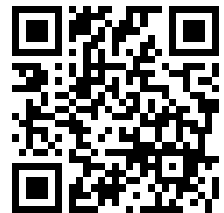
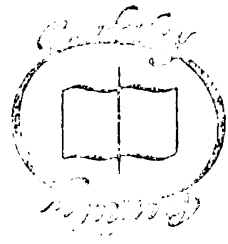
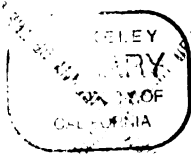
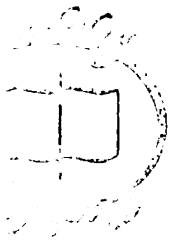

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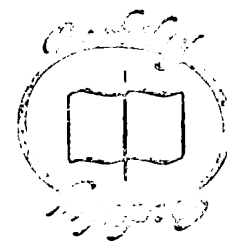
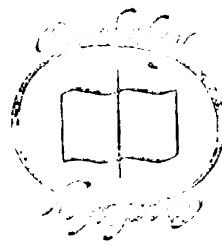
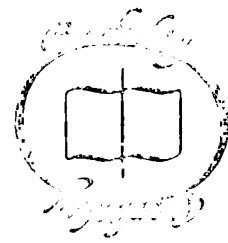
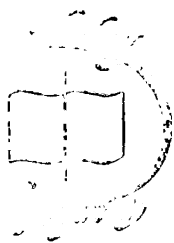
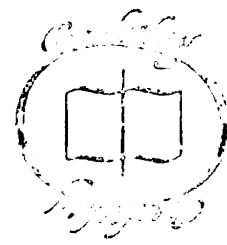
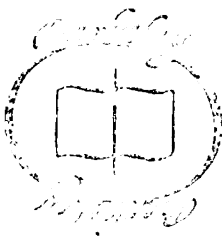
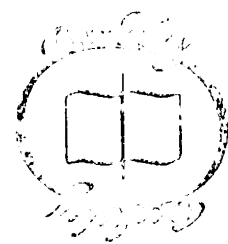
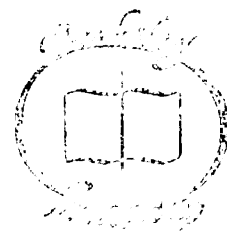
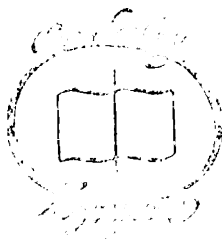
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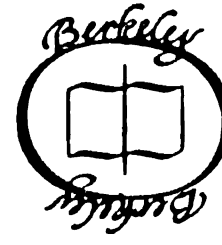
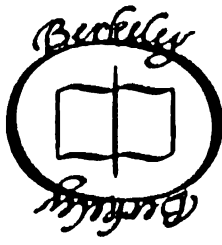
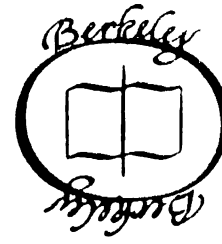
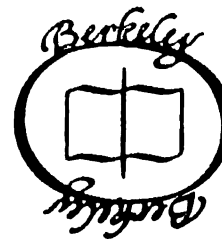
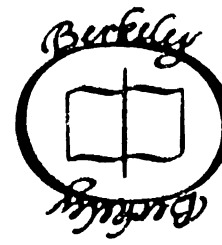
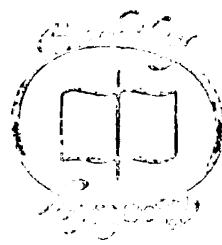
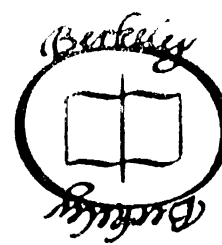
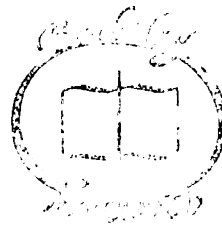
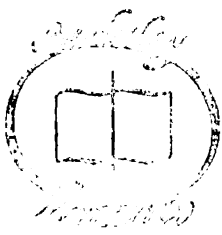
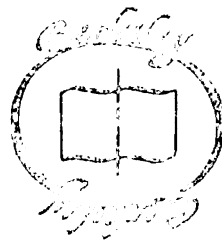
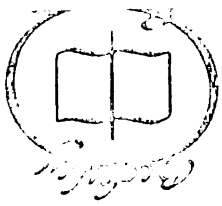
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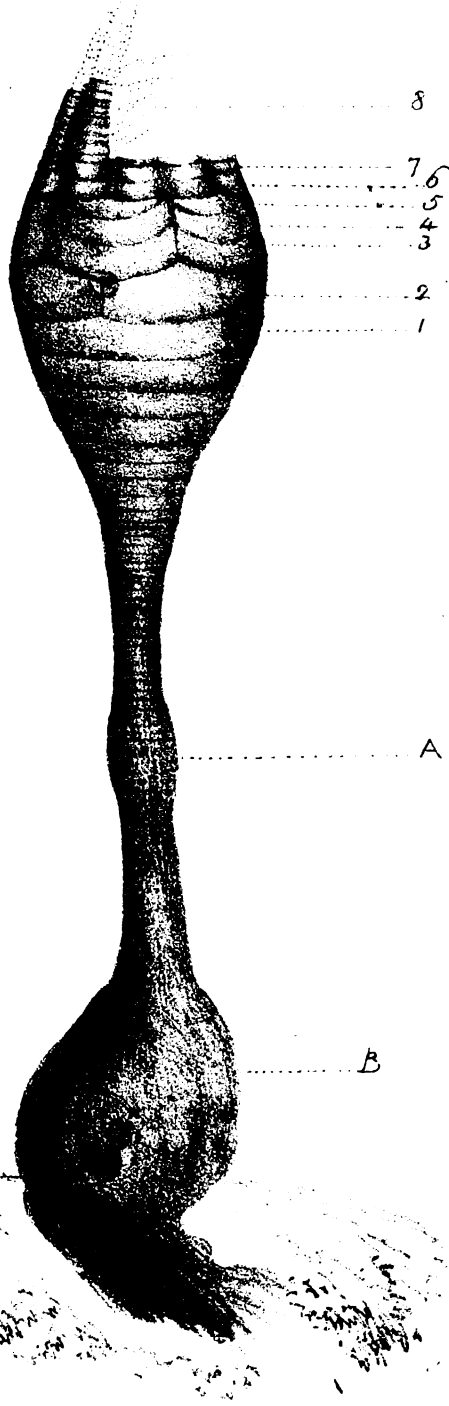


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N. 27.



RELIQUIÆ CONSERVATÆ,

FROM THE

PRIMITIVE MATERIALS OF OUR PRESENT GLOBE,

WITH POPULAR

DESCRIPTIONS OF THE PROMINENT CHARACTERS
OF SOME REMARKABLE FOSSIL

ENCRINITES,

AND THEIR CONNECTING LINKS.

1. THE BRADFORD, OR PEAR ENCRINUS.
2. THE TORTOISE ENCRINUS.
3. THE SITULARIA TRIANGULARIFORMIS.
4. THE MITRA. A NEW GENUS.
5. THE AMPHORA. A NEW SPECIES.

Illustrated by Sixty-six Figures.

If Fossils are justly denominated, we find harmony and pleasure in the science.

Bergman.



BY GEORGE CUMBERLAND.

Bristol :

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1826.

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THE object of the Author is to excite attention to the relics of a former creation, by simplifying the language employed in description, so as to render the study popular and alluring; and by specifying their precise localities, to afford the means of enriching the Cabinets of Geological collectors, in a science calculated to discover the features of each Stratum of the Earth, the true indexes of valuable materials in the economy of existence.

Technical language has therefore been as much as possible avoided, and the greatest attention paid to exhibiting faithful representations of the individual forms of the fossils selected, belonging to a class that are exceedingly rare, and but little understood.

The source from whence these figures will be taken, contains nearly all the known varieties of Encrini and Pentacrini, and is equally rich in other extraneous fossils; but, as many of our contemporaries may possess examples tending still further to elucidate specific character, we shall consider ourselves obliged by their communication, and with pleasure add correct figures of them to our own.

Note.—Collectors of extraneous Fossil bodies, who are studious of this branch of Natural History, will at all times be welcome to inspect Mr. CUMBERLAND'S Cabinet; and any one possessed of perfect Specimens, which they are desirous of disposing of, will find in him a ready purchaser; or, if more agreeable, by the exchange of duplicates.

INTRODUCTION.

THAT intellectual spiritual power which Reason, instructed by Revelation, has taught us to know and reverence as *the Supreme*, has created and endowed us with minds capable of reflection from his own; that is, furnished with such a portion of the ineffable principle of thought and the spiritual quality of mind as is suitable to our present circumstances, and necessary for improving our condition both here and hereafter.

And this is demonstrated from our conduct: for by the just importance we annex to Theology, and the invention of Astronomy and the abstruser sciences, we, as far as we can, endeavour to approach *Omniscience*; by Geometry, Geography, and Geology, *Omnipresence*; and, by Mechanics and Chemistry, to attain as much power over the material Elements of Nature as our limited intelligence is permitted to obtain when sighing after *Omnipotence*. We are indued also with the imaginative and procreative powers, but restrained in their exercise by impenetrable barriers: yet unhappily, highly as he is constituted, Man has (in the error of his understanding, upheld by the pride of his corrupted nature,) often mistaken his proper offices and forgotten his origin, attributing to the organic matter of his frame (which is destined to resolve itself into its primary elements) all the power and operations that belong alone to mind and

iv.

spirit. And because he has been permitted, by the exercise of thought, to comprehend so much of the organization of the universe as is necessary to his well being,—he has assumed, in his folly and arrogance, the importance of a self dependant creature; presuming to act as if *prescience* was an attribute of his existence, until called back to self knowledge and humility by the exhibition of divine power and justice. Numerous instances of which, Tradition and History afford; but the most striking example on record is the universal Deluge, of which the surface of the earth bears testimony, and Geology, or the study of its exterior, comes now in aid of that early tradition and record.

