

of excavations ; and excavations in a hard granitic gneiss. that varied from twenty to a hundred feet in depth would form marks at least as indelible as parallel roads on the mountain sides, or mounds of gravel and débris overtopping inland plains, or rising over the course of rivers. The want of lines of caves higher than those of the ancient coast line would seem to indicate, that though the sea may have remained long enough at the various upper levels to leave its mark on soft impressible materials, it did not remain long enough to excavate into caverns the solid rocks.

But though the rise of the land may have been comparatively rapid, there was quite time enough during the term of upheaval for a series of processes that have given considerable variety to the subsoils of our country. Had the land been elevated at one stride, almost the only subsoil of what we recognise as the agricultural region of Scotland would have been the boulder-clay, here and there curiously inlaid with irregular patches of sand and gravel, which occur occasionally throughout its entire thickness, and which were probably deposited in the forming mass by icebergs, laden at the bottom with the sand and stones of some sea-beach, on which they had lain frozen until floated off, with their burdens, by the tide. But there elapsed time enough during the upheaval of the land, to bring its boulder-clay deposits piecemeal under the action of the tides and waves ; and hence, apparently, the origin of not a few of our lighter subsoils. Wherever the waves act at the present time upon a front of clay, we see a separation of its parts taking place. Its finer argillaceous particles are floated off to sea, to be deposited in the outer depths ; its arenaceous particles settle into sand-beds a little adown the beach ; its pebbles and boulders form a surface stratum of stones and gravel, extending from the base of the *scaur* to where the surf breaks at the half-tide line. We may see a similar process of separation going on in ravines of the boulder-clay swept by