

ART. II.—ICE IN THE CARBONIFEROUS PERIOD.—BY HENRY S.
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Along our Atlantic shore the beaches are strewn with travel-worn rocks from distant hills and equally well rounded fragments that have dropped from neighboring cliffs. On the Cape Breton coast, where seams of coal crop out and suffer erosion, they contribute to the supply of pebbles and boulders found in the coves and under the headlands. Every winter, claspers of ice, stranded at high water, freeze to the rocks and loose stones that lie on the shore line, and are thence lifted with the ice when the tide returns; then, if the wind be favorable, they are borne away to be dropped in deep water.

When the dredge brings up from among the deposits of mud or sand that compose the contiguous sea bottom, any isolated rock or water-worn stone, no one questions how they were transported from among their fellows on the shore; everyone sees at work every year an agent that answers all the requirements of their surroundings.

Before us on the table are three pebbles of coal that came from a bed of fireclay 450 feet below the surface, and overlying by some ten feet the Acadia coal seam at Westville. They were found when taking stone from the goaf to make stoppings for the pit air-courses. How came these pebbles into this position? The beds above and below are uniform in quality and in thickness, and their geological horizon is some 2500 feet below the highest strata in the series.

Other pebbles were said to have been also seen in the same bed, but they were not secured, and when sought for could not be found; that they were seen however, is highly probable.

A cursory examination of the pebbles shews that at the time of their deposition, the coal of which they are composed was as

mature as that of those to-day lying at the foot of the Cape Breton cliffs. In short, it suggests the formation of coal seams from which they subsequently parted, the deposition over them of strata weighty enough to consolidate them, a long lapse of time, their elevation, exposure to eroding influences, the breaking off of fragments subsequently rounded by attrition in moving water, and then their transportation from the shore of their birth to the quiet waters of their resting place, and that too at a time when the coals we now mine were but newly deposited and not yet consolidated.

What was the agent that transported these carboniferous voyagers? May it not be assumed that the same agent that now does its work so well and easily in conveying the pebbles of to-day to their bed in the growing deposits of the Atlantic played the same part in ancient times? Certainly, with one so capable as ice, what need is there to seek the possible ability of other agents to effect similar results.

Sir Charles Lyell, in his *Principles of Geology* (Page 232), writes in his concluding remarks on climate:—

“If we carry back our retrospect to the primary or Palæozoic ages we find an assemblage of plants which imply that a warm, humid and equable climate extended in the Carboniferous period uninterruptedly from the 30th parallel of latitude to within a few degrees of the pole;” and he goes on to say, “while some indications seem also to have been discovered of intercalated glacial periods of older date (he is here speaking of *the* glacial period, as we know it) especially in the Miocene, Eocene and Permian eras.”

In these passages and their context Sir Charles seems to have in mind only the action of ice where the average temperature was below 32° Fah., and not to be considering the action of winter ice as we know it, *pari passu*, with a luxuriant summer vegetation.

But whence came these pebbles? Of lower Carboniferous and Devonian coals we have now none known nearer than the headwaters of the West River, to the South of the present coal field, where the seams are small and of inferior quality. It is to ~

hoped that the general Geological Survey now in progress by that careful observer, Mr. Hugh Fletcher, may throw some light on this interesting point, and possibly indicate the extent of the seams that have been swept away.