But Geology (a science induced by our necessities) is, in our times, permitted to disclose other truths calculated to confirm in us the belief of the goodness and power of the Creator; and to shew us that Matter fluctuates under his direction in form and quality; and that *nothing is unchangeable but Spirit*. That the Earth which sustains the life of human beings, is as liable to mutation of form as our own structure, and as capable of complete renovation, or restitution, after being reduced to an inert state by the decree of the supreme incomprehensible intellect.

Viewing the subject of Geology in this light, as a fair inference from reasoning, will give to our collections of the organic remains of the globe considerable importance; for it appears, by experimental examination, that these bodies constitute a great part of the matter of all that has been by theorists termed secondary Strata, such as Limestone, Sandstone, Chalk, &c.; and hence we draw a fair conclusion, that in the great event of the creation or reformation of the globe, they consisted of the decom-

V.

posed chaotic materials of a former world, disorganized by the fiat of that Omnipotent Spirit who governs all plastic matter, and can, by his *word*, re-organize it for his own wise but inscrutable purposes.

Why these fossil remains, the types of our recent things, which the decomposition of Strata discloses to us continually, do not *exactly* resemble somewhat similar ones, which we term *recent*, as possessing active existence, it will not be in the power of man to answer; but we may be permitted to conjecture, (reasoning from the results of former disclosures from scientific researches), that it was to make known to us *that former worlds had existed, and had been destroyed*; so as to confirm more intensely the rational belief of the immensity of that power which could vary its creations infinitely from the same material.

Hence I conclude, that the best use we can make of our discoveries in this branch of natural history will be, to display their wonderful variety, by exhibiting their precise forms, so as to make evident their actual structure and present localities.

For these things are the *Hieroglyphics of Nature*, which, well understood, point to the initiated, the concealed wealth which she has deposited in the bowels of the earth for the use of men in every age of their existence; and which is become more especially necessary to them, now that the multiplication of the species has increased their wants; evincing to every thinking mind the affectionate care of the Supreme Creator to provide for the existence of those whom he has destined to partake, for a period, of human life and its important duties.

If therefore we would fix the seal of stability on our

labours, they must unite simplicity of description to correctness of delineation, and be merely brought forward as additional facts in natural history, to supply *the features of strata*, in order that those vast depositions may be more generally understood, and the indications they afford of those materials of the earth which are necessary to our well being, be more readily disclosed.

To this end I have first subjoined, as a specimen of the mode in which I conceive these studies may be made generally useful, a full description of that remarkable Zoophyte, the BRADFORD ENCRINUS, accompanied with correct delineations of all its known parts, copied from specimens *that are always referred to*, and which are chiefly in my own possession. And have the rather selected this Fossil organic body to begin with, as it seems best fitted to afford a key to the general construction of many others of the same genus, from having been fortunately enveloped in a soft stratum of plastic clay, instead of a matrix of lime or sandstone, the situation of so many other bodies that appear to resemble it in their functions and character.

If it should be objected to this undertaking, that a work entitled "*Crinoidea*," has been published, containing a very diffuse compilation from various authors on the subject of these bodies, and that hence this is unnecessary; I answer, it is that very publication which has induced me to take up the subject anew; because that work, by affecting to explain properties in this class of fossils not demonstrable, by giving them names totally inexpressive of their forms or qualities, by supposing offices entirely founded on vague and improbable conjecture, or by misrepresenting their figures, whilst it offers scarce a single reference to the originals treated of, has greatly

contributed to mistify and obscure the study, and entangle investigation; for even those, who know and possess good specimens of these elegant objects, are at a loss to discover what it is the author refers to; and when we have waded through all the ideal anatomy and repetitions of repetitions of other writers on the same subject, we find nothing absolutely new, except a few vague conjectures relative to the oviducts of what we cannot yet *demonstrate*, by any mode of reasoning, to have ever possessed animal life. As to the general term *Crinoidea*, which has been amalgamated with a former erroneous nomenclature, it has nothing whatever appropriate, since there is not a single *Encrinus* or *Pentacrinus* existing, that in the smallest degree resembles a *Lilly*, either in stem, root, flower, or bud. Indeed these unfortunates, almost strangers to our planet in its present state, seem to have been particularly ill described when formerly introduced to our notice by scientific writers, and one has so long been termed the *Nave-Encrinus*, among authors who knew little, perhaps, of waggon wheels, that now it seems to be naturalized among their followers, and is absurdly enough adopted here in a work, where one named *Cariophyllite*, from the Clove, by far more appropriate, has been exchanged, quite unnecessarily, to *Eugenia*, from Prince Eugene, a hero long forgotten. We want also references to the precise, not general, localities, where these scarce objects most abound, in order that many hands being employed in the search, a sufficient quantity may be secured to enable us, by sections and dissections, to arrive at a more correct acquaintance with their internal as well as external construction; for the age, it is to be hoped, is passing away, when knowledge was oftentimes communicated by

means of a jargon of words, and discoveries exhibited beneath a veil. All we find out must now be frankly exhibited in a popular style, or we shall never advance our own march towards a perfect acquaintance with any object of natural history ; for prolix descriptions of particular forms can only serve to swell the page, as experience has shewn that it is impossible for the ablest draughtsman, with the clearest head, to execute accurate delineations from verbal accounts. For instance, to take only one of the least difficult of the author of *Crinoidea*, what sort of a thing would an artist give us were we to request him to draw a "*basaltiformed-five-angled-lilly-shaped animal?*" Or let us suppose four or five draughtsmen set to work, apart, to produce a "*Medusa-headed-five-angled-lilly-shaped animal.*" It is ridiculous to think of it ; and it would be of no use to help them on with the specific characters adopted ; for when they came to the *pelvis*, *costals*, and *scapulae*, it would be all over with our hopes, if they possessed any knowledge of anatomy ! For who would conceive that a cup-like plate resembled a human pelvis, or a circle of hexagonal plates a set of ribs, and that a head was surrounded by costal joints, or a trunk set on a scapula ! or of a pelvis with five joints ! or an arm with only two joints, connected with fingers and claws which branch, and whose joints amount to 27,000 ! But shew them the thing itself, and you would soon obtain a fac-simile, by an engraving of which you could enable all the world to examine its component parts, and without either a bad Greek or Latin nomenclature, procure abundance of useful opinions and comparative remarks from all quarters, elucidative and perhaps *demonstrative* of all its offices.

We might, surely, have reasonably expected, from a

prospectus which promises, "That the entire animal will be exhibited in its *most perfect form*, and the details of every part restored *with absolute certainty*." Something like a more perspicuous classification, and names of parts expressive of the genuine character, where the delineations were even inferior to those of Lhwyd or Plot. It would be endless to point out all the errors of this complicated production, whether we speak of design, description, or systematic arrangement; but their approximation to the *Comatula* or *Alecto*, might have made the author more diffident in classing them among the Oviparæ, as I believe no one has yet detected their ovaries.

That all or any of them are really animals, and not coralline sensitive plants, inhabiting the deep and still waters of the ocean, we as yet possess no *absolute proof*. Doubtless their extremely delicate texture would have rendered it impossible to remain and multiply where any great agitation prevailed, but their being found in clusters, like sea weeds, is no solid objection, since, like ears of corn, they might have been able to ply to slow currents, from which probably no basin of the sea is entirely exempt. In many parts also of their texture, we see they resemble certain well known sea plants, which I believe, not less than shells, possess the powers of generating and effusing a fine calcareous humour that hardens in fluids containing salt; and as to the power of closing or contracting their several arms or branches, there is nothing more surprising in it than that conferred on the sensitive plant, marygold and other flowers, to which we never attach any high ideas of vitality; it would therefore, perhaps, be as well for the present, to suspend the giving any absolute decision on the subject, and instead of seeking to account for their mode of feeding,

digesting, and depositing their eggs, to seek rather for the sexual organs, and those necessary for the support of their existence.

How far my method may be approved by general readers I shall not presume to anticipate, but I humbly conceive, in the present imperfect state of our knowledge, it is preferable to premature attempts at complete classification; what is perfectly understood it is easy to explain to every capacity; but imperfect discoveries, the result of haste to out run other enquirers on any given subject, generally conducts us to immature conclusions, which will not endure the test of time. In scrambles for fame no less than for honours, many inadvertently pass the boundary of truth, of which the almost new branch of science, Geology, affords numerous examples; opposition has been said to be productive of good, but it should be founded on evident discoveries, and justice is due to the weakest pioneer in the service. To the French professors we owe much respect, for their elaborate investigations, but we ought not always to look up to them as infallible, as some modern essayists have done. In the strictures I have taken the liberty to make, I disclaim any the slightest intention of giving personal offence, always respecting the talents I may lament the misuse of, and trust no one will think the worse of me for loving demonstration better than conjecture, and making that liberal use of the freedom of the press, without which the dominion of ignorance would be eternal.

G. CUMBERLAND.

Bristol, May 1826.

REMARKS
ON THE
BRADFORD ENCRINUS,
CALLED ORIGINALLY THE
PEAR ENCRINUS.

I HAVE selected for observation this remarkable Encrinus for several reasons—first, because it is a supposed Zoo-phyte, of which we can produce more perfect specimens than of any other, on account of the peculiarity of no part of it having been found imbedded on the rock to which it was evidently attached. Its having been preserved in a marly bed which surrounded it, and so well preserved, that we not only see its delicate and neatly defined figure, but even that of the milleporites and serpulites, with the minute oysters that have parasitically fixed upon them. We find also their radices or peduncles attached to the mass on which there is a probability they resided, connected with the foot of the column of support; and if we have never been able to procure an entire set of tentacula or feelers, by which it is supposed they collected sustenance, we have seen enough to ascertain their decided insertion and action, whilst the interior or cup-like cavity has been displayed to us in its utmost perfection.

From all these considerations it appears, that as the offices of almost all Encrinital and Pentacrinital Zoophites seem to have been nearly analogous, we cannot do better than to investigate carefully the form of that among the whole tribe, which is most conspicuously displayed in all its several parts.

