XVIII. *On some new Varieties of Fossil Alcyonia.*

By THOMAS WEBSTER, Member of the Geological Society.

To Sir HENRY ENGLEFIELD, Bart.

London, August 2d, 1811.

DEAR SIR,

I Obey with pleasure your request that I would give a particular account of the singular fossil organic body which I observed in the green sandstone stratum under the chalk, during my late examination of the Isle of Wight, and which appears not to have been hitherto described by any naturalist.

Whilst viewing the rocks about Ventnor Cove, and in various parts of the Undercliff, I remarked a great number of small prominences that at first sight appeared like harder pieces of the stone which resisted the effects of the weather after the rest had mouldered away. But examining them more particularly, I observed that most of them had exactly the form of branches of trees; and frequently the resemblance was so complete, that if they had been carved by a sculptor, he could scarcely have made a better imitation. Sometimes they were tolerably sharp and perfect, but most generally were a good deal decayed; and they then bore that sort of likeness to real branches which sculpture would after having been long exposed to the weather. Pl. 27, fig. 1.

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They were of various sizes, from half an inch in diameter to three or four inches, but were more usually about an inch and a half or two inches. Their substance was sandstone of the same kind as the rock they were in; but the part resembling the bark was somewhat harder, which enabled it to endure longer than the rest of the stone, and thus project above its surface.

The colour of the outside was sometimes of the same yellowish tint as the other parts of the rock, but was more frequently dark grey, owing to their greater durability permitting the lichens to grow upon them. When the dark coloured pieces were broken, the internal part was yellow. Often a piece of the bark appeared wanting, and then the central part of the branch, or that corresponding to the wood was smooth, but the outside of the cortical part was rough and corrugated. Some were straight, others a little crooked, and in a few instances I observed them forked. Others again had much the appearance of roots, having frequently holes as if branches had been broken out.

While in the rock their forms were sufficiently distinct; but they were so friable in their structure, that I could not detach pieces of any great length; and when so detached, they seldom conveyed the same idea. The appearance of the largest and finest specimens, therefore, which were imbedded in rocks of considerable magnitude, must be imagined from the drawings.

Notwithstanding that the resemblance of these forms to branches of trees was so striking that it was impossible not to imagine at first sight that this had been their origin, yet considering the difficulties attending the supposition that wood had been converted into sandstone, it seemed to me much more probable that they had been derived from some of those animals assuming a vegetable form and distinguished by the name of Zoophyte.

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Examining farther the limestone contained in this stratum, both in the bed and in those masses which had fallen down, and lay about the shore, I observed a great many smooth cylindrical forms as perfect and sharp as though they had been sculptured. Pl. 27, fig. 2. These penetrated the rock in all directions, many projecting above the surface as if carved in basso and alto rilievo, and exhibiting sections in every direction according to the fracture of the rock. They were also frequently broken out, leaving a cylindrical cavity where they had been.

These cylinders varied in size from one inch in diameter to the eighth of an inch, were sometimes straight, generally crooked, having much the appearance of eels in motion. They were exceedingly smooth on the outside, often slightly tapering, and, as well as the last mentioned forms, had evidently been inclosed in the rock at the time of its formation. When these cylinders were examined carefully, they appeared also to have an external coating or cortex, but it had been extremely thin, and was always worn off when they had been exposed by being on the surface.

Although I first noticed these beautiful cylindrical bodies in the limestone, yet I could afterwards trace them in the other parts of the sandstone stratum, although from the softness of the stone they were there almost obliterated; and I concluded them also to be some fossil organic remains, probably belonging to the class of Zoophytes; but I could not ascertain that they were parts of the same species as those I first mentioned, since in no instance could I find them distinctly connected together. Some rocks contained only one class, and some had both confuædly intermixed.

I found fragments of these fossils in every part of the island where the sandstone stratum can be seen, and even in the walls of buildings constructed of this stone; but it was only among the

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stupendous and difficultly accessible masses of rock lying under the romantic cliffs of Western lines that I observed the singular parts of these organic beings which I shall now mention.

In this place I not only met with the stems above described in great abundance and perfection, but also having frequently attached to them heads or bulbous terminations, in form somewhat resembling a closed lily or rather tulip, Pl. 28, fig. 3. These, like the stems, although sufficiently distinct as to the general shape, were commonly so wasted by the weather, that good specimens were exceedingly rare. In some I found the distinct traces of organic structure.

All these heads possessed nearly the same form, but varied in length from five or six inches to half an inch ; and I think it possible they may belong to several varieties of the same species, some differences being observable among them.

Pl. 28, fig. 4. & 5. are the heads attached to the branches so much resembling the parts of trees. In these the cortical part is often equally evident in the head as in the stem ; but being in soft sandstone I could very seldom observe the organization. I remarked that some of the stems had also tumid parts not unlike the bulbous terminations. Pl. 28, fig. 6.

