3. On a FOSSIL FRUIT found in the upper part of the WEALDEN DEPOSITS in SWANAGE BAY, ISLE OF PURBECK.

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BUT few of the numerous fossil remains of Plants in the Wealden and Purbeck deposits of the British Isles have as yet been completely described. Ferns, *Equisetaceæ*, Monocotyledonous plants, *Coniferæ*, *Cycadaceæ*, and *Characeæ* have been recognized by their leaves and stems. But fruits are uncommon. One of these is cycadaceous—*Zamiostrobus*, and there are two undetermined *Carpolithi**.

To this short catalogue I am now able to offer one addition, taken from a nodule of ironstone in the upper part of the Wealden beds, in Swanage Bay, at the close of 1857.

The general section of the strata near Swanage, on a line from north to south, shows, in succession, the Portland rock, the Purbeck deposits, the Wealden, and the Cretaceous beds. For the purpose of this notice, only Wealden groups require attention.

The upper part of the Wealden, as seen very completely in the Northern Cliffs of Swanage Bay, exposes about 700 feet of clays frequently red or purple, less frequently blue, greenish, or very pale, alternating with sandstones of different tints, mostly soft and fine-grained, but sometimes hardened by iron impregnation, or modified by admixture of pebbles. One band contains much lignite.

In the upper part of this series, above every red or purple bed, are alternations of sandstone and pale shale. In one of the shale-beds is a course of small nodules of pyritous ironstone, one of which yielded, on fracture, the fruit in question. It is a mass of bisulphuret of iron, which threatened to fall to pieces; but, having filled its pores with Canada balsam, I hope it may be preserved.

The specimen in question has the form of a compressed ellipsoid. The longest diameter, which coincides with the axis of the fruit, has a length of 0·8 inch, the other two diameters, measured at right angles to this, equal 0·7 and 0·6 inch respectively. The terminal surface is almost completely preserved, the other is only sufficiently traced to show the general figure. The well-preserved terminal surface (fig. 1) exhibits a central ring-like prominence; round this is an obtusely conical surface, slightly granulated, with faint traces of radiating striæ. Round this is a circle of oval prominences, from each of which a conspicuous rib or keel proceeds, in a radiating manner, toward the opposite surface, so as to resemble the meridian of a globe. Eight meridional costæ are clearly traced, occupying the circuit of the fruit symmetrically; six of the prominences at their origin are completely seen, a seventh is traceable, and there is an interval corresponding to another. Thus the fruit is ascertained to have had eight ribs symmetrically disposed.

Between two of the costal prominences, on the flatter side of the

* See Mantell's Geol. South-east of England, p. 246, and Bronn's Leth. Geol. pl. 28, fig. 6, for a representation of *Carpolithus Mantelli*, supposed by Brongniart to be the fruit of *Clathraria Lyellii*.

fruit, is a sort of collar (fig. 1, c); its external face is striated;

Fig. 1.—*Fossil Fruit from the Upper Wealden Beds in Swanage Bay. View of the terminal surface, showing the origin of seven ridges, and space for the eighth. Magnified six times.*

c. The collar.

within it, towards the axis, a depression. Between the other prominences a similarly-placed arched depression is traceable, and there seems nothing to prevent the supposition that a similar collar may have existed.

The eight ribs and the intervening hollow surfaces (see figs. 1 and 2) are striated by radiating vessels, which vary in size from $\frac{1}{500}$ to $\frac{1}{1000}$ of an inch in diameter (figs. 3, 4, 5, 6, and 7). They are pressed together, very continuous, occasionally dichotomous; and in this case, the divided vessels lie side by side (figs. 4 and 5). In fig. 5, appears a curious example of this dichotomy both upwards and downwards. They are all jointed at intervals which frequently measure about four diameters of the larger vessels. The surfaces are marked by projections, which, for the most part, appear as mere roughness (figs. 5 and 6), but in a few cases resemble fine oblique parallel striæ, $\frac{1}{3000}$ of an inch apart, and meeting the sides of the tube at an angle of 40° (fig. 7). In other cases they appear as small *puncta*, ranged in one line, at intervals equal to half the diameter of the tube, or scattered in a less regular manner. These last-mentioned observations are difficult, even dubious, and require good single lenses of $\frac{1}{4}$ inch or $\frac{1}{8}$ inch focus to be used for comparison with the results of the compound microscope.

