

træa, Thecosmilia, Rhabdophyllia [Fig. 384], etc.). Numerous sea-urchins occur in many of the beds, particularly *Cidaris florigemma* (Fig. 386), also *Pygurus*, *Pygaster*, *Hemicidaris*, etc. Brachiopods are comparatively infrequent. The lamellibranchs are still largely represented by species of *Avicula*, *Lima*, *Ostrea*, *Pecten*, and *Gryphæa* (*Ostrea gregaria* being specially numerous). Nearly all the species of gasteropods are peculiar to or characteristic of the Corallian stage. The distinctive ammonites are *A. ancepsalbus*, *A. babeanus*, *A. Bergeri*, *A. cadonensis*, *A. decipiens*, *A. rupellensis*, *A. plicatilis*, *A. perarmatus*, *A. pseudocordatus*, *A. retroflexus*, *A. Williamsoni*.

The UPPER or PORTLAND OOLITES bring before us the records of the closing epochs of the long Jurassic period in England. They are divisible into three groups: (1) Kimeridgian, at the base; (2) Portlandian, and (3) Purbeckian.

(1) Kimeridgian, so named from the clay at the base of the Upper Oolites, well developed at Kimeridge, on the coast of Dorsetshire, whence it is traceable continuously, save where covered by the Chalk, into Yorkshire. It consists of dark bluish-gray shale or clay, which in Dorsetshire is in part bituminous and can be burned. According to Mr. J. F. Blake it may be subdivided into two sub-groups:

- (a) Upper Kimeridgian, consisting of paper-shales, bituminous shales, cement stone, and clays, characterized by a comparative paucity of species of fossils but an infinity of individuals; perhaps 650 feet thick in Dorsetshire, but thinning away or disappearing in the inland counties. This zone is fairly comparable with the "Virgulian sub-stage" of foreign authors.
- (b) Lower Kimeridgian, blue or sandy clay with calcareous "doggers," representing the "Astartian sub-stage" of foreign geologists. This is the great repository of the fossils of this group.<sup>11</sup>

Among the more common fossils are numerous foraminifera (*Pulvulina pulchella*, *Robulina Münsteri*), also *Serpula tetragona*, *Discina latissima*, *Exogyra virgula* (Fig. 392), *E. nana*, *Astarte supracorallina*, *Thracia depressa*, *Corbula Deshayesii*, *Cardium striatulum* (Fig. 392). Upward of 20 species of ammonite occur only in this stage; among them

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<sup>11</sup> J. F. Blake, "On the Kimeridge Clay of England," Q. J. Geol. Soc. xxxi.