

Features



History of Geology

The Life and Times of Arthur Philemon Coleman — Geologist, Mountaineer and Artist (1852-1939)

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In June of 1885, arriving in Laggan (now Lake Louise) by the newly completed Canadian Pacific Railroad, a tired, bedraggled figure paid half a dollar to the landlord of a noisy saloon for a bed and slept in a sweaty rail sleeper car that rocked and shuddered with the entry of every noisy drunk; it was only later that night that Arthur Philemon Coleman, a young Professor of Natural History and Applied Science at the University of Toronto, found out that half a dollar had entitled him to only half a cot and that he had to share his slumbers. Next night, determined not to be disturbed, he moved out to his tent. Such was the inauspicious start to another, his second, geological field season in the Rocky Mountains. From his brother, Lucius, the manager of a horse ranch at Morley Flats, he was able to obtain ponies at little cost; between \$10 and \$25 was reckoned to be a good price. Earlier that week he had "waited at little Morley Station for the leisurely train to saunter up from Calgary, forty miles to the east, watching the silent Mountain Stonies as they sat on their ponies like statues to see the firewagons of white men ... for trains were still a novelty to them".

Coleman was born at Lachute, Quebec, in 1852, the son of a Methodist minister, and on his mother's side a descendant of John Quincy Adams, the sixth president of the United States. At Victoria University, then in Cobourg, Ontario, Coleman came under the influence of Dr. Eugene Haanel, a German-American who had fought with the North in the American Civil War. Graduating in 1879 with a Masters degree in classics, Coleman sailed for Germany to study geology at Breslau, it being the old college of Haanel. At that time, "we were looking toward Germany as the home of science", said Coleman in 1910, and "our American universities were not sufficiently equipped to give a thorough scientific training".

The tectonics and structure of Silesia was the topic for which Coleman, after training in chemistry, mineralogy, botany and zoology, received his doctorate in 1881. In the characteristic German style of oral examination for the Ph.D. degree where the student has to debate with his committee on themes unrelated to his or her thesis, Coleman spoke on three topics. First, that the "diuvium" of the northern parts of America and Europe was best explained by the Glacier Theory; second, that the technical terms of Science should be formed exclusively of Greek or Latin roots; and third, that the Weiss systems of crystallographic axes were preferable to all others.

After his degree, Coleman travelled extensively through Northern Scandinavia and Switzerland, travels that included being shipwrecked in 1882 off the North Cape of Norway. "My Canadian camping experience stood in good stead, with a small sail, a pair of oars and some stools, we made a low tent on the sheltered side of a ridge and made all things snug for the ladies".

In 1883, Coleman returned to Victoria University in Ontario and taught there until 1891 when the university moved to Toronto and Coleman was named Professor of Metallurgy and Assaying in the Faculty of Applied Science. At this time, he was concerned with the petrology of anorthosites, nepheline and the syenites, petrology being very much in vogue in Germany at the time. One of his first studies was of the petrography of the glacial drift in Ontario. His publications in the *Transactions* of the Royal Society are beautifully illustrated with watercolours of thin sections;

"microscopic petrography is being so eagerly studied and affords such interesting results, that no apology is necessary for the present contribution toward a subject hitherto but little cultivated in Canada".

It should be noted that Coleman was an accomplished artist, taking lessons from Otto Jacobs. There are over 300 watercolours by Coleman in the possession of the Royal Ontario Museum painted during the course of many years geological fieldwork in Canada and around the world.

By the mid-1880s, the Canadian Pacific Railway had opened up northern Ontario and the discovery of the Sudbury nickel belt had prompted the formation of the Ontario Bureau of Mines in 1891. The early reports of the fledgling organization contain several papers by Coleman on the minerals of the province, including descriptions of the Ontario ores exhibited at the World's Fair in Chicago in 1893. The purpose was to arouse the interest of Ontarians in the Province's mining industry; "one of the most promising mineral regions in the world, yet its people are afraid to venture on new and risky enterprises to develop the riches of the mining country to the north".

In 1896, he became embroiled in the "coal" boom scandal at Sudbury in which several "fly by night" companies had been floated (e.g., Citizen's Gold and Coal Company). The government had to withdraw the lands from sale and dispatched Coleman to report on the deposits; his report stated that the substance was not anthracite but anthraxolite. The debate continued on and off into the 1920s, in connection with radical theories of the existence of land flora forming coal seams in the Precambrian.

Coleman's work on the Sudbury basin nickel ores began in 1902 and culminated in a comprehensive report and a famous map (described as "a guide to thousands of prospectors" by Professor E.S. Moores) in 1913. With the outbreak of war, fears that the metal might be reaching the Germans prompted a Royal Commission to report on world-wide nickel production, which set up the framework for the modern industry.

