

TRANSACTIONS  
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## PREFACE.

BEFORE beginning a critical examination of the Ayrshire Drift or Glacial Deposits, I held the opinion that the various Boulder-clays were (so-called) "ground moraines," or, in other words, accumulations of material supposed to have been made and deposited by land-ice.

As my investigations proceeded section after section seemed to protest against this theory, but rooted ideas are difficult to eradicate, and it was only after the examination of a great number of sections that I was forced to abandon the land-ice theory of the origin of the drift beds, and definitely *to attribute them to deposition in water*. I had come to this conclusion before finding marine shells at very high levels, and before I had mastered the secret as to the manner of finding them, having always previously searched only the *clearly stratified* beds. My further examinations, however, led me to observe that the Boulder-clays themselves are not only stratified, but that they are in many places well stratified. This can be seen at all times by a minute scrutiny of the (undeformed) drift beds exposed in river scaurs, but best in dry weather, when viewed from a short distance, as the surface is then dry, except at the sandy partings, which are conspicuous as wet lines.

The discovery of marine shells in numerous exposures, from at or under sea-level up to over 1000 feet above it, left no possible doubt in my mind as to the kind of water under which the drift beds were laid down. After their deposition these beds have evidently been subjected—in many localities—to considerable deformation, chiefly by the movement of land-ice, and it was, probably, the indications of this fact that led many geologists to suppose the Boulder-clays were "ground moraines."

A thin layer sometimes seen under the drift and lying on the surface of the rocks is, I am inclined to believe, the only real "ground moraine" ever formed by land-ice, and this bed I have called in the following paper the *original ground moraine*. In cases where they have been dragged by ice, the drift beds have been converted into what may be called *secondary ground moraine*.

JOHN SMITH.

MONKREDDING, KILWINNING,  
*December, 1897.*