

cretaceous strata broken up, and swept away from the whole central area of Kent and Sussex. On these phenomena Dr. Fitton observes, that, 'whether the fractures and up-heavings took place entirely beneath the sea, or after the strata were in part or wholly raised above its surface, at once or at distant epochs, we have no facts to enable us to decide; it is, indeed, not impossible that the very act of rending the strata may itself have effected their protrusion from beneath the waves.\*' If, however, we consider that the chalk was upwards of 1200 feet in thickness, and extended over the whole southern denudation, it seems probable that elevation and destruction were going on simultaneously. So soon as the first ridge of chalk on the anticlinal line protruded above the surface of the ocean, it would become exposed to the action of the waves; and as elevation proceeded, degradation would proceed also, until the whole of the chalk strata were carried away, and the Wealden beds in their turn became exposed to the same destructive agency. The debris of both formations would thus become intermixed and deposited in the hollows of the chalk, giving rise to those accumulations of transported materials of which the tertiary strata are principally composed. During these important and extensive changes, the tertiary ocean which then covered the south-east of England, must have been studded with islands, formed by the most elevated portions of the chalk and Wealden; † the marshes of the then existing continent were peopled with tribes of extinct animals allied to the *Tapir* (the *palæotherians*,) and the lacustrine formations of Hampshire and the Isle of Wight were deposited.

The organic remains of the tertiary epoch differ entirely from those of the chalk upon which in the south-east of England they repose. In the Isle of Wight, in the Paris Basin, and many contemporaneous deposits on the continent, they consist of alternations of marine and freshwater shells, indicating the existence of lakes communicating with the sea. The ammonites, and other ancient pelagian shells, entirely disappear, and a small proportion of recent species occurs in the most ancient, and a much more considerable number in the newer deposits. With these are associated the remains of the *Palæotheria*, of crocodiles, turtles, birds, and fishes; and the stems and leaves of palms, and other vegetables characteristic of an equatorial climate. In the tertiary strata of the south-east of England, no traces of mammalia have been discovered; the organic remains consisting of shells, the bones and teeth of fishes, and the leaves and stems of vegetables.

The next era is marked by the existence of the fossil elephant, or mammoth, in these latitudes, having for contemporaries a species of deer, ox, and horse; and in other parts of England, the rhinoceros, hippopotamus, &c. The teeth which have been found in Sussex belong to a species nearly allied to the Asiatic elephant, and the deposits in which they occur are decidedly of a more recent date than those

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\* Geology of Hastings, p. 83.

† Vide the 'Principles of Geology,' vol. ii. In the map illustrating the extent of the tertiary sea, or seas, it will be seen that Mr. Lyell has delineated a range of chalk islands in the south-eastern part of England, agreeably to this theory of the gradual elevation of the land.