Coleman's years in Germany were not only productive for his academic development but also profoundly influenced his later achieve-

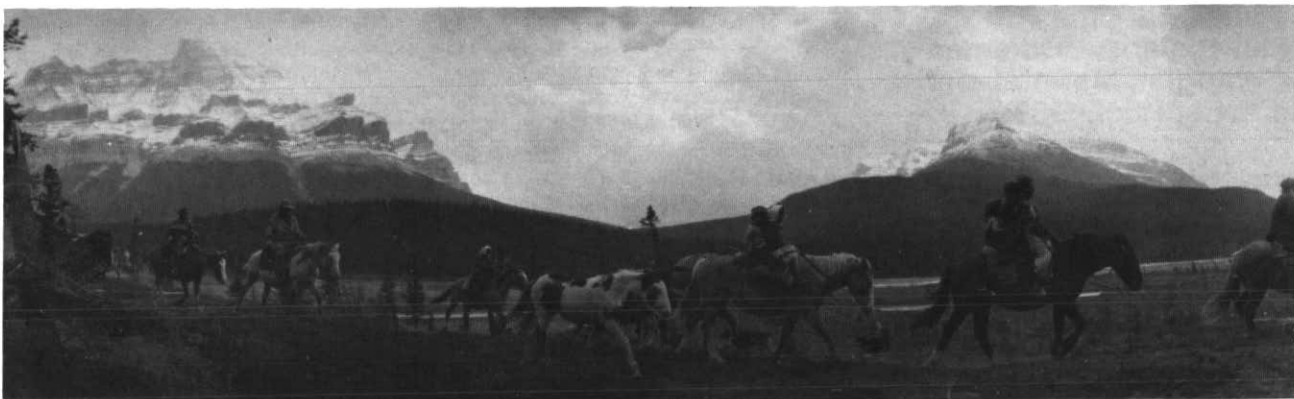
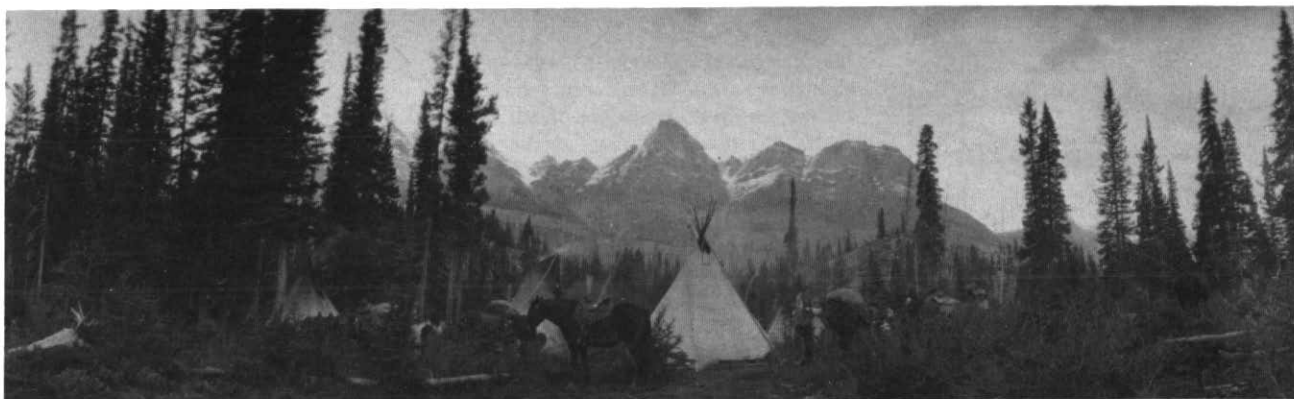


Figure 1 (top) Exploration party in front of an ice cave at Athabasca Glacier.
 (second from top) "We found fifteen lodges of Stoney Indians camped on the Kootenay plains near the foot of Sentinel mountain. As we passed they were just breaking camp in picturesque confusion, dogs barking, women taking down the canvas from the conical frame of poles, and looking up piebald or buckskin ponies to pack their household goods upon."
 (third from top) Stoney Indian hunting group. Every summer they left their lodges for tepees in the Bow Valley; mountain sheep were on the decline however, because of white hunters.
 (bottom) Surveying in Yoho National Park at Burgess Pass with Mounts Stephen and Field in left and right background, respectively.

ments in Canada. At Breslau and during mountaineering visits to the Alps, Coleman came into contact with a new generation of mountaineers then pioneering formidable first ascents. The period from the 1870s to the First War saw a rekindling of interest in Europe in high mountains of the Alps and mountain travel. Such interest had been lost as a result of climatic deterioration during the Little Ice Age, starting after 1300, when many Alpine and Scandinavian communities were extinguished, their lands being smothered by snow fields and glaciers. Before the Little Ice Age, medieval accounts make it clear that difficult trans-Alpine journeys across the high passes were commonplace in order to visit the Pope; they had been operated by well-organized guilds of guides, membership of which was jealously guarded. As a consequence of the climatic deterioration, this expertise was lost. By the mid-nineteenth

century, the old mountain thoroughfares had been forgotten and mountains had come to be viewed with dread, widely suspected of harbouring brigands and spiritual devils; even looking at mountains was thought to be spiritually damaging. The attitude of travellers was best summed up by Master John de Bremble, a Canterbury Monk, who crossed the St. Bernard Pass in 1188, "Lord, restore me to my brethren, that I may tell them that they came not to this place of torment".