Let us now, therefore, proceed to shew in what peculiarities they differ from or resemble others of the genus. And first we have to notice, that they decidedly indicate the great Oolite at *Bradford*, in Wiltshire, and at *Farley Castle*, in its vicinity ; having been imbedded in a pale-grey-coloured or yellowish calcareous marl, by assimilation with which they have assumed their present texture, being transformed into a mass of solid carbonate of lime of a light yellow colour, probably an ochreous tint, whose fracture is beautifully rhomboidal, whether the heads or stems receive the blow that causes the disruption of this petrified body.

Another peculiar feature is their great solidity, and the appearance their several plates at once suggest, of a cartilagenous substance, whose exterior surface was finely sulcated, radiated, and full of perforations. To discover the fibres of the cartilages, or muscles, I have cut down and polished several fine specimens, but all I could ever discover was some faint traces of feeble lines of separation at the surfaces of the numerous divisions.

Their form also differs from every other Encrinus hitherto discovered, except some slight resemblance to that which we call, the *chalk Bottle-Encrinus*, so common to Gravesend, in Kent, and which, although on this account we are obliged to rank as of the same genus, materially vary in their stems, and often in their paradoxical terminations ; being sometimes found so entirely

closed as not to admit of the idea of their ever having been furnished with feelers, and their radices are totally different; these latter being branching; they are also found converted into flint, of which I possess a specimen.

The Bradford are in general nearly as hard as the hardest chalk, but sometimes are found to resist the knife as much as the softest limestone, or white lyas, and are susceptible of a very good polish.

The clay, frequently occupying the interior, is equally hard with the other parts, and this is pretty generally the case, as far as the aperture above, which looks as if the juices of the *Encrinus* were of a nature to produce this induration; as we rarely, or I believe ever, find a considerable quantity of the clay indurated on the exterior. Hence it is we have been so much better enabled to investigate the correct forms of the whole, its various orifices resembling mouths, and their singular inflections.

In making sections of the heads, as in No. 1, we see a row of muscular bodies encreasing in their dimensions upwards as to diameter, each muscle terminating in a sharp edge, and wedge-formed, resembling somewhat a mass of double concave lenses placed one above the other, but perforated largely through the centre, and encreasing both in circumference and diameter, as they ascend, contracting a little at the summit again, so as to assume the form of a *pear*, and hence it has been called the *Pear Encrinus*.

But these concentric rings are not all of one piece; the first 13 or 14 from the end of the stem are decidedly so, if we reckon, in a good specimen, from that part where the stem becomes a regular pillar, (see fig. 27) for it is not in this fossil, as in many other *Encrini*, that we can decide where the column or stem terminates, and the upper

part or body commences. The whole of the joints gradually diminishing, in good specimens, both in circumference and thickness, down to the lower joints, which as they recede from the head become serrated at their edges, by means of which I apprehend there can be no doubt they were connected to intervening ligaments, whose attachments were like those sulcated Radii seen at No. 12.

We know also, that this column, composed of an undetermined number of equal parts, extended till it rested with its flat end on the rock or bed to which it was localized, passing quite straight through all the bulbous looking roots or buttresses that contributed to the support of the lower part of the pillar, as we exhibit it in No. 4 and No. 5, which are seen as if inverted, by an accident of the engraver.

Another singularity that attends this Fossil, is its manner of attachment to the rock, which seems to be constructed from a fluid that oozed from the joints of the lower part of the column, and not, as on specimens of the Clove Encrinus, or the Tortoise of Staffordshire, issuing in branching arms from partial spots in the circular coil-formed oval joints, like some grasses.

In fact, a fortunate specimen which I owe to the well known generosity of the Rev. Mr. RICHARDSON, of Farley Castle, at once shows, past dispute, that the radicles were concentric, like the coats of an onion—and are, in this case, about seven; each a twentieth part of an inch thick at the base. A fortunate blow of the hammer broke at once the specimen, and detached the lower set of coats or coverings from the upper; and although by a polished section of No. 5*, we were formerly able to comprehend this remarkable system, it never

was manifest before that they were separated from and worked on each other like sockets. See No. 6 and 7, which fit into No. 6, having been detached from it by a blow.

This habitual construction also appears more probable, by the great variety of forms assumed by the numberless radicles formed, some resembling a bulbous root. (See No. 3); others again flat like a hat, (see No. 8); again with double, treble, and quadruple limbs, connected with one base; (see No. 3); or coated high up the pillar, as in No. 2, with its epidermis or exudation; in fact, to describe all their Proteus-like forms would be endless; but all seem calculated to embrace any shell or body connected to the spot of their habitat so as to secure a firm footing.

The next peculiarity of these Zoophytes, which I shall here remark, is an apparant power of partial contraction and distention, like the earth worm, whether for ejecting with force its food after the nutriment had been extracted, or any other purpose; but I think *we may be allowed to suspect*, that animals of this kind, if animals they were, did eject their food as the Polypes do, since no one has yet discovered, at least in this species, any thing entirely resembling a vent or vents, unless the five apertures, No. 2 of No. 27, be such; (see also No. 24 and 29).

Having procured several specimens of the columns, which exhibited in parts large regular protuberances, I made sections, and polished them for the purpose of better examining their internal structure, and it became then evident, whether attributable to diseased parts, or an inherent muscular power, that wherever such a disposition was manifested, the cavities within the columns or joints were diminished in an exact proportion to the extent of the swelling out of the exterior; and that the

column itself possessed this power of distending its joints horizontally, will be seen by the exterior of No. 11, probably by a sort of compression, for those joints which are apparently distended, outwardly, are evidently thinner than those above or below in a state of rest. The interior section, No. 11, also, if carefully examined with a microscope, shews that these swellings were composed of coats or lamina, like the bases or roots No. 6 and 7.

Whatever the nature of the body was that connected or strung, as it is were, these trochital columns, one thing is remarkable, that we never find it under any other form than that of clay indurated, more or less, and not as in other the like bodies representing a cavity only, instead of a fossil thread. We however see always where it once resided, and evidently, that if the body of the animal had been decomposed, and this part had taken up calcareous matter, it would have resembled exactly those casts of the interior cavities of *Entrochitæ*, so commonly found in Derbyshire in *Silex*. In this part, therefore, it resembles all the tribe as far as we know and can compare them.

Thus much for those parts which exhibit united rings ascending pyriformly, and ending with the most enlarged part of the body. Let us now proceed to shew those separate fibrous parts which contribute to the action of the animal, and support of the limbs, by which in all probability that part analogous to a stomach was supplied with food or nutriment, as well as the column and extremities.

The first circular member of the upper part that deviates from the regular discoidal form, having a convexity on one or both sides as we generally find them when separate (as in No. 12), is divided above into five trian-

gular concave depressions, exhibiting, as in all the discoidal muscles below it, a number of concentric rings resembling in the appearance of their radiating fibres and undulations the ciliary membrane of the eye; each of which rings appears to be the basis of attachments to strengthen the action of the fibres, whose office probably was the expansion or contraction of the whole muscle; and this muscle I take to be the basis of what has been called the stomach, a sort of pylorus, (see No. 13,) as from the point in its centre the sac begins to expand, as will be seen in No 14, placed over it, connected with five wedge-like limbs.

On this is next placed five distinct muscles reposing on the triangular concave depressions of the upper part of the limbs last described, (see No. 15 and 16) whose vertical centres form more exalted ridges, and whose exterior outline, which is the thickest part, forms a pentagonal figure, of which the base is undetermined and upper part a triangle—(see figure 17). These five limbs are triangular, which from the exterior ridge diminished to the bottom of the sac or stomach, where, as in the specimen No. 14, it turns up like a leaf, and which probably is the root of all its diverging members; like the last, retaining on its surface the concentric rings and radiating fibres. At its centre the sac or stomach again widens gradually, and here it is we discover at the upper junction of the exterior line of these five muscles, five outlets of a minute but triangular orifice; but in some specimens the outlets are lower, and in one very fine specimen, No. 19, they protrude a little like a nipple, as in No 24. In a larger specimen, No. 23, exhibiting five great protrusions, forming five mamillæ, so as to give, as in No. 23, a direct pentagonal external figure from the circle it springs from at the base.

What these were, and what office they performed in the animal economy, must now be matter of conjecture; but I think it is not improbable they might be excretory ducts, as they seem to correspond with five decided apertures in the interior of the fossil, of which more notice will be taken when we come to that part.

Above these five separate muscles (15 and 16) I speak of the upper surface, lay two more courses of muscles of five parts, alike crescent-formed exteriorly, the central terminating point of each of which forms the upper and under part of five exterior orifices (see No. 17) at the summit, all of which exhibit the same fibrous radiated interior, and whose curved form leave deep undulations, on which repose five smaller muscles, whose exterior is a triangle, composed of three curved lines, the base of which, in length, is equal to that of the two uppermost, having two truncated ends of very short dimensions, so much so, that in most specimens it might have been mistaken for a triangle of three curved lines; and here commences what may be called the bases of the division, constituting the branches or feelers; below which, on the inside, are seen five distinct mouths or outlets. See 23.

We next come to the first joint of the branching processes, or feelers, whose office probably was to enclose and convey food to the interior animal. These were ten, and these, there is every reason to think, were not dichotomous, or indeed very long. Neither has any one been able to ascertain the number of joints of which they consisted, since no entire specimen has been found, or any specimen preserving above seven joints connected with the head. The best belongs to the Chatley specimen, of which I have given a figure, (No. 22). Of separate joints I possess more than a hundred of various sizes, which,

when mounted, form restored arms or feelers, and from evident appearances, having three perforations in each, they probably each of them possessed attachments for two minute feathered limbs, (see 26) as we see in the recent *Alectos*, or *Comatulas*, from the North Seas, and in many encrinites; but that this was not always the case with every encrinite there is some reason to believe, though a deviation from this arrangement is rarely found.

In describing one joint I shall describe them all, except the terminating one, and that we are not yet acquainted with, though probably it was similar to those of all others, a mere apex, with one attachment for the end of the connecting nerve, like a thread of the whole chain.

