

by observations at Chapel Hall, Lanarkshire.¹¹ During the thirty years which have intervened since these observations were published, a large amount of additional information on this subject has been collected in the British Islands, on the continent of Europe, and in North America. The boulder-clays are now well known to be split up with inconstant and local stratifications of sand, gravel and clay, often well stratified, pointing to conditions quite distinct from those under which ordinary boulder-clay was accumulated. These intercalations have been recognized as bearing witness to intervals when the ice retired from some districts and when ordinary water-action came into play over the ground-moraine thus exposed. Much controversy, however, has arisen as to the chronological value to be assigned to these intervals. To some geologists the intercalations in the boulder-clay appear to indicate little more than seasonal variations in the limits and thickness of the ice-sheets, such as now affect the glaciers of Scandinavia and the Alps. To others, again, they furnish proof of successive interglacial periods by which the long Ice Age was broken up. Thus Prof. James Geikie, recently reviewing the whole evidence on the subject, has come to the conclusion that there were really five glacial intervals embraced within what is called the Glacial Period, separated from each other by four interglacial periods of mild temperature.¹²

Much difficulty in forming definite conclusions as to the importance of these obvious interruptions in the deposition of the boulder-clay arises from the absence of continuous sections wherein the order of succession of the several stages

¹¹ A. G., *Trans. Geol. Soc. Glasgow*, vol. i. part. ii. 1863.

¹² *Trans. Roy. Soc. Edin.* xxxvii. part i. 1893, p. 146.