However, with the wedding of Victorian romanticism, which sought inspiration from the landscape, and scientific and technological inquiry into the natural world by the mercantile classes, the mountain environment came to be seen as an area for academic, physical and spiritual challenges. The new sciences of geology, physics and botany were seeking to find man's place in the universe and this meant greater understanding

of the natural world. It was the age of the Victorian travelling naturalist, complete with time-honoured load of scientific impedimenta. Much has been written of this new breed, dominated by scientists and clergy drawn to the mountains by the romantic movement then in vogue in Britain.

A classic example of this new approach is John Tyndall's book, *The Glaciers of the Alps*, by which the modern science of glaciology was started in 1860 and which was dedicated to the physicist, Michael Faraday. The book is divided into two parts; the first part is science, the second is an account of mountain travels in the Alps. The earlier-written works of Swiss geologists and naturalists such as Venetz, Charpentier and Agassiz had only faintly reached the knowledge of the public; but Tyndall's book, together with James D. Forbe's *Travels through the Alps* published in 1843, were highly readable and widely read.

Coleman, with his artistic, geological and mountaineering interests, fitted this new mould perfectly and unwittingly introduced these ideas into Canada on his return from Europe. In 1883, for example, he wrote "in discussion of the morale of Mountain-Climbing, we may be content to affirm that it has strong attractions for the robust and bold; that it has been of good service to Science". This is a pre-echo of Francis Gribble who, in his immensely popular *Story of Alpine Climbing* (1903), wrote of mountaineering as a means of scientific study and as a sport, a theme which Coleman followed to the letter all his life. Some of his best scientific papers appear in the *Canadian Alpine Journal* and consist of a mix of listing first ascents with astute geological observations. John Ruskin, the grand apologist for the new romantics, spoke of mountains as "having been built for the human race as at once their schools and their cathedrals"; he took the first photograph of an Alpine peak in 1849.

By 1880, the major European mountains had been climbed and European climbers were seeking new horizons. With the building of the Canadian Pacific Railway, the focus of energy shifted to North America and the Canadian Rocky Mountains and Coast Ranges (Figure 1). In 1892, Douglas Freshfield, a veteran climber, wrote that "a very noble field has been opened up for explorers in the last few years by the completion of the Canadian Pacific Railway".

Coleman's interest in western exploration appears to have been spurred at Toronto by Sir Sandford Fleming, surveyor of the railroad, concerning the true height and location of the "half fabulous Mts. Brown and Hooker" named and mapped in 1827 by the Scottish botanist David Douglas after his former botany professor and his patron. These mountains had been first seen sixteen years earlier by David Thompson when discovering Athabasca Pass in his search for a commercial routeway to the Pacific for the Northwest Company. Thompson had estimated their



Figure 2 (upper) The brothers Coleman; Lucius Quincy at right and Arthur Philemon seated, with unknown man probably L.B. Stewart, Professor of Surveying at Toronto.
(lower) The fine art of loading a pony; "a novice does not always find it easy. One of my earliest attempts was met with a lightning kick on the head which revealed to me many stars not usually visible by daylight".

height to be 4877 m and 4572 m, respectively, by reference to the change in boiling temperature of water. The railway now allowed easy access to the mountains.

The impact of the railway is lost today on a generation becoming used to space odysseys but the last decades of the nineteenth century were times of unbridled railway expansion and speculation, and a means of making a nation out of confederation. In later life, Coleman openly acknowledged his debt to CPR when he wrote that he would never "have reached the mountains after years of humdrum city life in the east without the railway". Coleman's first trips between 1884 and 1892 were unsuccessful ventures from the "end of steel" at Laggan involving slow and arduous traverses amid bugs, burnovers and whitewater (Figures 1 and 2). Coleman never mastered the use of ponies and his writings are full of his encounters with obstreperous mounts whose behaviour had to be matched by continuous "coaxings and shouting".

Coleman's account of his Rocky Mountain forays are contained in *Canadian Rocky Mountains: Old and New Trails* (1911), an immensely entertaining description of his western explorations, in which he portrays very clearly the impact of the railway in the mountains and the creation of "the New West". The bush fires and devastation along the railroute, the social conditions found in the mines, and the debauched whisky ranches, which were built just outside the statutory ten-mile strip either side of the right of way (within which the consumption of alcohol was illegal), are all graphically portrayed. The new railroad was a double-edged sword; it opened up the west and allowed easy access to the mountains but destroyed what it touched. In 1902, William Sherzer, who produced the classic report on the *Glaciers of the Canadian Rockies and Selkirks*, financed by the Smithsonian Institute of Washington, was unable to take any photographs of the surrounding mountains because of the haze created by forest fires along the railroad right-of-way.