The forms of each is a discoidal wedge, resembling the horse-shoe, with a very small perforation near the centre, and approaching rather to the crescent part, than the grooved end; each side of every joint being hollowed into a slight concave at the surface, whose cavity is crossed by elevated bars, generally in the larger ones, of an extremely oblong triangular form; in the middle of which is the perforation that receives the thread, or sinuous body, which connects them together; (See fig. 26, and B. on that sheet,) but at what part this ligament terminates I have not been able to ascertain; for in the smaller joints we find no further traces of this construction, and the cavities are there, in some instances, crossed with seven plain bars, forming a stellated juncture, with indications, however, of the perforation to a great extent, and I think we are warranted in supposing it to be continued to the end of the limb. In some specimens of pairs united, now before me, I perceive plainly that the triangle-formed ridge, (No. 26) with its foramen, as remarked above, is always on the upper or smaller side of

the joint, and in some the other limb is radiated delicately like the divisions of the Trochital columns, common in Derbyshire, and elsewhere. (See A. fig. 29, and the magnified figure near it.) I am also warranted in asserting, from evidence, that to a certain distance from the commencement of the Tentacula, each separate joint gave out two moveable limbs from its narrowest end, on each side the groove or notch which terminates its horse-shoe form; for on the early ones, we can plainly discern the distinct seat of these side feathers, and the perforated foramen for a ligament to connect them; (see fig. B. No. 29) but none of these side limbs have as yet, I believe, been found *in situ*. Probably, however, the office of these short side limbs might be to agitate the insects or mucilage destined for the support of the animal's sac or stomach. And when the whole of the ten larger arms were at rest and folded like a closing flower, (see 27,) these smaller ones occupied the intervening space, and, like a number of little buttresses sustained the elegant cone from within, exactly in the form we have seen in sections of the Stone Lilly, in the British Museum, and elsewhere.

With respect to the stomach, interior cup or flower, as by some it has been called, from its slight resemblance to such parts, it will be best understood by the figure No. 20 and 23, where this pentagonal basin exhibits ten open passages or mouths, each having corrugated lips, and at the setting on of the first limbs of the Tentacula, five other openings are discernible of larger dimensions, the lower lips of which are furnished with a triangular protrusion, that fills up the centre part of this mouth-formed opening like a leaf or bracket—(see also 23). The surface also of this sac or stomach, probably had a sort of cuticle of a velvety texture (see 25), and the whole

when seen as in No. 20, and 23, has somewhat the appearance of the calyx of a flower. This cuticle or soft coating appears to be continued and connected with the inside of the Tentacula, as far as we have been able to trace it, which has never been beyond the three or four first joints (from 5 of No. 27). Mr. MEAD, of Chatley, has one specimen with seven, but they are not quite perfectly in place, (see the specimen No. 22.) My own specimen, No. 19 and 20, has two rows of two joints each perfectly in their places, and shews how strictly they were united with the body of the animal, and how much these two first joints contributed to deepen and expand the orifice destined to receive its fleshy part, and perhaps its food.

The magnified drawing, No. 23, is from a very large specimen once possessed by a Mr. PITMAN, of Bristol, and correctly exhibits all the divisions of the pentagonal lines that constitute the interior image of this elegant vase. The centre dark spot is a well of something more than one-eighth of an inch deep, whose base is wider than its upper aperture, and whose lip or rim is composed of five leaf-formed muscles (see 15 also), the corners of which form as it were the under lip of each of the cavities that are always open, the upper part being a repetition of these leaves, whose corners also are connected with a muscular protuberance resembling in some degree that which is exhibited on the upper lip of the human mouth, and which the figure will best explain; and this terminates the second pentagonal frame to the well, surrounded by the second row of muscular bodies that form the lower lining of the cup or sac; above these, a third row of five muscles is connected with them, from the upper surface of which the ten feelers set off from a remarkable

linge (see 23 upper part), whose elegant projections seem to be designed to dovetail into the first joint, and to check its progress inwards when the whole are closed in a state of inaction, so as to secure the interior by a formidable and compact line of defence; for I have reason to believe, that should we ever find one quite perfect and closed, we shall see the whole lower and upper part equally compact, and forming nearly a double cone; the upper part representing a reeded pyramid divided into ten equal parts, of which an idea may be best formed from the drawing (27) placed last, where I have, from the best authorities, exhibited the whole animal, restored as far as I am acquainted at present with its construction from my own very perfect specimens.

What follows are remarkable varieties, shewing how capable of contraction and expansion some species are. I have also one nearly circular from Farley Castle. No. 2, near to figure 29, is a remarkably depressed specimen, and No. 1, next to it, has some inexplicable divisions, perhaps repairs. In the figure No. 27, restored from genuine specimens in my collection, all the small figures on the right hand side are connected by dotted lines, with the parts represented in the other plates. The letter A refers to No. 11, the enlarged column, B to the root No. 3, and other radices.

No. 1 refers to No. 12.

2 to 13.

3 to 14.

4 to 15.

5 to 16.

6 to the basis of the Tentacula.

7 to the first joint of ditto.

8 to the whole number yet found in situ.

No. 18, last leaf but one of the plates, should have been on the 3d leaf; it is merely to shew from a fine specimen that the large limbs of the trunk or shell sometimes are found sliding sideways from each other, I suppose when the living animal ceased to exist.—No. 29, a magnified specimen, at A and BB, with their surfaces of the upper and under limbs enlarged, shew the character of the arms or feelers more distinctly, and the figures 1, 2, 3, 4, 5, correspond with the parts marked with those figures at No. 27 overleaf.—No. 26, before quoted, is the magnified horizontal surface of the feelers at No. 25, and will explain a part hitherto unnoticed, the perforations for the attachment of two additional minute feelers connected with every joint of the Tentacula.

It now only remains to say, that I think it very probable that a fleshy part of the animal resided in the upper cavity, whence it had the power by ligaments passing through the lower larger mouth-formed cavities, seen distinctly at No. 23, of moving the larger feelers, and from those above them the smaller and shorter ones that fringed the channelled sides of them; and that the lower cavity was the real abdomen, connected with the five side vents, and supplying by a canal the whole column and its trochital joints with nourishment, as well as juices to strengthen the abutments of the base. That the animal was the inhabitant of coral beds, like others of the kind, and formed its stem and root first from the same materials as the coral insects, on which it may have subsisted, and as it advanced to maturity constructed by degrees that part of its habitation which we call the trunk or body; advancing at regular periods from the germ, as the frog advances from the tadpole; but as all

these conjectures have no solid foundation in any analogy, we must be content to wait for full information on the subject, till some naturalist, who is at the same time a navigator, ransacks the bottom of the ocean, and shall be fortunately enabled to place before us the *Analogues* of these hitherto undiscovered exemplars, of which many doubt the recent existence.

LOCALITIES
OF THE
PEAR ENCRINUS.



FOR the following localities of the Bradford or Pear Encrinus, I am indebted to the Rev. B. RICHARDSON, of Farley Castle, Somerset, to whom also I take this occasion of making my acknowledgments for much information on the subject of this Zoophyte, and many fine Specimens collected by him at the period they were first noticed by himself and that able Geologist, Mr. Wm. SMITH (so ill rewarded.) It was first discovered in the year 1780, at Buryfield, on the north side of Bradford, in Wiltshire, and has since been found in digging the Kennet and Avon Canal, and in other recent quarries on the south side of that town. Also at Farley Castle, at Kingsdown, at Wormwood, by Neston Park gate, near the seven mile stone from Bath, at Pickwick, near Corsham, and at Chapel Plaster, seven miles from Bath, near the London road.

The radix, or foot, is fixed on the rag or uppermost bed of the great oolite, and the bodies and other parts are imbedded in the clay which covers that rock. During the digging of the Canal at Bradford, they were found in such abundance, that children used them as

spinning tops, and thus an infinite number of valuable specimens were completely destroyed. Indeed, when I first became acquainted with them, the bodies alone were noticed, then called heads, but soon after the greatest variety of bases or bulbs attracted attention, and I had the pleasure to be the first Collector who, with the help of Mr. RICHARDSON and Mr. MEADE, of Chatley, brought to light the Tentacula; both *in situ*, and scattered in separate single joints among the clay, only to be seen when washed on the banks by showers and lit by an evening Sun, for at such a time alone and in such situations can they be discovered by eyes previously acquainted with their general forms; and when we first commenced our scrutiny among the clays, it was considered by that industrious Collector, Mr. TOWNSHEND, who was equally interested in the research, as likely to be a fruitless labour to all concerned in it.

OF THE

TORTOISE ENCRINITE.



I shall now proceed to describe, from my own specimens, a species of *Encrinus*, hitherto only depicted from supposed, or imperfect, exemplars; that in Mr. PARKINSON'S work being decidedly from a *Situlite** in chalk, of which I have seen specimens in Mr. DONOVAN'S Collection estimated at a high price, and detached plates of which, found in most collections, have, for many years been sold as those of the Tortoise *Encrinus*. In fact, I do not believe a single specimen of the trunk, of what is properly called the *Tortoise Encrinus*, has ever been discovered in the chalk. Yet, in Mr. PARKINSON'S *Outlines of Oryctology*, we still find the same error repeated; for at page 91, sp. 6, he describes it as having 15 plates—five at the top, *pentagonal*, five next them, *hexagonal*, and five beneath, *pentagonal*, with *one* at the base, which would be 16. Now the fact is, the Tortoise *Encrinus* possesses only *fifteen plates* in all, and all pentagons; viz. five on the upper part, each having a semicircular notch in the most elevated edge, to receive the first joint of the branching processes; then five more pentagonal ones

* This refers to the same fossil as Mr. MANTEL'S *Marsupite*.

follow, and a flower-like formed base of five pentagonal plates, to which the column or supporter is united, by insertion into a circular and pretty deep perforation in the centre. Each plate is tuberculated in radii from its middle; but they do not rise high in their centres, as in the *Sitularia*, and possess no ridges, but form altogether a globose mass, studded in every part, as the figure, in my own collection, will shew more clearly to which I refer. (No. 38.) The stem is formed of very thin trochital plates, (No. 37,) has a very large cavity, and in a specimen which I possess, of the root or base, they seem to expand a little in width towards the foundation, while they diminish in thickness, taking a trumpet-formed shape, where they adhere to the matrix. The exterior or cortical part, I consider, on an average of my specimens, to be about one-third of the diameter, and the passage of the cavity is circular. Whether they gave out any side arms from the stem at any part, it is not easy to discover, as on all the specimens I possess, or have seen, although there are small cavities in part of the edges of the trochital columns, yet I never saw any extraneous body adhering to them; and if they had been there, they must have appeared very little thicker than a common needle. In some specimens of Entrochital columns there seems to be an alternation of a thinner trochitæ to make up the mass, and it is evident that they could bend a little, but not considerably, any way. These almost circular bodies are rare, and hitherto unpublished. My specimens I discovered some years back, in the quarries of limestone at Fown Hope, near Hereford; and those * to

* Professor BUCKLAND, and other Geologists, having made it a rule to communicate the localities of my discoveries to all who might be inclined to follow them up.

whom I communicated the source, have since found parts of others ; but I believe it was once generally supposed they were not to be found except at Wenlock-edge, where the same light-coloured rosy lime-stone is abundant, and which is chiefly used as a flux for metals ; they are almost always accompanied by the chain-coral and *annomia-producta* in both places. The first I ever saw was from the Alluvium Gravel, near Stroud, in the collection of Mr. JOHN HAWKER ; it was about a quarter of an inch only in diameter, and perfectly round ; but it possessed all the characters I have described, as to number and position of plates, only its tubercular surface was rubbed down by friction, and it wanted the stalk.