Heads similar in shape, but generally much smaller, were attached to the smooth cylinders in the limestone ; and in these the cortical part was scarcely visible ; whilst certain lines on the sides sometimes gave the appearance of petals, Pl. 28, fig. 7, 8, 9. On breaking them, slender tubes were seen passing through in a longitudinal direction ; and one specimen displayed the internal structure very distinctly, fig. 10. From this it appeared, that these heads consisted of a group of tubuli now converted into and enveloped with stony matter ; and in some of the specimens, as fig. 11.

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one end was pierced externally with several small holes placed in a regular order, which probably communicated with the tubuli I have mentioned, and by the contraction and dilatation of which the animal was enabled to draw in the water from which it extracted its nourishment.

Besides these extraordinary shapes which projected in relief, I observed a variety of very regular white figures as if painted upon the rock, being even with its surface, Pl. 29, fig. 12. They consisted of circles, of ellipses with various eccentricities, and of parallel lines, both straight and curved. These I considered to be the different sections of some cylindrical and perhaps tubular bodies inclosed in the stone: the figures being always such as would be produced by the various sections of a hollow cylinder both straight and crooked. The circles were generally from two inches to half an inch in diameter, and were of a whitish yellow colour, the rest of the stone being of a greenish yellow, or greenish brown. They were smooth on the inside, but the outside was radiated, as if the original body had been covered with spiculæ.

The substance which filled up the area of these figures was generally the same as that surrounding the outside, but sometimes it was a little different.

Although I had no doubt but that these singular figures owed their origin to some organic body, yet I did not at first suspect that they were in any way connected with the cylinders in relief that I have just described. Fortunately however an illustrative specimen in the limestone convinced me that both these appearances so different from each other were derived from the same source. Pl. 29, fig. 13, represents the specimen to which I allude. In this on one side may be seen a perfect example of the white radiated circles, and, in consequence of some of the stone being broken away, the in-

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ternal part is exposed, and corresponds exactly with the smooth cylinders. Having seen this in one complete instance, I was able to trace it in others; and was now convinced that the smooth cylinders were only the internal parts of the same body whose various sections formed the white circular and elliptical figures.

When these forms are enclosed in a very soft sandstone, although the sections are very evident from their colour, yet they are seldom seen in relief, because the cylinders themselves are soon destroyed by the abrasion of the surface; whereas the hardness of the limestone permits them to remain.

Besides the prodigious quantity of fine specimens of these fossils to be found at the Western lines, Pl. 30, there is another circumstance peculiar to the place, arising from the position of the rocks forming the cliffs. These consist entirely of the green sandstone formation, which has slid down in a mass into the sea at the time when the great failure of the stratum took place which occasioned the under-cliff. The stratification of these rocks dips considerably towards the land, and from the action of the sea on the lower part, large portions have been detached, leaving the upper part overhanging frequently twenty or thirty feet. These masses have separated from the rest of the rock, and exhibit in the divisions between the beds a view of their upper and under surfaces. Attached to these surfaces are vast layers of these fossils heaped upon each other, and lying prostrate in every possible direction, and in fragments of various sizes. Their substance is always sandstone of very soft quality, and having suffered much from the weather, they appear like sculpture almost defaced. It is not difficult however to trace multitudes both of the stems and heads, varying from four inches in diameter to the eighth of an inch. In the joints between the beds where they are still not separated, they may also be dis-

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tinctly seen. The number is indeed truly astonishing, almost every block of stone contains many, and some of the rocks appear entirely filled with them.

Whether those having a thick cortical part, and the smooth cylinders with a spiculated cortex, are different parts of the same species, representing in one case the stems and in the other the branches, I must leave to be decided by future observers; at present I am not in possession of any facts that would connect them together. They both agree in the great length of the stems, and in the general forms of the heads attached to them; but I never found the smooth cylinders of larger diameter than one inch, although I frequently observed the other four or five inches in diameter. The cortex of the former, when it was at all discernible, was always extremely thin, but that of the latter was nearly equal to the internal part; and I never found the sections of the last sort in the green sand like rings.

With respect to the smooth cylindrical fossils, whose sections formed white radiated circles, I cannot help thinking that the originals were tubular bodies, or that the animal matter which originally filled them was gelatinous, or consisted of some substance not sufficiently dense to undergo the process of silicification; in consequence of which the fossils were at first hollow, and admitted the matter which enveloped them also to fill the inside; since I constantly found the material within the radiated ring, whether sandstone or limestone, the same or very nearly so with that which surrounded it.

Although by giving full scope to the imagination, one might easily be led astray in contemplating a phenomenon so curious, yet I have no doubt but that these appearances will warrant the conclusion, that there must have existed here an immense bed of these wonderful animals, of the most gigantic size, growing like asub-

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marine and animated forest; and from the infinite variety of curvilinear forms in which the branches are found, it is probable that they were possessed of the power of moving their arms in every possible direction, for the purpose of searching for and obtaining their food, which they extracted from the sea-water.

