

Playfair in his book *Travels through the Alps of Savoy and other parts of the Pennine Chain*, Edinburgh, 1843, in which he quoted the work of 1822. By 1843, however, the theory of the extension of glaciers back to prehistoric times had been confirmed incontestably and accepted universally since 1841 by the publication of Agassiz's *Etudes sur les glaciers*, Neuchâtel, 1840, and de Charpentier's *Essai sur les glaciers*, Lausanne, 1841.

In Switzerland the first promoter of the idea was a simple peasant from the Val de Bagnes (Valais), Jean Perraudin. He had been struck by the presence of huge lumps of volcanic rock on the sides of the valley; he had also noticed the scars left by the glaciers on the surface of the rocks. Already in 1815 he had tried to interest de Charpentier in his ideas as to their origin but had only had a shrug of the shoulders in reply. It required all the insistence of the Swiss engineer Ignatius Venetz to convince him. He was forced to give in to the evidence of the facts and from then on he became the keenest supporter of the glacial theory. In his turn he converted Agassiz during the visit which he made to Bex in 1836.

Thus in Switzerland the combination of Perraudin-Venetz-de Charpentier-Agassiz is well established, but it is no less a fact that John Playfair was the first to give a valid explanation of the origin of the wandering boulders and of their transportation far from their original sites.

XVI

THE ORIGIN OF TABULAR ICEBERGS IN THE SOUTHERN OCEAN

In his review of ice observations made during Capt. James Cook's second voyage, 1772-75, Herdman (1959) has drawn attention to Cook's opinions about the origin of tabular icebergs, or "ice islands", as he called them. During the voyage, Cook modified his ideas on the subject, finally concluding that these ice formations must originate, not at sea, but along coasts. In his journal entry for 21 February 1775, he postulated the existence of what later came to be called ice shelves (not discovered until Ross described one 66 years later), from which he thought that these floating ice masses must periodically break away. Some further light on the development of this theory is now available. The publication of Cook's original journal of the voyage (Beaglehole, 1961) includes an Appendix containing extracts from the independent log kept by Charles Clerke (1743-79), second lieutenant on H.M.S. *Resolution*. This is in the Public Record Office (Adm. 55/103). Clerke's thoughts on "ice islands" in 1775 are reproduced on the opposite page, from Beaglehole's transcript (p. 766).

REFERENCES

- Beaglehole, J. C., ed. 1961. *The journals of Captain James Cook on his voyages of discovery. Vol. 2. The voyage of the Resolution and Adventure, 1772-1775.* Cambridge, University Press for Hakluyt Society. (Hakluyt Society. Extra Series, No. 35.)
- Herdman, H. F. P. 1959. Early discoverers, XII—Some notes on sea ice observed by Capt. James Cook, R.N., during his circumnavigation of Antarctica, 1772-75. *Journal of Glaciology*, Vol. 3, No. 26, p. 534-41.

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APPENDIX IV

[ICE ISLES AND SOUTHERN CONTINENT]

In respect to Lands still unexplor'd towards the Southern Extreme of the Globe, I'm of opinion tho' this Voyage has clearly evinc'd there can be no Continent or Isle at all worthy the attention of any People under the Sun, yet that there may be, and is, some extensive Land or a multitude of Isles in that part of the World. I'm induc'd to this way of thinking by the innumerable Ice Isles throughout the Seas in the high Southern Latitudes, which Isles, I make no doubt must be form'd under the Cover of, and contiguous to some Land. Untill this last Southern Campaigne we were very various in our Opinions concerning the formation of an Ice Island, but the sight of those Lands at the bottom of the Atlantic render'd this matter very plain, and gave us a very clear idea of its Origin—*increase &c. &c.* We there saw Icy Cliffs from which Isles, apparently and evidently had broke off and some Bays only partly full, the rest having separated and floated away to Sea; in short what we there met with, dispel'd all our doubts and clearly convinc'd us, that the Isles are form'd under the Cover of Lands either in Bays or wherever the water is so much shelter'd that the general purterbation of the Sea cannot much effect it, but the surface becoming smooth is of course in a state to be more easily congeal'd which must be soon brought about by the intense Cold that reigns here throughout almost the whole Year—thus Originated, its bulk I suppose to be increas'd to the huge size we found them by the immense quantities of Snow which falls to the share of these happy Climes, which will be found by the account of the Weather in the Log to be almost perpetual even in the height of Summer—this Snow as it falls continues to freeze and embody itself with the Ice, 'till it becomes too enormous to bear its own weight and of course immerses into the Sea; or probably continues till the return of the Vernal Season, which tho' not very mild here, may have influence enough to weaken in some measure a body of Ice, and consequently breaks it adrift and leaves it to cruize at the mercy of the Winds and Seas. Now this being my Hypothesis of an Ice Island I'm led to believe from thence, that the Myriads we've met with, cou'd not have been form'd but by a great deal of shelter and of course large quantities of Land—the Land we fell in with in the Latitude of 59° was as totally inaccessible to us, as tho' 'twas only a Body of Ice—the shores were form'd of high rocky precipices and the Bays chok'd up with Ice making in high Cliffs, as recorded in the Log—which Cliffs extend themselves in many places beyond the points of Land which form the Bays, so that getting a foot onshore was wholly impracticable—now this was the Midsummer of a Year we had reason to suppose a very mild one, therefore if such was the case in this Latitude, what can be expected when farther advanc'd towards the Pole which we must allow the Center of intense Cold; so what can be expected, supposing there were any Lands comatable which however I believe the Account of this Voyage will put altogether out of the question.

CHA^s CLERKE