

composing once more into clay or mud, and presenting, in this respect, a contrast to the hard, fissile, and often slaty shales of the Lower Silurian series. Many of the sandstone-beds are crowded with ripple-marks, rill-marks, and annelid-trails, indicative of the shallow littoral waters in which they were deposited. One of the uppermost sandstones is termed the "Fucoid Bed," from the number of its cylindrical seaweed-like stems. It likewise contains numerous inverted pyramidal bodies, which are believed to be casts of the cavities made in the muddy sand by the rotary movement imparted by tides or currents to crinoids or seaweeds rooted and half buried in it.<sup>88</sup> At the top of the Upper Ludlow rock, near the town of Ludlow, a brown layer occurs, from a quarter of an inch to three or four inches in thickness, full of fragments of fish, *Pterygotus*, and shells. This layer, termed the "Ludlow Bone-bed," is the oldest from which any considerable number of vertebrate remains has been obtained. In spite of its insignificant thickness, it has been detected at numerous localities from Ludlow as far as Pyrton Passage, at the mouth of the Severn—a distance of 45 miles from north to south, and from Kington to Ledbury and Malvern—a distance of nearly 30 miles from west to east; so that it probably covers an area (now largely buried under Old Red Sandstone) not less than 1000 square miles in extent. Yet it appears never to exceed, and usually to fall short of, a thickness of 1 foot. Fish remains, however, are not confined to this horizon, but have been detected in strata above the original bone-bed at Ludlow.

A considerable suite of organic remains has been obtained from the Upper Ludlow rock, which, on the whole, are the same as those in the zones underneath. Some minute globular bodies, doubtfully referred to the sporangia, of a lycopod (*pachytheca*<sup>89</sup>), occur with some other plant remains (*Pachysporangium*, *Actinophyllum*, *Chondrites*—a beautiful seaweed). Corals, as might be supposed from the muddy character of the deposit, seldom occur, though Murchison mentions that the incrusting form *Favosites fibrosus* may not infrequently be found enveloping shells; *Cyclonema corallii* and *Murchisonia coralli* being, as their names imply, its favorite habitats. All the corals of the Ludlow group are also Wenlock species. Some annelids (*Serpulites longis-*

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<sup>88</sup> Op. cit. p. 133.

<sup>89</sup> See Q. J. Geol. Soc. xxxviii. 1882, p. 107. Mr. Carruthers suggests that they are possibly the remains of an animal rather than a plant.