamonds but also rubies, emeralds and sapphires. Not a typical Western "gold mine," but promised wealth could ignore that aberration.

The investors formed a \$10-million company (no shares available to the public) to harvest the bonanza. The details of the discovery reached Emmons, King and topographer Aiken Wilson at their Fort Bridger, Wyoming, field headquarters in October 1872. They set out to check the site.

Locating the freshly staked claims, the government men determined the diamond fields had been "salted" by the prospectors. Gems had been placed in anthills and in holes poked with a stick. On Nov. 11 King announced their conclusions and branded the promotion a hoax. He became an overnight hero. It didn't hurt him seven years later when President Rutherford B. Hayes was looking for a USGS director.

King, in sending Emmons to Denver in 1879, instructed him to make a study of the mineral wealth of the Rockies — district by district in Colorado. Emmons made his Number One task the mapping of Leadville. When Emmons' report was published with one of the first USGS geologic maps, the work was appraised as "epoch-making . . . permitting the mining engineer to steer a course of exploration."

Emmons was later described as "the leading economic geologist of his day . . . His name and authority are recognized in every mining camp from the Arctic to Australia."

But on the evening of Dec. 8, 1882, in his downtown Denver offices at Sixteenth and Larimer Streets, Emmons surrounded himself with a group of "giants" for a different kind of scientific endeavor. Twelve in all were present. Emmons proposed creation of the Colorado Scientific Society:

"We must each of us resolve to do his part, however small it may seem, to contribute new facts or suggest paths for investigation. It is not

enough to listen to what others may have to offer. If we are to prove ourselves worthy of the opportunities which nature has offered, we must each of us lend a hand in the work."

He said the time had come for Coloradans "interested in true science to unite in forming an association whose immediate object should be to facilitate the interchange of scientific observation and ideas."

Emmons set one scientific goal that has never been reached: "I call on members to bear in mind that in their papers and discussions, clearness and conciseness of statement is an essential requisite."

While Emmons was elected president, he had no corner on stature among the twelve founding members. Some had come to Colorado in the 1860s and helped gain statehood; one was then a U.S. senator, another was the governor-elect. All but one had lengthy scientific backgrounds. That one would be described later as "the most widely known cleric in the Rocky Mountain region." All twelve were men of major accomplishment:

✓ Nathaniel P. Hill, a New York native and professor of chemistry at Brown University before coming to Colorado in the mid-1860s, organized the Boston & Colorado Smelting Company at Black Hawk in 1867, adding a larger smelter at Argo near Denver in the '70s. He was U.S. senator from Colorado (1879-1885), owned the *Denver Republican* newspaper and also the Denargo Land Co.

✓ James Benton Grant had just been elected Colorado's first Democratic governor (1883-85). A metallurgist, he joined an uncle in Leadville to build a lead smelter in 1877, moving operations to Denver in 1882 (Omaha & Grant Smelting Company). His 350-foot-high smokestack was a Denver landmark into the 1950s. Grant also was president of the Denver School Board for eight years.

✓ William Francis Hillebrand earned a Ph.D. at Heidelberg, Germany, before joining the USGS in 1880, switching to the Bureau of Standards as chief chemist in 1908. Elected CSS president in 1885, he was an expert on minerals, rocks and methods of analysis.

✓ Albert Howard Low, a chemist with an MIT degree, worked at smelters in Leadville, Boulder and Denver before serving as chief assayer for the Denver Mint. He joined co-founder Adolph von Schulz, also a chemist, to form a Denver partnership of mining consultants on technical methods of ore analysis. Von Schulz, who first came to Colorado from Germany to work for Hill at Black Hawk and Argo, headed the Colorado School of Mines chemistry department 1919-26.

✓ Richard Pearce, an Englishman, came to Colorado after attending the London School of Mines, joining Senator Hill's mining ventures. He was vice consul for Great Britain in Denver. Elected vice president to Emmons in 1882, he served three terms as CSS president — 1884, 1886 and 1889. A consulting engineer and lecturer, he received an honorary Ph.D. from Columbia University in 1890.

✓ Hermann Beeger became a metallurgist in his native Germany and was brought to Colorado by pioneer mining interests in 1868. He was instrumental in creating Colorado's first successful smelter at Leadville, building another at Alma in South Park before moving to Denver. He has been called "the father of smelting in the West."