The leading distinctions between this fossil and the *Situlites* is therefore—

First, that it is almost perfectly round, and not elongated or egg-formed, or divided into *triangular* ridgy surfaces.

That it has only fifteen plates instead of sixteen, which constitutes the *number* on the *Situlites*.

That its plates have no angular surfaces, but are all studded with small elevations.

That none of them are hexagonal.

That it has a stem and a trumpet-like base where it adheres to the rock.

That it is only found hitherto in Limestone of a light marly colour, and in aluvial gravel among rounded bodies of limestone.

That it is, when found perfect, even scarcer than the *Situlites*, which are only found in chalk.

Note.—Mr. MILLER seems to have mistaken the column or stem of the Turban *Encrinus*, for that belonging to the head we are referring to.

REFERENCES TO THE PLATES.

No. 38.—The body somewhat compressed with part of the column adhering.

No. 36.—The base separated with column joints adhering.

No. 37.—The column in the limestone of No. 38, found adhering to the first specimen.

DESCRIPTION
OF
A NEW GENUS OF FOSSIL.

SITULARIA TRIANGULARIFORMIS,

Once considered as a TORTOISE ENCRINITE, and afterwards called
MARSUPITE, from its supposed resemblance to a Purse.



IN the Summer of 1824, my Son sent me some fossils in chalk of that rare species which had been long the envied object of collectors, and by most writers falsely denominated the Tortoise Encrinus; the only specimens of which, that I then knew of, was one in the museum of Mr. DONOVAN, and one or two more in the collection of Lord TANKERVILLE, from Surry Chalk Pits. Mr. PARKINSON had also engraved a specimen, but reversed, in his valuable work, taken from some other author.

The account given me of the situation where my first specimen was found, induced me to go to Brighton, with a view to procuring the object complete; for knowing well the character of the Tortoise Encrinus, from having discovered them at Fown Hope, near Hereford, I saw at once that this had little to do with that fossil, except its having a form made up of large plates, which were united by sutures of a serrated construction; and that it must be a new animal or vegetable. During a week's close application to the chalk pits, I furnished myself

* So named from *Situlus*, A bucket.

with several specimens, three of which seemed to be of different species, and afterwards soon got it etched on stone, in order to give it publicity by giving it to collectors to circulate among their friends. But previously to quitting Brighton, I communicated to Mr. MANTEL, of Lewes, to whom I then was a stranger, all that I knew of its structure and locality, in the hope that through his facilities, as well as great zeal, we should be able to furnish a clear account of this rare zoophyte; for none of my various specimens (notwithstanding four or five were beautifully entire as to the plates) possessed the tentaculæ attached, although in all, the place of insertion was very distinctly preserved. How little success he afterwards had; his valuable book of the Sussex Strata will shew, and as he kindly promised to assist me, as soon as he had provided a single specimen complete for his own collection, I am convinced these perfect specimens must be very rare indeed, for I have obtained nothing since through his investigations; and but that a third expedition on this errand, has been more successful, I should not now have been able to give any account of the construction of the superior parts of the zoophyte in question. The world has seen Mr. MANTEL's announcement of it, that he has himself given it a name, and a trivial one; but, as I do not find it appropriate, I shall take the liberty to propose another, which I gave it on first drawing it from the Brighton chalk pit, as more suitable. As to trivial names, taken even from the discoverers of new objects, they appear to me to be perfectly ridiculous, as they load science with clogs, and can only serve to confuse foreigners for the sake of gratifying personal vanity; and if this gross error is to be continued, in spite of common sense

surely Lord TANKERVILLE or Mr. DONOVAN had the best title to this imagined distinction, who years ago first exhibited this remarkable body. The name, *Marsupite*, or purse-like, is inappropriate, inasmuch as a purse, in all its forms, always resembles a satchel, or any other sack, when empty, and is ever flat and thin until it is expanded by other substances. Now this fossil body is a distended-oblong globose figure, composed of sixteen crenulated and sulcated embossed plates, connected together by serrated edges, and most resembles a bucket, worked in the manner jars are often defended by cane reticulations in the East Indies. I therefore think *Sitularia*, from Situla, a pail or bucket, comes the nearest to a description of its general form, and venture to submit it as preferable to the appellation proposed by Mr. MANTEL.

The whole form of the sac or interior is made up of sixteen plates. The first five resembling (No. 33) being each a hexagon, with one point truncated, to form a bucket joint for the arms of an escutcheon or shield-like form, (see also *a* or 32), winged at the sides, and having in the centre a semicircular notch, with a hinge to receive a corresponding projection connected with the arm joint, both of which are perforated in the middle; evidently, as in all others, to allow the passage of the ligament or fibre that connected them, and probably united the links of the chain of tentacula to its extreme termination. This row is seldom much more than half the others in height.

The second row of plates commencing from and united to these by irregular crenulations, or sutures, consists of five embossed *hexagonal* shells (see *b*. No. 32), whose upper edge at the summit meets the line which divides

from each other the first row, as in masonry ; and whose base is a point in a perpendicular line below the division ; from the boss in the centre, some raised six radiating ridges form a stellated figure, each of its divisions forming a species of depression, that, united with the centre of the two adjoining plates, forms the boundary and third part of an equilateral triangle, as the figure will best explain. In specimens somewhat worn by rolling, this character is most easily traced, and one such I possess, where an additional and very clumsy plate has been made to repair a fractured part ; the middle having been ground smooth while the top and bottom have escaped the smallest injury ; and I have also a variety, where this perfect smoothness does not seem to be the effect of friction, for its shape is well preserved in every part, yet not a trace of its having ever been tubucular appears. When I come to speak of the principle of their general exterior, I shall have occasion to mention it again, as it best of all illustrates their hitherto unnoticed and very peculiar uniform construction. To return—

The third row of plates are all pentagonal (see *c.* No. 32) forming, with those above them, by their sutures, a regularly serrated zig-zag line across the widest part of the centre of the whole body ; of course the horizontal side of the pentagon is at the bottom, and forms one of the five sides of the basement plate, which, in the specimen I am writing from, is, if any thing, a little larger every way than this last row which I have been describing ; it is also, as I think is generally the case, less embossed, but, like all the other ten lower plates, is sulcated between tubercular ridges ; but in other specimens, I find the ridges less elongated, never reaching the middle of the plates, but passing into irregular tubercles, or elevations resembling them.

In other specimens again, as in No. 30, I find the bottom plate the smallest; 31 is another view of the same. In some I trace varieties of form. This is nearly globular, while others are considerably elongated and more bucket-formed, (as 32), and all are a little distorted by pressure from the material of the chalk that surrounded them, except one (No. 31), where the upper aperture or opening of the interior is seen in perfect regular divisions, and the five semicircular notches all in their places.

These notches are beautifully sunk into the substantial part of the plates, and occupy something more than one third of its horizontal side, being embraced by two elegant sloping lips, that diminish in thickness as they recede towards the corner of the face of the plate, and are gradually sloped inwards like the lip of a vase, but entirely plain within. Each of these notches have a triangular elongated bar imbedded in the centre, lengthways, in the middle of which bar or hinge is a small perforation for the ligament, (see 31), and from hence proceed the arms or feelers, which I am now enabled to shew (from the only specimen I possess with them *in situ*) are dichotomous. This rare specimen, perhaps unique, is on a flint highly marked and exquisitely preserved, exhibiting the base plate, the three ascending rows of plates, and four of the small plates connecting the arms to those upper pentagons.

There are three of these upper sub-pentagonal plates united to the specimen, to the first of which (separated at No 33, as it cannot be seen in the design No. 32), is attached, in its exact place, a joint whose lower part fits into the circular notch in the pentagonal plate correctly; its exterior outline being rather escutcheon-formed, and having on the face, which is semicircular, three project-

ing elevations. The upper surface is of the form of a bow, the string being inwards, and in itself exhibiting a triangular hinge similar to that which occupies the circular notch of the upper plate; and no doubt the lower part of this joint possesses a similar process to connect it with the lower hinge; from its centre perforation we also see beautifully regular radiating lines.

To the next upper pentagonal plate of No. 32, left hand, I find this joint surmounted by another (*e* 32) that affords three hinge surfaces; the first horizontal, to receive and connect itself to that joint just described, and the other two forming nearly right angles with its base; each consisting of a semicircular notch, furnished with hinge joints similar to those before described. On the third pentagonal plate (*a* No. 32) I find two diverging triangular joints (above *e* No. 32) annexed, that are curved inwards towards each other, but cut off obtusely at the outward extremities, each exhibiting similar hinge-joints on their upper surface, no doubt intended to receive a continuation of the dichotomising branches of the tentacula. Whether these divide again, I know of no other example that could explain; but I rather think, if the fingers lay crowded together, as we see them in the specimen of some loose fragments in Mr. MANTEL'S plate of one, they were not again sub-divided, as they would, in that case, have occupied too much space to be able to collapse.