But if we reflect upon the changes which these extraordinary creatures have undergone, our wonder must increase. From some mysterious cause the animal membrane becomes converted into siliceous matter; and we have then to contemplate the idea of their still retaining their original forms and situations but changed into stone. By subsequent convulsions of nature the silicified animals are broken to pieces, whilst the fragments are scattered in all directions. These are enveloped and covered by sand and calcareous matter, the alternate depositions of each with these fossils forming the vast mass of strata we have been examining. Had the animals been overwhelmed by the sand while in their living state, they must have been crushed quite flat by the superincumbent weight; but in no instance is this the case; their cylindrical forms remain perfect, and do not appear to have suffered from pressure.

You will no doubt perceive that in thus supposing the first change of the animal into silex, I have followed the theory of Mr. Parkinson, as stated in his work on organic remains; and the above observations may perhaps tend to confirm the justice of his conclusions. That these fossils contain generally more siliceous matter than the investing stone, appears probable from their greater durability, and indeed in some instances I found them almost wholly siliceous.

Having noticed the extensive distribution of this fossil, I endeavoured to ascertain the several strata in which it is found. In the ferruginous sand, below the green sandstone, I could not find

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any specimens. In the blue marl on which the sandstone rests, I found only two or three fragments of cylinders with the cortical part easily detaching itself, the substance being of the same nature as the stratum containing them. The green sand and the limestone were the chief repositories. I traced them upwards into the chert; but they there became rare, and they totally disappeared in the chalk marl. But in the fragments of flint with which the shore from Dunnose to Ventnor is covered, I found many of the cylinders enclosed, and sometimes exhibiting both the internal and cortical part. Frequently I observed white circles in the flint, somewhat resembling those above-mentioned in the green sandstone, having in the internal part flint of the same kind as the envelope; and it is not improbable that these are sections of the cylindrical forms I have been describing.*

Since my return to London, the drawings and specimens above described have been seen by several gentlemen skilled in organic remains, and particularly by Mr. Parkinson. It was his opinion that they all belonged to the genus *Alcyonium*, but were of three if not four different species, not one of which had hitherto been described. The circumstances which he pointed out in which the first-mentioned differed from any known fossil *Alcyonia* are the following.

The heads vary in form from any other, being longer or more tulip-shaped.

* In a subsequent excursion to Dorsetshire, I observed evident traces of an *alcyonium* nearly similar in the Purbeck stone, and another apparently somewhat different in the limestone rocks between Weymouth and Sandsfoot Castle. I found in great abundance the appearances of the white radiated circular and elliptical figures in the Isle of Portland, and have since noticed that these are extremely common in the blocks of stone brought from that place to London. They may be seen very distinctly in the Portland slabs in the door-ways of most of the large houses in this metropolis.

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In the fossils of this genus yet noticed, the pedicle or stalks have been very short; and although numerous fragments of these have been found, it was not certain that they belonged to the heads, the portions of stalk attached generally not exceeding an inch or two; whereas in those which are the subject of the present paper, we see stems of considerable length, frequently extending four or five feet. All the fossil alcyonic heads which have been described as approaching to a globular form, are characterised by a considerable opening in the end; but the species we have been considering has no such structure. From the circumstance of the heads appearing in shape much like the closed buds of the tulip, and from their being attached to long smooth stalks, perhaps the name *Tulip Alcyonium* may not be improperly applied to this species.

In the stratum containing the white radiated circles, and frequently in the same block with them, I noticed another species of cylindrical and tubular organic body, somewhat resembling them, but differing essentially in some particulars. Fig. 14, Pl. 29, exhibits the appearance they assume. They are usually about half an inch in diameter, the inside nearly cylindrical, or rather slightly elliptical, and the body much thicker on one side than on the other so as to make the form of the outside very irregular; but they never have the radiated character of the others. They do not vary much in diameter, and are frequently several feet in length. They do not taper, and I found no branching nor bulbs. Their substance is calcareous, of a whitish colour, and the matter with which they are filled is the same with that in which they are enveloped.

Fig. 15, Pl. 29, represents a fossil organized body, which I found to occur frequently in the stratum of blue marl immediately under the sandstone, or rather in the part where both these strata pass into each other.

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This appears as blackish streaks in the ash-coloured marl, much resembling in form some plant. They frequently project above the surface, being a little more compact than the marl, though they are also calcareous; they lie in all possible directions, exhibiting sections sometimes at right angles to their axis, sometimes oblique, and sometimes longitudinal. Their stems appear to have been hollow, and they have some parts attached to them extremely thin, like leaves. I found nothing like bulbs or heads to these. They are also very extensively distributed, occurring at every place where I observed this stratum.

Fig. 1.

Fig. 2.

Drawn by J. H. Foster.

Engraved by G. Cooke.

Published by William Phillips, London, 1830.

Aleyonia.

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Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 11.

Fig. 10.

Fig. 9.

Alcyonia

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

Drawn by J. Webster.

Engraved by G. Cooke.

Western Lines, Isle of Wight.

Published by William Phillips, London, 1844.