In 1893, with the assistance of his brother and L.B. Stewart, Professor of Surveying at University of Toronto (Figure 2), Coleman finally located Mounts Brown and Hooker and realized that they were a "fraud" with heights of less than 2800 m. "We looked in vain for magnificent summits: instead we saw the commonplace". Their heights were ascertained by Coleman's trusted aneroid barometer, also used to measure geological sections, which was calibrated at home in Toronto against the height of the basement floor to the lecture room above in the School of Practical Science (40 feet 4 inches).

Although the mountains themselves were a major disappointment, the effort to find Mounts Brown and Hooker resulted in two major geographic discoveries. The first was the discovery in 1892 of the "splendid snowfields" of the Columbia Icefields. These were



Figure 3 (upper) Coleman addresses the July, 1912 annual camp of the Alpine Club of Canada in the Yoho Valley, Alberta.
(lower) Coleman (right) with Captain C.G. Crawford, a British climber, recently returned from the second Mount Everest expedition; at the annual camp of the Alpine Club of Canada, Maligne Lake, Alberta.

not recognized for what they are until 1898 when John Norman Collie, English discoverer of neon, and Herman Woolley climbed Mount Athabasca and published an article in the *Alpine Journal*. Secondly, an American alpinist, W.D. Wilcox, wishing to test Coleman's claims of the exaggerated heights of Mts. Brown and Hooker, established the route from Lake Louise over Bow Pass to the Athabasca Glacier (Wilcox Pass), then down the Sunwapta River to where it joins the Athabasca River. Today, this is followed by the Icefields Parkway from Banff to Jasper, constructed during the Second World War.

Coleman played a fundamental part in opening up the eastern Rockies to mountaineering and later to tourism, particularly by Canadians who had taken a back seat in exploration and climbing to the Americans and British who were busily completing an impressive list of ascents in the Rockies. In 1897, a joint Appalachian Mountain Club and Alpine Club of London group climbed Mounts Victoria and Lefroy; Mount Dawson, highest peak in the Selkirks was climbed by the American professors C. Fay and H. Parker in 1899; and in 1903, James Outram, an Englishman, climbed Mt. Assiniboine, the Matterhorn of the Rockies. In 1904, the Smithsonian Institution had financed Sherzer's expedition to the glaciers of the Canadian Rockies in order to "render a description of some of the most accessible glaciers upon the American continent" and to ascertain what "additional light the study might throw upon some of the unsettled problems of Pleistocene geology". Coleman's trips had been the only Canadian effort in this entire period.

In the face of foreign competition, Coleman, along with A.O. Wheeler, a topographer for the Department of the Interior, was instrumental in forming the Alpine Club of Canada in 1906 for the purpose of interesting Canadians in alpine mountain regions of Canada, "so that they may unite in the promotion of scientific study and the cultivation of art in connection therewith. Further, that they may lend their influence as a body to the preservation of the forests, the lakes, the animals, and the birds of these regions". Thus the twin themes of the late nineteenth-century European romantic movement, science and art, had been imported into Canada for a wider audience, along with the added concern for conservation derived from the environmental excesses of the "New West".

The dualism inherent in promoting both tourism and conservation in the same breath never seem to have concerned Coleman. He wrote "as good roads and trails and cabins for shelter are extended to the wilder and more impressive parts of the mountains, it becomes easier for the ordinary visitor ... to study the sublimities of the valleys, glaciers and mountain peaks once out of reach without expensive camp equipment". Here we see the dualism inherent in the treatment of the Rocky Mountains, as officially enshrined

today in the Canadian National Parks system. There is no notion of the sanctity of wilderness here but one of "enlightened" management.

Neither was the Canadian Alpine Club for everyone, but reserved for intellectuals and professionals; essentially the advance guard of European Romantic ideas. In that first year of its existence, Sandford Fleming was the President of the Alpine Club of Canada, Coleman his deputy, with the first-week long annual camp held at Yoho Pass in July (Figure 3). In contrast to the long summer camps of the Alpine Club of Canada, the British Columbia Mountaineering Club, formed in 1907, organized Saturday afternoon climbs thereby making it possible for working people to attend; out of the 90 members in 1913, only five were professionals and many were women. "That was very early, when we wore bloomers and skirts. You couldn't go on a streetcar in bloomers. Nobody did anything like that in those days, you know. We had to wear skirts, you see until we got to the beginning of the trail. And then we hid the skirts, and put them on when we came down, and got home looking respectable". This down-to-earth account written by Emmie Brooks, who led the first all-woman ascent of Mount Garibaldi, should be contrasted with that appearing in the *Strand Magazine* in London for 1898 where, under the title of "Adventures of a Female Mountaineer", our middle-class heroine is admonished by her spouse for leaving the servants in charge of the household while climbing in the Alps.

