chalk of England and France there are no proofs of sand, shingle, and clay having been accumulated contemporaneously even in European seas. The siliceous sandstone, called "upper quader" by the Germans, overlies white argillaceous chalk or "pläner-kalk," a deposit resembling in composition and organic remains the chalk marl of the English series. This sandstone contains as many fossil shells common to our white chalk as could be expected in a sea-bottom formed of such different materials. It sometimes attains a thickness of 600 feet, and by its jointed structure and vertical precipices, plays a conspicuous part in the picturesque scenery of Saxon Switzerland, near Dresden.

Chalk Flints.—The origin of the layers of flint, whether in continuous sheets or in the form of nodules, is more difficult to explain than is that of the white chalk. No such siliceous masses are as yet known to accompany the aggregation of chalky mud in modern coral reefs. The flint abounds mostly in the uppermost chalk, and becomes more rare or is entirely wanting as we descend; but this rule does not hold universally throughout Europe. Some portion of the flint may have been derived from the decomposition of sponges and other zoophytes provided with siliceous skeletons; for it is a fact, that siliceous spiculæ, or the minute bones of sponges, are often met with in flinty nodules, and may have served at least as points of attraction to some of the siliceous matter when it was in the act of separating from chalky mud during the process of solidification. But there are other copious sources before alluded to, whence the waters of the ocean derive a constant supply of silex in solution, such as the decomposition of felspathic rock (see p. 42), also mineral springs rising up in the bed of the sea, especially those of a high temperature; since their waters, if chilled when first mingling with the sea, would readily precipitate siliceous matter (see above, p. 42). Nevertheless, the occurrence in the white chalk of beds of nodular or tabular flint at so many distinct levels, implies a periodical action throughout wide oceanic areas not easily accounted for. It seems as if there had been time for each successive accumulation of calcareo-siliceous mud to become partially consolidated, and for a rearrangement of its particles to take place (the heavier silex sinking to the bottom) before the next stratum was superimposed; a process formerly suggested by Dr. Buckland.*

A more difficult enigma is presented by the occurrence of certain huge flints, or potstones as they are called in Norfolk, occurring singly, or arranged in nearly continuous columns at right angles to the ordinary and horizontal layers of small flints. I visited, in the year 1825, an extensive range of quarries then open on the river Bure, near Horstead, about six miles from Norwich, which afforded a continuous section, a quarter of a mile in length, of white chalk, exposed to the depth of 26 feet, and covered by a thick bed of gravel. The potstones, many of them pear-shaped, were usually about three feet in height, and one foot in their

* Geol. Trans., First series, vol. iv. p. 413.