✓ Anton Eilers was deputy U.S. commissioner for mining statistics and prominent in Virginia and Utah mining circles before coming to Colorado in 1879. His "Utah Smelter" in Leadville accounted for a major output of the district because of new processes he developed. He later

was general manager and president of the Colorado Smelting Company in Pueblo.

✓ Charles Whitman Cross brought a Leipzig Ph.D. with him to Colorado in 1880 when he joined the USGS and Emmons. He criss-crossed the West, producing a huge volume of early photographs of the Colorado high country. He was CSS secretary and treasurer for four of the first five years.

✓ Peter H. Van Diest was a Denver civil and mining engineer before operating the Lead Mining Company in Colorado's San Luis Valley. He was CSS vice president for two years before heading the society in 1887.

✓ Emmons was given a middle name for his distant cousin, Benjamin Franklin (*the* B. Franklin) and he used Frank as a common name. While still spending most of his time in the West, he helped organize the International Geological Congress and was U.S. representative to sessions in Russia and Austria. He was elected president of the Geological Society of America in 1902. He also spent considerable time mapping in the shadow of "his" mountain at Crested Butte.

✓ The Rev. Henry Martyn Hart was dean and rector of St. John's Episcopal Cathedral from the time he arrived in Denver from England in 1879 until his death at eighty-two in 1920 (he is buried at the church at East Fourteenth Avenue and Washington Street). He excelled in science and mathematics at the University of Dublin, leading him into the scientific society (he was vice president in 1884). Educator, writer and builder of two cathedrals in Denver, he received a University of Denver doctor of laws in 1889.

A latter-day society officer explained that "the presence of the sky pilot doubtless was for poise and dignity or, perhaps, to direct scientific re-

search in that mysterious land across the Styx whose shores were then as now untracked by the feet of returning explorers, scientific or otherwise."

During the 1880s and '90s, six of the twelve founders achieved a prominence in posterity by having newly discovered minerals named after them: emmonsite, crossite, hilbrandite, beegerite, vandiesite and pearceite. Franklin Guiterman joined the society in 1884, and, the same year, guitermanite immortalized his name (he was CSS president 1909-10).

In those early years of the society when its voice was singular and powerful, it was heard whenever scientific recommendations were required on both state and national levels. It wasn't all-powerful, and in the late 1880s when a USGS office was moved to Washington, it was removed despite CSS objections.

On the other hand, CSS was the power that created the Colorado Bureau of Mines in 1891, the Colorado Geologic Survey in 1908 and the Colorado Engineering Council in 1919. An Emmons proposal to establish a Colorado Academy of Sciences didn't succeed. The society helped draft much legislation, including mine accident laws.

The names of inventor-members are still prominent.

A.R. Wilfley, while at Kokomo in Summit County, gave the world a greatly improved concentrating table for the separation of sulfides from ores. The Denver engineering company he started still operates under his name.

William Ainsworth invented an analytical balance used in chemical research and started the manufacturing company for scientific instruments known today as Ainsworth Division of Denver Instruments Company.

David W. Brunton (CSS vice president in 1906) invented the "pocket transit," a

surveying compass carried by most geologists in the field. John Van Nostrand Dorr invented a classifier or filter to solve separation problems in gold milling. His business expanded worldwide to today's Dorr-Oliver process-equipment company (a branch is in southwest Denver).

Over the decades the society continued to publish the gamut of scientific papers presented at the monthly meetings. The importance and impact of those volumes "cannot be overestimated," says Edwin B. Eckel of Denver, a seventy-six-year-old USGS veteran and CSS president in

1950 and '51.

"Bear in mind that only two of the American geologic journals that we know today were in existence in the 1880s," says Eckel. "Those were *Science* and *American Journal of Science*. The USGS itself had barely begun. The CSS publications filled a real vacuum in the scientific reporting field. The society can be proud of its very respectable contribution to the permanent fund of knowledge over a very long period."

Eckel has done as much as anyone to encourage adherence to Emmons' words of wisdom on "clearness and

conciseness of statement." Drawing on his fifty years' experience in writing and editing scientific papers — he was chief of two USGS branches in Denver since 1946 — he produced a 273-page "bible" for government writers called *Suggestions to Authors of the Reports of the USGS* (1978).

"Scientific gobbledegook is no less gobbledegook for being scientific," says Eckel. "Language is the problem. Everybody talks about it but, like the weather, nobody does anything about it. Few scientists can even talk to ordinary people."