In an act of colonial defensiveness in the midst of ever-increasing American and British competition, the first meeting of the Alpine Club of Canada at the YMCA in Winnipeg offered the first ascent of Mt. Robson, the highest in the Rockies, to Coleman. In 1907, together with his brother and the Reverend George Kenney, they tried it, only to be thwarted by blizzards; and the same happened the following year (Figure 4). To stall any would-be claim jumpers, Kenney made a hurried solo ascent; but, as it turned out, he missed the highest point by 30 m. The peak was finally climbed in 1913 by a group led all the way by the Austrian guide Conrad ("Gentlemen, I can take you no further") Kain.

Coleman was in the vanguard of what later was to be called "the selling of the Rockies" the most practiced exponent of which was the Canadian Pacific Railway. Rails had been laid across the Rockies at enormous expense, there were no major natural resources along the route and tourism was seen simply a means of recouping some money and creating publicity. The building of luxurious hotels at Banff and Lake Louise were important first steps in the commercialization of the "Alps of North America", and after the first climbing fatality in 1899 threatened to spoil the image, Swiss guides were brought in to shepherd visiting members of the "cruise-set" up the mountains.

By this time, of course, the romantic movement that had been born in England, combining Science and Mountaineering, had evolved into a broader desire for travel to the remotest parts of the Empire, which became in effect a global adventure playground. The most popular reading at this time was not romance or crime but adventure. Large parts of the Empire were rough and lonely going, and, one way or another, the Imperial gamesmen and women suffered a good deal. Coleman did his part to popularize the Rockies in public lectures and newspaper articles; "Canadians themselves are often not aware of the splendid scenery and unsurpassed opportunities for climbing of all grades of difficulty offered by their own mountains. There is no more exhilarating sport than that of the mountaineer, and there is no more interesting region for the geologist".

As a whole, European middle-class ideas of wilderness failed to prosper among ordinary Canadians. Wrestling a living from wilderness with its bush and long bleak winters was different from extolling its virtues from the city. As Susan Leslie has put it "the clergymen, school teachers, doctors and professors ... came to the mountains with a secure sense of their own importance; they did not stay long enough to feel diminished". The image many ordinary Canadians had of the "New West" at this time was dominated by the hardships of life on the frontier. Just outside the respectable resorts, the social conditions in the growing boom towns along the railroad, lumber camps, placer mines and among Indians suddenly faced with whitemen in large numbers, was a source of especial concern back east and prompted drives for missionaries to work out west. The Reverend Charles W. Gordon, friend of Coleman and better known under his pen-name "Ralph Connor", tells of a drive to attract young men to the cause, on the University of Toronto campus in *The Prospector* (1904). "It was terrible to hear his tales of men in the mines with their saloons and awful gambling places, and the men and women in their lonely shacks in the foot-hills ... there are your mines ... and you are our prospector. Dig them up". Gordon's introduction to *Trail Tales of Western Canada* by F.A. Robinson refers to the new west being "full of broken driftwood of humanity, showing the marks of the attrition of time and conflict and defeat — good stuff but it is but waste and lost". Robinson's book is a classic rendering of the triumph of the gospel in a rough and tumble mining camp; the moral indignation is overblown but the descriptions of camp life are accurate; "along the hallway were men in various stages of intoxication, and the missionary knew from past experiences that some of the men were only at the beginning of a debauch that would last for several days, perhaps weeks".

The conditions among the Indians caused particular alarm. "Without wishing to enter into the political questions of the day, I still



Figure 4 (upper left) *Swimming ponies across the Athabasca River, 1908.*
(middle left) *Writing up field notes prior to travelling in a dug-out canoe down the Athabasca River.*
(lower left) *Coleman and assistant on the Main Glacier near Mount Robson, 1908.*
(above) *Negotiating a large crevasse.*

feel that a word should be said as to their treatment by the Indian Department", wrote Coleman in the *Canadian Methodist Magazine* in 1885. "Their rations, at times almost unfit to eat, were discontinued last summer to encourage them to self-support. Under the circumstances, the Stonies must support their families chiefly by hunting; but the buffalo is gone. Idle, vicious tribes on the plains have their rations regularly that they may not be troublesome. We cannot wonder that the Indians look on this as a direct premium on idleness and vice".

Coleman was a devout Methodist and was good friends with several missionaries working the New West, including Mr. Rundle, a "self-sacrificing missionary of the early days who had gathered the Mountain Stoney Indians together on a reservation at Morley" in 1879. However, despite his concern for their welfare, Coleman's friendship did not extend to the Indians themselves who he

regarded as largely sullen and uncommunicative; his attempts to discover what they knew of the geography of the mountains were unsuccessful since they kept no maps and measured distances by "sleeps".

