

## History of Canadian Geology: Early Canadian Record of Glacial Erratics

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## History of Canadian Geology

### Early Canadian Record of Glacial Erratics

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As one reads the records of early Canadian naturalists, and especially those of pioneer geologists, a recurring question is why they did not appreciate that the smoothing of bedrock and the existence of erratic blocks were the result of ice action. Thomas Roy, for example, who was a very shrewd and thoughtful observer of all major aspects of Canadian geology, attributed rock "polishing" to the action of flowing water (Roy, 1840). The long opposition to the idea of widespread glacial action, continuing throughout much of the nineteenth century, is in keeping with this lacuna. This general attitude may possibly have been linked with firmly held religious beliefs, an explanation that has been advanced to explain why Lyell did not anticipate Darwin despite all the evidence he assembled in *The Antiquity of Man*.

There were a few exceptions to this general picture. George W. White has published a most helpful review of the work of early American geologists who did pioneer the idea that ice action was responsible for glacial drift (White, 1973). Drake is believed to have been the first to suggest this, advancing in 1825 the concept of "large fields of ice" floating down and depositing till (or *geest* as he called it) (Drake 1825). As White observes, this was "too radical (a view) for general acceptance at that time", so that it was not until 1841 that "the ice sheet origin of drift in America was first seriously proposed and supported by clear reasoning from field data by Hitchcock" (Hitchcock 1841).

Drake was not, however, quite the "lone pioneer" that White's fine review might suggest. This is shown by the following quotation from a volume published in London, England, in 1829, entitled *Three Years*

*in Canada*. The author is recording the observations he made when he came up the St. Lawrence River on his arrival in Canada in 1826:

"After the ice and floods have passed away, large round stones are sometimes found at the bottom of these rapids: they are generally of quite a different nature from the rocks which compose the banks or bottom of the river. Some think that they are conveyed on these ice-floes from the sides of the lake, and hurled with them down the rapids. I think also that they are indebted to the frost for moving them about; but that they have not fallen from the banks upon the ice-floes, as suspected, but are taken up, by being frozen into them, from the shallow shores of the lakes. When the floes are compelled to move before the floods, they take the boulders with them, like plumbs in a cake. They are chiefly formed of hornblende and gypsum, and are not unlike the potted head-stone, well known to the Scottish curlers. On the shore of the great Gulf of St. Lawrence we met with boulders of an enormous size; many of these detached stones could not be less than twenty tons. These are quite a different kind of boulder-stone from those we have been considering: they are ten times larger, and not to be found on the shores of any of the lakes, nor by the rapids of any of the rivers. What their component parts are is beyond my mineralogical skill, but the specimens brought home (to Scotland) may elucidate them. The colour is very black grey, having pointed particles of a brilliant nature; they are very hard; the blocks without veins, generally all of one colour; those which deviate in this respect incline to brown. There is evidently trap about them, but altogether I have seen no stones like them. What cause has brought them to where we find them, is hard to say, or even where they have come from, as the rocks of the Gulf shore are generally a slaty limestone. To venture a humble opinion, however, methinks they are some of the products of the arctic regions, and therefore I shall call them, until we find out a more proper name, the *arctic boulder*; and that they are frozen into, and conveyed to the Gulf shores by the icebergs, or thick-ribbed ice-floes, which visit the Gulf every season, where some of them are left on the shore after the ice is dissolved. At low-water mark, I found the largest; the smallest are found higher up the beach: from which I would infer, that the largest come in the largest floes, and these require deeper water to float in, and that those of the greatest magnitude are probably deposited where the water

never ebbs sufficiently low that they may be seen. Independent of there being nothing valuable about them as minerals, that is to say, nothing to please the lapidary and man of commerce, still, to the naturalist, they are gems not to be sneezed at. If they come with the Polar ice, as I have every reason to think, they come from where the eye of the most intrepid man will never see them, — perhaps from under the Pole itself: bowled, as it were, by the hand of the frost, on a theatre where they may be inspected: a curiosity conveyed by Nature in a singular manner, from dreary, frigid regions, for us to look at: — and, laying poetry aside, they seem to be, after all, the best of mill-stone metal." (Mactaggart, 1829).