In my specimen (No. 32), this appearance will be clearly explained, but it will be less clearly seen, that there is, between these two branching arms, a flat plate and two very small brackets that exactly fill the vacancy occasioned by this branching off; and thus we have the whole of this object quite complete, as far as to where

the arms branch from the body in two directions. The inside of these remarkable plates, as in the Bradford Encrinus, also display a very elegant floriform appearance, while all below, to the bottom of the vessel, is quite plain, as I know from having scraped out several plates, one of which I have no doubt was the basement plate; and I never saw the smallest perforation there or any thing that could indicate the connection of a stalk or stem having been united to it; so that nothing resembling it having ever been found in this quarry, I think there cannot remain a doubt of their having been floating bodies. To some I have found joints of tentacula adhering of various sizes, and I have one plate of an inch and a quarter diameter, but none smaller than a quarter of an inch.

Out of the chalk they are not known; and in it, I believe, in not more than three or four places. Resembling the Testudo, and being considered as an Encrinus till lately, they acquired the name of the Tortoise-Encrinus; and the plates in some degree corresponding with that which is a real Encrinus, (and only I believe found near Wenlock Edge, in Shropshire, and at Fown Hope, in Herefordshire), has occasioned no small confusion among writers on this subject. To explain clearly the decided differences they exhibit, has been my chief object in this little sketch; and although we cannot now perhaps be allowed to displace the Shropshire fossil, or alter its name, I am clearly of opinion, that that fossil would be better understood, if it could be allowed to assume a more appropriate appellation; for (as has been seen) it much less resembles the Tortoise than this we are now treating of, and to which a name

has been proposed, still less descriptive of its real form, viz. *Marsupite*, or purse-like.

In fact, the real character of this, to which I have long given a name, more suitable as it seems to me to its general appearance, viz. *Situlite*, or Bucket-formed, has a peculiar character, extremely distinguished in good specimens, and is, in reality, a form made up of twenty-five perfectly regular triangular surfaces, commencing from the centre of the basement-plate, the first of which are necessarily a little curved; so the whole lower part is formed of ten diamond-formed diagonal squares, whose apexes and bases are vertically placed when the *Situlite* is perpendicular, each formed of two equilateral triangles, these making twenty triangles, and the five uppermost completing the number twenty-five, which is the whole amount.

Combining these figures, and taking a view from the middle point of the second row of plates, we have five regular large hexagonal figures made out of the three rows of five each; and thus many other figures may be produced, whose origin is the triangle. Hence we may derive a trivial name, quite, I think, appropriate, and call the

GENUS,

SITULARIA TRIANGULARIFORMIS,
OR
TRIANGLE-FORMED SITULITE.

LOCALITIES.



First.—In a Chalk Pit at Brighthelmstone, at the end of a New Street, facing the Sea, at about six feet below the surface, many have been procured.

Second.—At a Chalk Pit in Surrey, near Guildford, from whence, I believe, Mr. DONOVAN's came; that, with his usual accuracy, is described in Mr. PARKINSON's 2nd volume, who there, calling it "Tortoise Encrinite," notices it "as having a *Marsupital* form."

Third.—In Lord TANKERVILLE's Collection are good specimens from an unknown quarry, the earliest perhaps found, and little noticed at the time.—I know of no other sources—although doubtless there are others, near Guildford.

I now proceed to describe the figures on the plate marked A, the upper row numbered 1, 2, 3.—No. 1 is from an entirely new species of Crinite, partially allied to the Kentucky Asterial one, figured by Mr. PARKINSON in vol. 2d of his Organic Remains, inasmuch as the upper part is divided by emarginated ambulacra; and as this fossil body has never before been found in England, that I know of, I propose to class it as a new genus, and call it, from its resemblance to a mitre, or Sacerdotal Bonnet,

Genus, M I T R A.

1. MITRA VERA.

DESCRIPTION.

A Crinite, height 1 inch $\frac{1}{2}$, breadth 1 inch $\frac{1}{4}$; summit composed of five folded leaves or plates meeting in a point, emarginated, forming a species of ambulacrum, or serrated edge, the lower half acutely angular, is injured at the termination, but shews faint markings of a funnel-formed basis, which was divided into five plates; of a stem there are no traces. The mass is in a brown opaque limestone, and was found by the author in the summer of 1824, on the borders of Yorkshire and Lancashire, on a geological tour, when following the limestone beds in the West Riding of Yorkshire, with a view to ascertain their transition into schist, and the fossil bodies which accompany that change.

These lay out of all high roads or paths, among the sloping hills, scarping out of the sides of a barren down, and accompanied by many other varieties of true Encrinites—some of which also are new; mixed with abundance of broken columns, but none, that I could collect, of their feelers or tentaculæ. Among the columns were some whose Trochitæ, measure 2 inches in diameter, and others united, of the length of several inches, forming a regular curved branch. But the most remarkable specimens were those, of which I intend hereafter to give a figure, and which I think clearly explains why this species of Encrinus was formerly called *The Nave*, (probably the quarryman's nomenclature) for it is impossible for any thing more to resemble the *nave* of a cart wheel than some of the loose knot-jointed columns do; and I suppose were themselves taken for heads and mixed with them.

From the same quarter I also procured good specimens of a new variety of head, of what has long gone by this unappropriate name, and to which it is wished to annex the better one of *Amphora*; good specimens of it have been sent to the British Museum, and to Mons. CUVIER, at Paris, for the Institute; having deposited lately another in the Bristol Institution, for I had the good fortune to procure several; but of those, which I have named *Mitra's*, having only found three, of which two are varieties, I have not been enabled to be liberal. I now proceed to No. 3, a variety which we may be allowed to call (Plate A, 3, of the upper part of the plate,)

2. MITRA DEPRESSA.

DESCRIPTION.

Of pure white limestone, somewhat compressed, exhibiting the same features with the other, the lower parts

more perfect, but showing no markings of connection with the column, the whole appearing to be constructed of ten plates; the five lower smaller ones forming the capital, or funnel-formed cup, and five above folded in by the ambulacra; for on the closest inspection I cannot discover in either of the specimens any indications of what have been called in the Philadelphia Transactions by Mr. SAY, (Interscapular plates) forming the points of the upper foldings. Yet such do exist in some specimens, Mr. SOWERBY says, in the Kentucky fossils, called in America *Pentremite*; he has once seen it among many specimens. And judging from Mr. SAY's description of *Pentremites pyriformis*, in the Zoological Journal, No. 35, I am inclined to think our No. 1 is his American one from *Reading*, which, from its resemblance to the *Altheabud*, might have found a better name.

3. MITRA ELIPTICA.

In some respect corresponding with *Pentremites Eliptica*, of America, published there, and republished by Mr. SOWERBY, that is, in its general form, and the base being truncated, (see 1, 2, and 3, of the middle portion of the Plate A,) of perfectly white limestone, filled with brown calcareous crystals, as appears by a fracture on one of its sides.—2 shews it in its natural position, when attached to the column; 1 as inverted; 3 shews its base. The size that of the original.

In some respects it will be found to approach to the *Pentremites Eliptica*, sent to Mr. SOWERBY from Preston, in Lancashire, chiefly as to the base and breadth of the upper parts, but more closed at the summit, and differing also in not possessing any marks of, what he calls, interscapular-plates, viz. the five quadriformed tips; and

which, in my variety, could never have existed, the lines of division extending from the sub-truncated foot to the summit of the head.

4. MITRA HIBERNICA.

Supposed to be found at Mayo country, in Ireland, of which I have given four views at the bottom of Plate A, numbered, and which will best explain in what it differs from the above; it being of the natural size of my specimen, the locality of which I have never been able to learn. It is in dark limestone.

Plate B. 2, 1, 3, at the top of the plate, represents the Kentucky fossil, from a genuine specimen procured of Mr. MEADE, of Chatley, and for which I propose the name of

5. MITRA RUGOSO, QUINQUE PERFORATA.

This specimen, of which No. 1, of the natural size, half an inch long, and the same in breadth; is in white amorphous limestone, and filled with calcareous transparent spar, being exceedingly thin in its coat or integument, on the thickest part, the summit, not above the thirtieth part of an inch. No. 2 and 3 will shew its character better than any verbal description, where the rugous open surfaces, or ambulacra, are distinctly displayed, and the five open perforations, which probably supported the arms, being divided in the middle, as in many other Encrinital bodies, and not at all I think likely to be ovaries, as Mr. SOWERBY has conjectured; neither has any specimen I have seen the interscapular markings, which being so rarely found may be merely fractures of encreased parts, unless those found in chert should be a different species.

Platc B. 2nd row.

6. MITRA ELONGATA. No. 1, 2, 3.

This is a variety in white limestone, differing only in its lengthened form, of which I possess three specimens, whose bases are truncated and very concave: all are in pure white limestone; the figures will best explain them.

Platc B. 3rd row.

7. MITRA HUMERO-STELLATA.

No. 3 is the base, forming a pentagonal star, and exhibiting the cavity for the reception of a pentagonal plate connected, no doubt, with the column, of which some fragments were found near. This base differs from every other in the broadest part, the height being just half an inch, whilst the breadth is somewhat more.

No. 2 shews it in its natural position, and how peculiarly close it is at the summit; while No. 1 exhibits the new and uncommon projection of the shoulder brackets, which end in a species of beak, and receive two rows of ambulacra that resemble two cords placed in a groove.

The lines that separate the plates between the ambulacra are not seen, being in a very dark limestone, and one of the five tips exhibits a vent or orifice, of a singular construction. The original, in my possession, was discovered in the spring of 1823, among some distorted shaly fragments of our Avon mountain limestone, at its transition from the magnesian, on the new road ascending from the Hotwells, Bristol. And only one other has been discovered since, notwithstanding I made it known to that diligent labourer, Mr. WILLIAM MORGAN, at the finding of which I was directing.—

As it differs materially from all others known, and was the first of the kind found in England, I sent both a drawing and the original to the Geological Society as soon as possible for examination, with permission to publish it; but as that was neglected, I introduce it here, with my other discoveries of the same family, persuaded that it will interest every lover of natural history, and add one more interesting link to this remarkable group of Zoophytes, being nearly unique.

