

Caithness, for instance, and in Wigtonshire,—it contains numerous shells, which, both in their species and their state of keeping, throw light on the origin of the formation. But of that more anon. Let me first remark, that the materials of the level marginal strip of ancient sea-beach beneath the old coast line seem, like the materials of the existing sea-beach, to have been arranged wholly by the agency of water. But in the boulder-clay we find a class of appearances which mere water could not have produced. Not only are the larger pebbles and boulders of the deposit scratched and grooved, but also its smaller stones, of from a few pounds to but a few ounces, or even less than an ounce, in weight; and this, too, in a peculiar style and direction. When the stones are decidedly of an oblong or spindle shape, the scratchings occur, in at least four cases out of every five, in the line of their longer axis. Now, the agent which produced such effects could not have been simply water, whether impelled by currents or in waves. The blacksmith, let him use what strength of arm he may, cannot bring his file to bear upon a minute pin until he has first locked it fast in his vice; and then, though not before, his tool bears upon it, and scratches it as deeply as if it were a beam of iron of a ton weight. The smaller stones must have been fastened before they could have been scratched. Even, however, if the force of water could have scratched and furrowed them, it would not have scratched and furrowed them longitudinally, but across. Stones, when carried adown a stream by the torrent, or propelled upwards along a beach by the waves, present always their broader and longer surfaces; and the broader and longer these surfaces are, the further are the stones propelled. They are not *launched* forwards, as a sailor would say, *end on*, but *tumbled* forwards *broadside*. They come rolling down a river in flood, or upwards on the shore in a time of tempest, as a hogshead rolls down a declivity.