Just as with Mounts Brown and Hooker, Coleman's name is linked to the "unknown mountain" of the Coast Ranges. His book *Canadian Rockies: Old and New Trails* had inspired a Vancouver climber, Don Munday, a veteran of Lens and Passchendaele, to "dream of equal opportunities awaiting recognition in the Coast Ranges". At this time, in the late 1920s, the Coast Ranges were largely unknown; "few of its countless peaks bear even unofficial names, still fewer appear on any published map". It was known that the apex of the Coast Ranges lay about 300 km north of Vancouver, but the identity of the highest peak was the subject of much speculation and debate.

Reports by prospectors of glaciers up to

30 km in length were treated with scepticism. The Mundays, Don and wife Phyllis (the first Canadian woman on top of Mt. Robson), set out to climb a "mystery mountain" seen from the top of Mount Arrowsmith on Vancouver Island. The mountain, the highest in British Columbia, was named Mount Waddington after the entrepreneur who had attempted to construct a road to the Cariboo goldfields from the coast. It was finally climbed by two Americans in 1936. Coleman wrote the foreword to Munday's book *The Unknown Mountain* (1948) in typical fashion: "to any man of sound muscles and healthy instincts a snowy mountain peak is a challenge and the higher the peak, and the more difficult its ascent, the more powerful is its attraction".

Geological fieldwork for Coleman seems at times to have taken a backseat to the desire to climb the highest peak in the area. In the manner of birdwatcher seeking that elusive "tick", his fieldnotes are full of musings on elusive, half-named mountains. Working in the Torngats of Northern Labrador in August 1915 near Nakvak, after long and arduous days in the field subsisting on cold mutton and mixed tea and cocoa, he wrote that "the vague suggestions of some writers of peaks reaching 10,000 feet must, I think, be given up. I could hardly have missed such giants". Nonetheless, the disappointment was matched by a long series of first ascents including Mount Tetragona, related in several papers in the *Alpine Journal* after 1916, where discussion on the tectonic history of the Torngats occurs side by side with accounts of his climbs; again, the twin themes of science and mountaineering.

Coleman's appointment in 1901 as Professor of Geology in the Faculty of Arts at Toronto had freed him to pursue the more academic side of his geological interests, regarding the geology of the Canadian Shield and history of glaciation in Earth history. These two areas converged in 1906 with Coleman's discovery of the Early Proterozoic Gowganda "tillites". His interest in the silver ores of the Cobalt area had inspired him to study the origin of the poorly sorted host rock described by Sir William Logan in 1863 as "slate conglomerates". Coleman's extraction of soled and striated clasts convinced him of its glacial origin.

This was a controversial discovery when it appeared in the *American Journal of Science* in 1907, since it was widely held that the Earth was too warm for glaciers at such an early period. Coleman's arguments, set out in the classic *Ice Ages Ancient and Modern* (1927), that such deposits were probably of glaciomarine origin, continental glacial deposits being seldom preserved, have been entirely vindicated by recent work. Discoveries on the southern "Gondwana" continents of Permo-Carboniferous glacial rocks (1859 - Talchir, India and Inman Valley, South Australia; 1878 - Dwyka, South Africa; 1888 - Parana, South America) on a scale far surpassing



Figure 5 (upper) Outcrop of Late Paleozoic Dwyka Tillite, South Africa, with W.M. Davies, the geographer, 1905.

(lower) On the rocks; Late Paleozoic Tillite, Inman Valley, South Australia, 1914.

Pleistocene glaciations inspired Coleman to travel extensively to document these findings (Figure 5). His field notes record his surprise at collecting striated pebbles in India near water buffaloes amid rank jungle growths; "half-clad negro women and wholly unclad children suggested anything but glacial conditions". "I have been laughed at by country people riding their mules to market while I chipped striated stones from tillite well within the tropics not far from plantations of coffee and banana in Brazil".

In 1910, he visited Spitsbergen with a field party led by the Swedish geologist, Baron de Geer. He wrote that this was "a welcome opportunity for a poor professor to study the habits of a living ice sheet instead of puzzling over the work of glaciers dead thousands of millions of years ago".

The mechanism whereby glaciations simultaneously affected the southern "Gondwana" continents escaped him, however, and to the end of his life, according to former students such as the late Duncan Derry, he regarded continental drift as "an incredible theory". In his Presidential address to the Geological Society of America in 1915, Coleman referred to the "essential permanence of continents and oceans" castigating other geologists, "especially paleontologists, as well as zoologists and botanists, who display great recklessness in rearranging land and sea".

In fairness to Coleman, Wegener in his *Origin of Continents and Oceans* believed that continental drift also accounted for Pleistocene glaciations. Wegener's map showing Scandinavia, Greenland, Labrador, Newfoundland and the British Isles huddled together near the Gulf of St. Lawrence, with the outer terminal moraines of Europe and America joined smoothly, was rightly demolished by Coleman in 1932.