With it, besides the loose fragments of Trochitæ, there were coralloids in abundance, and some mammillated Echinital plates. The colour exactly resembles *Mitra Hibernica*; perhaps in *oleaginous*, L. S.

At the bottom of Plate B, is a sketch of the new species of Nave, which I have named *Amphora*; this it was at first intended to write from, being of the natural size, and from one original; but I have since made a more accurate design from two others, and I now write my description from that on the Plate marked C.

AMPHORA. 1st Species.

No. 5, of Plate C, is from one now in the British Museum, from which I made the drawing, with the permission of Mr. KONIG. It was first I believe described by LISTER, 1674; next by Mr. BEAUMONT, in the Philosophical Transactions, 1676, who I believe deposited this identical specimen (No. 5,) in the Museum; then by Mr. PARKINSON, in Organic Remains, where I suppose, from not copying his figure from the original, it is given incorrectly; and lastly, the Author of the Crinoidea has misplaced it among his Actinocrinites, although it has no radiating markings on the inferior plates, a feature from whence he professes to take its

distinctive name; and commending Mr. PARRINSON'S draughtsman for very correctly representing the single pentagonal costal plate, whereas the fact is, that plate in this species, is the only true Hexagon in the row of his costals, or side plates; all the others being only irregularly so. He is also in error in saying these plates have no articulating surfaces, since I can shew from specimens, that they are completely furnished with that necessary apparatus, and pretty broad ones also; a circumstance there cannot be a doubt is general. The plates of this fine specimen, which is entirely hollow, are remarkably emarginated with broad borders, resembling on its outer form an earthen wine *amphora*, with five handles for suspension, and a central neck to pour from, and totally unlike the *nave of a wheel*. Hence I have taken the liberty to give it one more appropriate.

2nd Species of AMPHORA,

Are figured 1, 3, 4, 22, of Plate C. The drawing, of which I now only give two examples, will shew, that it properly belongs to the genus of the *nave* of the museum, and will amply explain a part varying from this; the neck or proboscis, proceeding from the crown or upper part, and differing probably only in its position; which is, in our new one, always placed *on the side*, not as in that, in the centre. The summit of the dome is a large semiglobular plate, whose base is hexagonal, (see middle figure of Plate C. under No. 1,) surrounded by six similar tubercles, whose bases are also hexangular, and these again encircled by eighteen oblong flattened pentagonal tubercular plates; which are succeeded by rows of smaller and flatter hexagonal ones, tending to unite with the lower part of the body at the junction of the branching appen-

dages, or feelers, placed above the inferior part of the body of the animal, which is supported by a column made up of Trochitæ, that are crowned by, and firmly united to, a cup-like plate resembling a capital, which is divided into three equal parts, (see 22) and which presents six faces, on an exterior edge of an hexagonal form, with articulating surfaces.

To these six surfaces are united six hexangular plates, (see 22) five of which, that are depressed hexagons, are succeeded upwards by two, the uppermost of which is also a depressed hexagon, so as to complete the necessary support of the buttresses, to which the five feelers append. And the sixth, which is a perfect hexagon, (placed opposite to No. 4, Plate C.) with its pointed side towards the crown or cap, springs from one of the three divisions of the hexangular base, and is united to two other hexagonal plates, by which three plates, the largest fifth division of the cup or basin, forming the lower part of the body (as at No. 22,) is filled up solidly; as are the other vacancies occasioned by the radiating of the buttressing plates, compacting from the base firmly, by a series of 30 articulating plates, forming the whole area of the lower part of the animal's protecting coat, and affording it great power of resistance.

Thus formidably armed at all points, on geometrical principles, the viscera could have, I apprehend, but little advantage from any exterior cuticle, as has been vaguely conjectured; and much less was it necessary to move the feelers, whether branching or strait, by means of such machinery; since they could evidently be acted upon by ligaments passing from the fleshy body of the inhabitant by the ten large apertures on the sides, by means of which not only the largest branches might have been

expanded, and closed at pleasure, but the smaller tentacula that we are pretty sure were attached to them.

To what length these feelers, or feeders, extended ; and whether they divided or not, as in others, is by no means decided as to the two specimens here alluded to. For I have not only never seen them near these bodies (and I have examined many,) but I believe no existing Cabinet possesses any that are completely satisfactory on that head.

Of another species of *Amphora* (*Nave Encrinus*) I have, however, a rare specimen of an extension of the arm beyond the common broken orifices, and compacted with them, of about a quarter of an inch long, forming a corrugated tube, and which gives us reason to think, that the arms were for a considerable length cartilaginous. Theories, such as we have had, composed from loose fragments, can only serve to mislead and bewilder, like will-of-the-wisps, which end in disappointment.

There is another feature belonging to this fossil which several specimens afford, that is peculiar to it: it is a thorn-like projection on the centre plate that overhangs the beaked one, that divides the two cavities from each other, from whence the feelers proceed. And in some states (for the head assumes many forms, and in one instance I have it quite round) when the neck or proboscis is withdrawn inwards, the coronal plates are contracted, and in their centres sharpened to the resemblance of thorns ; and, assuming so many changes, I cannot but consider them as cartilaginous bodies, during the life of the animal (and after all it seems most likely to have been an animal, both fleshy and flexible.) Since on the plates of the *Echinii*, fossil or recent, or *stelleridæ*, we never observe any marks of corrugation or extension, which here are most

glaringly exhibited, so that it is very difficult to find a single specimen out of many, the form of which is not, someway or other, distorted, contracted, or expanded, partially.

The Note which follows, will shew, that we are far from the end of our labours, and that probably this class of Fossil Bodies is infinitely more extensive than was of late years supposed. Other new ones are now in the Author's possession, and will be brought forward in due time.

NOTE.


AFTER completing this account, I met with, in May 1826, No. 35 of the Zoological Journal, where we are presented with a description of some new Encrinital bodies, by THOS. SAY, Esq. from the Philadelphia Journal, which he has named *Pentramite*; and one from Derbyshire, of the same family, by Mr. SOWERBY, which is nearly rotund, and which was presented to his father by Mr. WHITE WATSON, of that county, as an Echinus—of all of which he gives us correct figures in outline.

The *Pentramites Derbiensis*, he reports as having five interscapular plates, and says it belongs to the 26th bed of limestone; compares the ambulacra to two rows of beads, and describes its surface as covered by minute grains; it is also subrotund.

The Kentucky one is described also as having a pelvis, (capital) of three unequal pieces,—two pentagonal, one trectagonal, (a mistake I believe;) summit, five rounded (ovaries,) and an angulated central opening, (mouth and arms;) supposing that it had no arms, (this also I take to be a mistake that future specimens will correct.)

We have also an Eucrinite, termed *Caryocrintus ornatus*, from America, having 15 costæ, and a pelvis of four irregular plates, resembling another which Mr. KONIG shewed me from America last year, and which had more plates, and was very perfect. All these are very interesting.

LOCALITIES
OF THE
AMPHORÆ.



BROUGHTON, near Preston, Lancashire, is I believe that of the specimen in the Museum.

My new and singular one was not far from the locality, where I have spoken of finding the *Mitras*. Perhaps in other places in Lancashire, in the schistous limestone, where several Encrinital bodies exist, such as I saw at Skipton, in Yorkshire. From Whitby also, in the shaly clays, or coal measures, I have had specimens sent me by Dr. YOUNG, whose stems exactly resemble that from *Chedioc*, near Lyme, (see my Paper in the Geological Transactions for 1821,) with engraved exemplars. It is the *Hemontholithus portentosus* of Linnæus. Genus *Halophenix* of our British Museum.

ADDENDA.

BEFORE I conclude, I wish to give some account of an unpublished fossil, which was found so long ago as 1816, by Mr. WM. MORGAN,* at Clevedon rocks, in soft sand stone, and threw great light on the origin of abundance of loose plates, of an hexagonal and pentagonal form, frequently found among the clays that filled up the joints of the Black Rock, on the Avon, mixed always with encrinital reliquia—of which I also possess considerable fragments. But that first found, shews more of the body, and two rows of ambulacra; of what number they consisted, the specimen is not perfect enough to explain; to judge from its appearance, being crushed, it should have only three. It was found at Woodspring, in an open fissure of transition mountain limestone, almost sandy, in a state of decomposition; very slightly attached indeed to the rock, and deposited edgeways. My first idea was, that it might be a new species of Echinus, for I found by the microscope, that every plate was covered with abundance of minute spines, the longest not quite one-eighth of an inch high.—Between each ambulacrum were placed four rows of plates, the two middle ones hexagonal, the two outside ones pentagonal, and the edge, which connected them with

* To the persevering activity of this gentleman, we are indebted for the early discovery of several rare Encrinites, at *Clevedon*, in sandy limestone; and also for a nearly entire Ichthyosaurus, at Watchet, now in the College of Surgeons, London:

the ambulacra, had its fifth side largely serrated. The ambulacra, consisting of four rows of plates, two of which had perforations in them, similar to those of some well-known Echinii. But what was most singular in this specimen was, that a kind of epidermis had been left on a part of the ambulacra, covering these four rows of plates, and being itself covered with minute tubercles, each of which had also short spines attached. Now what leads me to doubt if this be really a species of Echinus is, that to make it one we must dislocate all its plates, which, in both Mr. MORGAN'S and my specimens, are in perfect conformity to each other, and would, if the body had not been crushed, have given us an oblong instead of a round figure, which, in some examples, is not at all incompatible with that of an Encrinus; yet nothing resembling either fingers or stem have been found near it. And I trust it will not be considered as a very improbable conjecture, if, for the present, we consider it as a link between the Encrini and Echini. Whatever it is, I think an account of it will be favourably received, and may be the means of exciting others to make further researches, until, by finding a perfect one, the enigma shall be explained. Judging from one side, the number of its separate plates alone cannot be less than one hundred and twenty, if it was pentagonal. The ambulacra a considerably greater number. And this accounts for the extreme dispersion of its parts, for some rocks are full of them. And as we know of many Encrinites and Pentacrinites, that are also made up of separate plates, there is no reason why this may not be one of them. The strongest objection appears to be, that we have never yet found spines adhering to Encrinites; but we have many that are covered by tubercles, which generally are

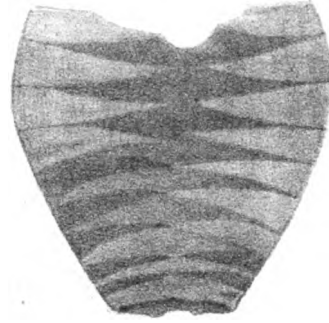
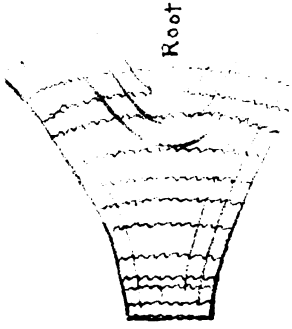
the basis of such appendages ; and as it is also rarely we find the epidermes fossilized in any of them, it is not improbable it might have been so armed, but from their minuteness and weak attachments they may have been dispersed. Microscopical examination of the surfaces of limestone fossils may yet disclose a great deal of information, as polishing has already done ; and I doubt not, so many eyes being now employed in these amusing researches, that we are on the eve of continual discoveries, hitherto unimagined.