The lengthiness of this quotation seems justified since it shows so clearly a man thinking. And the author was, indeed, a thinking man, a young Scotsman named John Mactaggart. He was born in 1797 in the parish of Borgue in Galloway (in the southwest of Scotland), attended two village schools and Kirkcudbright Academy and travelled in Scotland and also in England, where he gained some engineering experience, probably under the great John Rennie. In 1826 he was appointed, upon the recommendation of John Rennie, as the first Clerk of Works on the building of the Rideau Canal under Lieut. Colonel John By R.E. In 1828, however, he had to be replaced (by N.H. Baird, another young Scot) and returned to the United Kingdom where he died on 8 January 1830 at Torrs, also in Galloway, at the early age of 32, in all probability as a result of his exertions on the Canal project. John By himself died in 1836, less than four years after his return to England, almost certainly as a result of the *ague*, the name applied to the acute malaria that caused such havoc on parts of the Canal works; Mactaggart also suffered from this illness.

Mactaggart did attend classes at the University of Edinburgh before coming to British North America (as Canada was in those days), but he was not impressed. In his own words "I gathered ten times more out of that book (the *Encyclopedia Britannica*) than I did at the College..." "so he was, to a degree, self-educated. His thirst for knowledge and his wide-ranging interests are well shown by the fact that in 1824 (when only 27 years old) he wrote and published *The Scottish Gallovidian Encyclopedia*, a volume of 504 pages which was a miscellany of "natural curiosities of the South of Scotland" (Mactaggart 1824). Unfortunately, the book had to be withdrawn from circulation because of some indiscreet words he had used about a young lady. Copies of the original edition are, therefore, scarce and valuable. 250 more copies were printed in 1876 but it was

not until 1981 that a new printing with a helpful introduction by L.L. Ardern became available (Ardern 1981), to whom I am indebted for information on Mactaggart in Scotland.

The book on Canada was, therefore, Mactaggart's second venture as an author. The full title of the work is *Three Years in Canada: an Account of the Actual State of the Country in 1826-7-8 comprehending its Resources, Productions, Improvements and Capabilities; and including Sketches of the state of Society, advice to Emigrants & C.* (Mactaggart 1829). It was published in two volumes of 347 and 340 pages, respectively, containing in all about 150,000 words. Roughly half of the contents relates to the building of the Rideau Canal, for which it is a source of invaluable information. The remainder consists of acute and often amusing comments on many aspects of life in British North America in the 1820s, the subjects ranging from carrion crows to butterflies, from suicidal manners to "Vale of Gatineau, a proper place for the transportation of Convicts".

Mactaggart was clearly a good all-round naturalist. In August 1827 he was unanimously elected a member of the Montreal Natural History Society, then an active organisation. Throughout his book there are perceptive comments on flora and fauna and some references to geology. He gives a clear account, for example, of pot-holes and their formation. His book is now rare, and because of this his name is missing from the usual listings of early Canadian geologists. There does not appear to be any immediate prospect of *Three Years in Canada* being reprinted, and so some further extracts may be presented in a further Note.

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Note: Drake and Hitchcock refs. are as given in White.

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## Einstein and Gutenberg

The scientist's celebrated absent-mindedness stems primarily from his preoccupation with the problem that seems most important at the moment. In 1933 Caltech's senior seismologist, Beno Gutenberg, received a visit from Einstein, who wanted to know something of Gutenberg's speciality. The two strolled around the college grounds while Gutenberg explained the science of earthquakes. Suddenly an excited colleague broke in on them. They looked round to see people rushing from buildings and the earth heaving under their feet. "We had become so involved in seismology", recalls Gutenberg, "that we hadn't noticed the famous Los Angeles earthquake, the biggest I had ever experienced, taking place around us."

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In *A Geological Miscellany*, compiled by G.Y. Craig and E.J. Jones, Orbital Press, Oxford OX1 1TZ.