Coleman's principal reservation, shared by many geophysicists at the time, lay in conceiving of a mechanism to drive continental drift. "It is hard to imagine a mechanism that could do the work, and no convincing geological evidence can be brought forward to show that such a thing ever took place".

Surprisingly, Coleman also ignored the new astronomic theory of Pleistocene ice ages as proposed by the Yugoslav Mathematician Milankovitch; this was published in *Climates of the Geological Past* in 1924 and was based on the earlier work of Croll and Ball. Milankovitch's theory "provided far too many ice ages" for Coleman since "direct evidence of the implied conditions has not been supplied". It should be remembered that, at this time, most geologists accepted the classic German scheme of only four Pleistocene ice ages (Gunz, Mindel, Riss and Wurm). The existence of many glacial cycles over the last 700,000 years is, of course, of only recent demonstration, from oxygen isotope studies on benthic foraminifera preserved in deep marine sediment cores: these fully vindicate Milankovitch's elegant theory.

In 1912, Coleman was instrumental in establishing the Museum of Geology, one of five original museums comprising the Royal Ontario Museum: "the people's true university". Initially, it was housed in the Mining Building into which the Department of Geology had moved in 1904 and which it still occupies pending completion of a new building. Just as today, there were loud complaints as to the lack of space and the museum moved into the new Royal Ontario Museum

building on University Avenue in 1913.

Excavations for the basement of the building revealed much that was new of the local Pleistocene geology. Coleman's famous investigations of the glacial geology of Toronto was greatly facilitated by the numerous brick pits which were spread across the city; only the Don Valley quarry now survives and this is due to the discovery and wide reporting of a rich interglacial flora and fauna by Coleman in the Don Beds (Figure 6). His report on the Toronto



Interglacial Beds 25 feet thick.
 More than a hundred ^{species of} Pleistocene Fossils
 have been found in them, including
 leaves and trunks of warm climate trees,
 many freshwater shells and a few mammals

Figure 6 Last Interglacial deposits described from the Don Beds in the Don Valley Brickyard, Toronto.

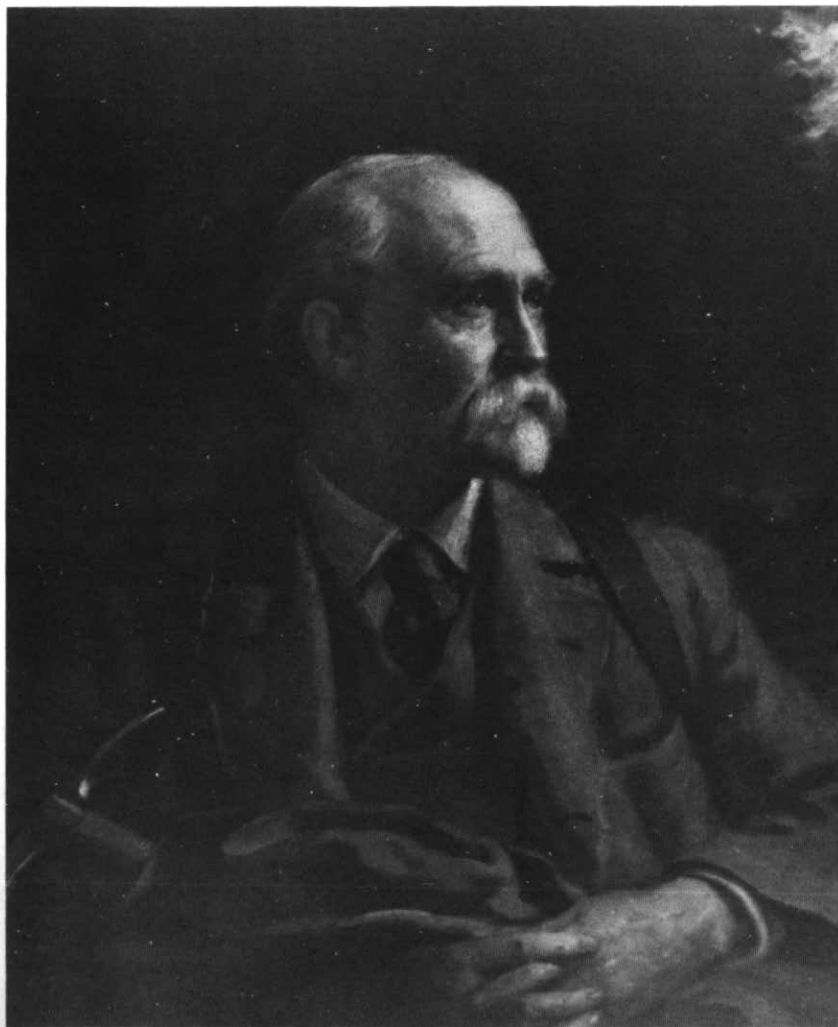


Figure 7 (upper) Watercolor portrait of Coleman (age 76) presented to him on Founder's Day at Victoria University in 1927 by Professor W.A. Parks, Coleman's successor as Professor of Geology at Toronto. The Coleman Gold Medal for the best geology undergraduate at Toronto was established at the same time. **(lower)** Mount Coleman from Pinto Lake, Alberta, 1924. The lake was named by Coleman after one of his most contankerous ponies; the "Evil One". The mountain is carved from Upper Devonian and Mississippi Palliser, Banff and Rundle Formation carbonates arranged as broad open folds in large thrust sheets typical of the eastern Main Ranges of the Rocky Mountains.

