

may have proceeded so far, that no ruins are left of the dilapidated rocks.

Although denudation has had a levelling influence on some countries of shattered and disturbed strata (see fig. 87, p. 63, and fig. 91, p. 69), it has more commonly been the cause of superficial inequalities, especially in regions of horizontal stratification. The general outline of these regions is that of flat and level platforms, interrupted by valleys often of considerable depth, and ramifying in various directions. These hollows may once have formed bays and channels between islands, and the steepest slope on the sides of each valley may have been a sea-cliff, which was undermined for ages, as the land emerged gradually from the deep. We may suppose the position and course of each valley to have been originally determined by differences in the hardness of the rocks, and by rents and joints which usually occur even in horizontal strata. In mountain chains, such as the Jura before described (see fig. 71, p. 55), we perceive at once that the principal valleys have not been due to aqueous excavation, but to those mechanical movements which have bent the rocks into their present form. Yet even in the Jura there are many valleys, such as C (fig. 71), which have been hollowed out by water; and it may be stated that in every part of the globe the unevenness of the surface of the land has been due to the combined influence of subterranean movements and denudation.

I may now recapitulate a few of the conclusions to which we have arrived: first, all the mechanical strata have been accumulated gradually, and the concomitant denudation has been no less gradual: secondly, the dry land consists in great part of strata formed originally at the bottom of the sea, and has been made to emerge and attain its present height by a force acting from beneath: thirdly, no combination of causes has yet been conceived so capable of producing extensive and gradual denudation, as the action of the waves and currents of the ocean upon land slowly rising out of the deep.

Now, if we adopt these conclusions, we shall naturally be led to look everywhere for marks of the former residence of the sea upon the land, especially near the coasts from which the last retreat of the waters took place, and it will be found that such signs are not wanting.

I shall have occasion to speak of ancient sea-cliffs, now far inland, in the southeast of England, when treating in Chapter XIX. of the denudation of the chalk in Surrey, Kent, and Sussex. Lines of upraised sea-beaches of more modern date are traced, at various levels from 20 to 100 feet and upwards above the present sea-level, for great distances on the east and west coasts of Scotland, as well as in Devonshire, and other counties in England. These ancient beach-lines often form terraces of sand and gravel, including littoral shells, some broken, others entire, and corresponding with species now living on the adjoining coast. But it would be unreasonable to expect to meet everywhere with the signs of ancient shores, since no geologist can have failed to observe how soon all recent marks of the kind above alluded to are obscured or entirely ef-