The pyrites appears to be moulded in the cavities of the original vessels, the seeming joints being caused by original transverse plates, and the small projections corresponding to tubular openings and slits in the walls, or to internal depressions having these forms.

The fibrous body is partly surrounded by a thick dark mass of minutely granulated pyrites, which, under the microscope, suggests the question of its being deposited in the cavities of a thick cellular envelope. By an accidental fracture through the pyrites in the part of the specimen opposite to the terminal surface already described, the internal cavity is laid open, lined with finely crystallized bisul-

Fig. 2.—View of the broader side of the Fossil and its Terminal Surface. Magnified four times.

Figs. 3 to 7.—Illustrative of the Structure of the external portion of the Fossil Fruit.

Fig. 3.—Part of the fibrous surface of the Fruit. Magnified twenty-five times.

Fig. 4.—Part of the fibrous surface, to show the relative diameters and divisions of the Vessels. Magnified forty times.

Fig. 5.—Selected Vessels, to show the dichotomy and the rough or dotted surface. Magnified seventy times.

Fig. 6.—Large, rough, or dotted Vessels. Magnified 100 times.

Fig. 7.—Obliquely striated Vessel (rare). Magnified 100 times.

phuret of iron. In it, near the base, deep grooves appear (corresponding to the external ribs); two of these are very distinct, and, after passing less than half the length of the interior, cease symmetrically.

By the same fracture the thickness of the shell or crust is discovered, varying from $\frac{1}{40}$ th to $\frac{1}{100}$ th of an inch. The whole of this substance is fibrous.

In a geological point of view, the more precise determination of several of our fossil fruits appears desirable; especially of the Oolitic and Wealden periods. But this is far from easy. If, for example, we endeavour to trace the analogies of the present specimen, and begin with the great Monocotyledonous groups, we may regard its fibrous mass as having a resemblance to the fibrous pericarp of the *Palmae*. But what Palm gives us a regularly eight-ribbed fruit? What Monocotyledon exhibits such remarkable deviation from the usual tendency to be represented in threes?

Without stopping among the *Coniferae* and *Cycadaceae*, which offer in their fruits nothing of this kind for comparison, we may enter the Dicotyledonous groups. Keeping in view the probability of the object being of a firm or woody texture, like a nut, we find in the *Juglandaceae* some analogies worth notice. For example, the Hickory-nuts have often four stronger meridional ridges alternating with four weaker elevations, corresponding to the quadrilocular interior cavity. The outer covering is four-ridged in *Carya amara*. Ranged among the *Euphorbiaceae*, in the new Museum at Kew, I find an example of a quadrilocular capsule,—trilocular capsules being common in this order. The plant is from North Australia, and is named *Petalostigma quadrilocularis*. As far as general appearance and character of figure may be appealed to, this fruit is the most like my Swanage fossil. The specimens at Kew show the pericarp to be marked by eight meridional ridges, while the interior divisions of the fruit correspond in number, and separate in octants.

It may, perhaps, here deserve notice, that a spheroidal many-ribbed body, which is usually regarded as a fruit, and was obtained from the lowest part of the Oolitic series on the Yorkshire coast, at Whitby, has been compared with *Hura crepitans*, the Sand-box-nut of the West Indies, which is also Euphorbiaceous (see Young and Bird, Geological Survey of Yorkshire Coast, pl. 1. fig. 5, ed. i., pl. 2. fig. 6, ed. ii.).

I purposely abstain from recording the ineffectual attempts I have made, by my own inquiries, and by consultation with others, to settle the place of this fruit among the natural orders of plants. Probably further search in the same locality will yield additional data, and render it easy to determine what is now found hard to guess.