deposits to the British Association of Science meeting in Sheffield, England in 1910 and his publication in the *American Geologist* in 1894 prompted the interest of Sir Archibald Geikie: the British Association contributed over £25 toward the cost of further excavations at the site. That same year, Coleman was awarded the Murchison Medal by the Geological Society of London.

In 1929, Coleman lost the fight to save a brick pit at Sunnyside, destroyed for an amusement park, heralding on-going concern at the present day over the future of the Don Valley Brickyard which has just been expropriated for the public by the Province. A geology museum is planned for the site, the central focus of which will be Coleman's work.

The twin themes underpinning Coleman's outlook on life (he never married, but instead lived with his sister, Helena, a minor poet who published *Songs and Sonnets* in 1906), appear to have been science, in particular, geology, as a means of illustrating the Creator's ends, art and mountaineering. However, despite his strong ties with missionaries working among the Indians, lumbermen and miners, Coleman was no religious zealot. In Labrador, in 1915, suffering a long stretch of bad weather where "wood was too precious to burn merely for the luxury of getting warm", one Sunday dawned a clear beautiful day, perfect for a rapid climb to the top of the nearest summit, but "pious Alf" his field assistant could not think of climbing on the Lord's day and kept him in camp, much to his chagrin. "So I chaffed in camp all day and decided to go Monday if the weather was at all reasonable, and disappoint the men, eager to start homeward, and afraid of autumn storms in a punt".

Late in 1922, on a visit to Gaspé, Coleman complained that dancing had been curbed by the priests and that violin playing was allowed only for private amusement.

Coleman's geological interests and religious beliefs were never in conflict. In a piece he wrote for the *Toronto Star Weekly* (Coleman was a regular contributor on a wide range of popular topics), he argued that the primary role of science was to provide "accurate information as to the methods and purposes of the creator of the universe". The "real fundamentalist is the one who studies nature to discover the history of creation, the methods used in building the world and the mentality of the Creator. The man who unravels these laws is truly revealing the mind of the master".

After briefly reviewing the major developments in geological thought in the *Bulletin* of the Geological Society of America for 1916, Coleman went further and concluded by asking "can we look on these surprising adjustments as merely accidental?" These comments, coupled with his declared mountaineering interests, are the closest expression of Coleman as an individual. He was a solitary, but not lonely, figure. His friend,

Joseph B. Tyrrell, whom Coleman had unsuccessfully tried to attract to the University of Toronto when he left the Geological Survey of Canada, remarked that, for Coleman, "an evening party in a smart environment was a yawning bore in comparison with a camp fire supper on a windy mountain-ledge with a dozen shining glaciers in view".

When Coleman died in 1939, in his eighty-sixth year, the holder of the Penrose Medal from the Geological Society of America and the Flavelle Medal from the Royal Society of Canada, Coleman's obituary appeared in all the regional papers across Canada. By his books, nearly one hundred publications and regular commentaries on earthquakes, volcanoes, glaciers, climate and his world travels, that appeared in the syndicated press, Coleman was well known to the public; few topics escaped his attention. His close escape from being incinerated on the slopes of Mt. Colima in Mexico, by a sudden volcanic blast had been widely reported as headline news across Canada in 1906. At that time, Coleman was in Mexico for the meeting of the International Geological Congress, where he

presented papers on the Toronto Pleistocene. It is a fair measure of how far the collective professional reputation of the geologist has sunk since then when it is considered that the President of the Mexican Republic went so far as to import two entire trains of Pullman cars from Chicago, for the transportation of delegates around the country.

In a trip to South America in 1935, when Coleman was over eighty years old, he had climbed to over 5000 m. Just before he died, Coleman was planning another trip to the Andes.

He remained fit throughout his life, being reputed to be the fastest walker on campus even after his retirement in 1922 (Figure 7). Following a gruelling return trip from South America in 1915, the end of what had been a long world tour, he was out measuring sections in the local brickpits the following day using his aneroid barometer.

Coleman's scientific and mountaineering accomplishments stand on their own merits but, if any broader theme distilled from his achievements can be related to the present academic environment, it is the absolutely

vital importance to the geologist of field work. In today's atmosphere of a steadily decreasing fieldwork component in teaching and research programs, Coleman remains an outstanding example of the necessity to "go and see".

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