Eckel has tried to practice

what he preaches in his 100-year survey of Colorado minerals and in his seven-year study of The Great Alaska Earthquake of 1964 ("That's a dozen volumes that won't be read until another city is hit by an 8.4 earthquake," he says).

The society in some ways functions much as it did a century ago.

"This is a wonderful sounding board for young scientists," says Eckel. "They can stand up, give a speech on their subject and then get beaten down by the other, more-experienced members. It was good for me when I did

it years ago. And everybody learns something new."

Ogden L. Tweto, a USGS staffer for forty-two-years who recently completed the new Colorado Geologic Map (only the fourth such overall study in state history), contends that everyone, not just scientists, benefits from the CSS-encouraged communication of scientific developments in all fields.

James Michener, the author, certainly benefited. While researching the geologic history of eastern Colorado for the opening chapter of *Centennial*, Michener interviewed three of the society's

members at length — Tweto, G. Edward Lewis and Glenn R. Scott. The geologists gave Michener an A for effort, but geologic history is as complex as some scientific explanations of it. They feel Michener was overmatched by the subject.

Tweto unwittingly prepared for his big job of putting together the underlying geology of Colorado on a map while the only USGS geologist in Colorado during World War II. Other federal agencies had him running all over Colorado on matters of essential natural resources (like metallic minerals and uranium). "I feel like I worked on that map for forty years," he says. Tweto was CSS secretary for four post-war years before becoming president in 1952.

While the society continues its monthly programs of hearing two or three scientific reports, as suggested by Emmons, its library and mineral collection surpassed their promise as educational treasures. In 1923, the society "loaned" its 3,000 volumes, plus an exchange list of some 200 scientific periodicals, to the Denver Public Library for ten years. The loan period was forgotten. Fifty-four years later a document was signed to make the loan an outright gift.

The library established a technical and engineering division — it was generally referred to as the CSS corner — which expanded into today's major department. Some on that old journal exchange list in distant locales, like South America, still mail in publications, long after the society ceased its own publication in 1959 (not counting newsletters and field trip booklets).

Also in the 1920s, the bulk of a 700-specimen mineral collection along with their many display cases was loaned to the State Bureau of Mines Museum. This was eventually transferred to the School of Mines Museum in Golden. The Denver Museum of Natural History was given twenty-one meteorites and other specimens.

In 1890 an unusually large and rich specimen of gold ore — eighteen pounds from the Smuggler Union Mine in Telluride — was donated to the society. It won medals for the society when displayed at the 1893 Columbian Exposition in Chicago and at the 1900 Paris Exposition. Divided into two pieces (twelve and six pounds), both specimens were given to the Denver Museum of Natural History

and are on permanent display.

Society field trips throughout the region date to the horse and buggy days. Twice-a-year outings, sometimes filling three large buses (current membership is 480), are a regular society feature. Some of the old-timers, however, knew how to go in style.

The 1895 field trip was to Cripple Creek, then at the height of its gold-mining boom. Thirty-four members took a private railroad car for a two-day excursion. On arrival, they were met by eighty mine managers and other leading citizens who, with anticipation, listened to members present a series of papers on mining geology. The guests were then given a grand tour of several mines.

The society could play host, too. In 1891 it entertained the 5th International Geologic Congress in Denver, providing a visit to nearby smelters, a drive through greater Denver and a dinner. Who could ask for more? The American Institute of Mining Engineers got the same treatment in 1896. While tours and dinner are out, the society in 1982 welcomes the public to its monthly meetings (usually the second Monday night of the month at Holiday Inn West).

A scholarly geologist, like Emmons, leads the society into the second century. Rudy C. Epis, who got into the business as a kid selling rocks to tourists next to the copper mine in his native Bingham Canyon, Utah, is professor of geology at Colorado School of Mines and the fifty-eighth man to be elected CSS president. In Golden since 1956, his specialties are vulcanology and field geology.

"We are truly a scientific society because we share our knowledge with everyone," says Epis. "The reports, publications and research impact citizens in many ways since we deal with the earth sciences — from ground water to fossil fuels, minerals to hazards."

"Our members are doing these things — the best work in this area and we tell about it. In the early days the society's important function was as a forum for the gathering of scientists to communicate with each other. That's still a primary function of the society. Anyone with an inquisitive mind can come now."

Who knows? Maybe even "clearness and conciseness" can be mastered in the second century, a worthy goal of the Colorado Scientific Society.