Note.—Of this Tract only 150 copies are printed, and the Plates are cancelled.

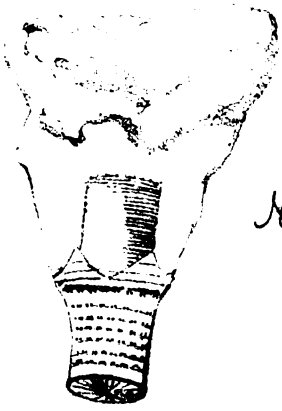
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[J. M. Gutch, Printer, 15, Small-street, Bristol.]

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N^o 5



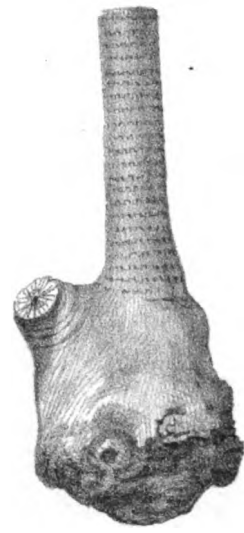
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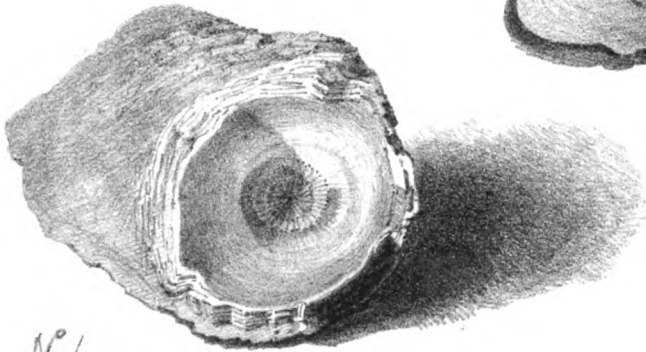
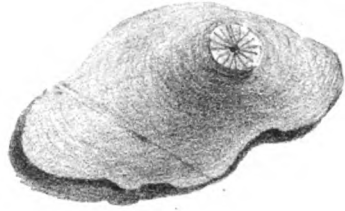


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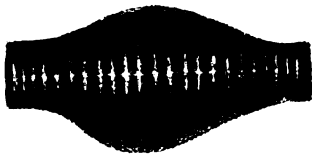


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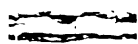
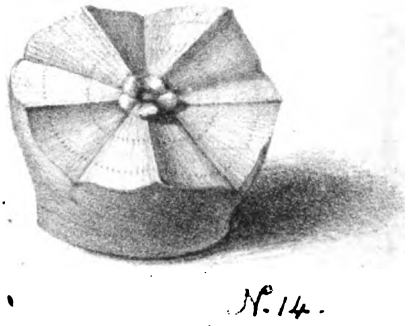
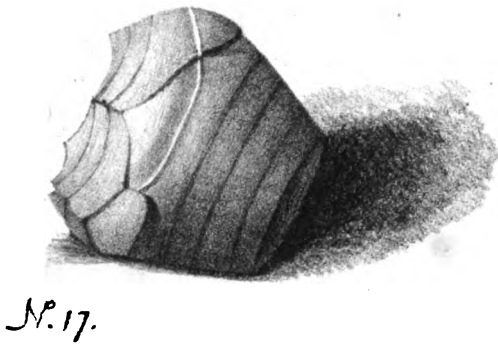
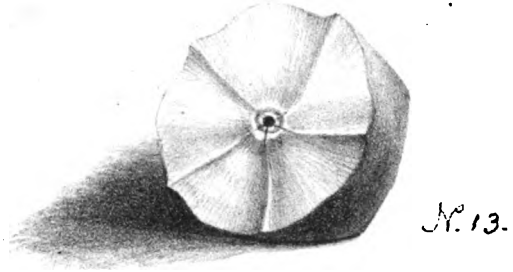
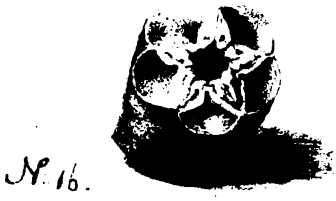
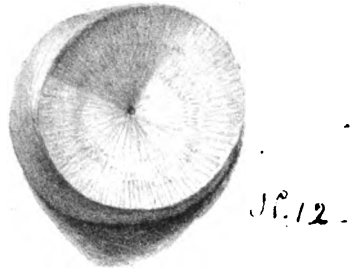
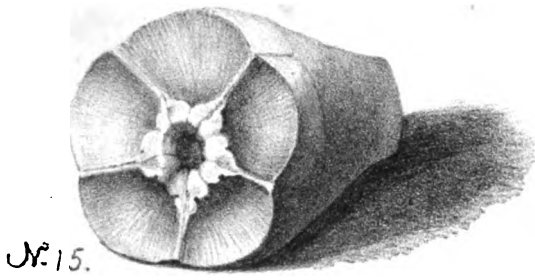
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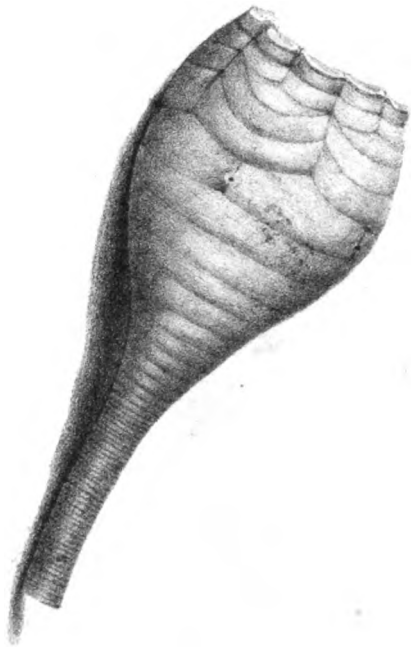


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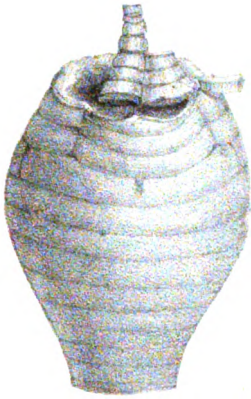




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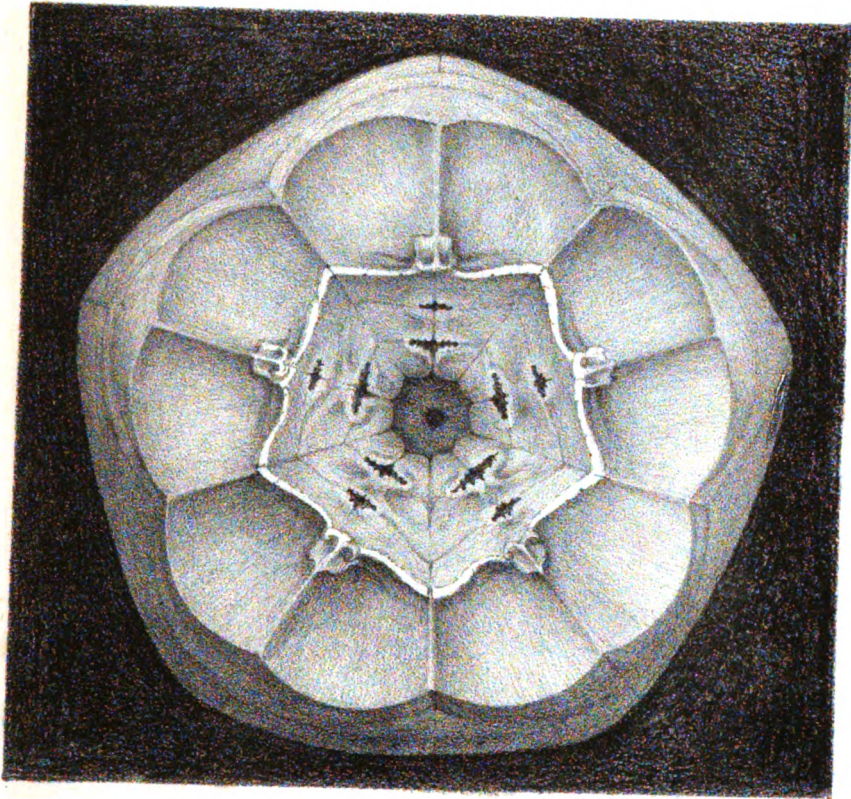
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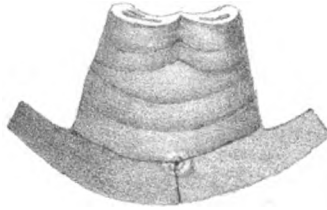


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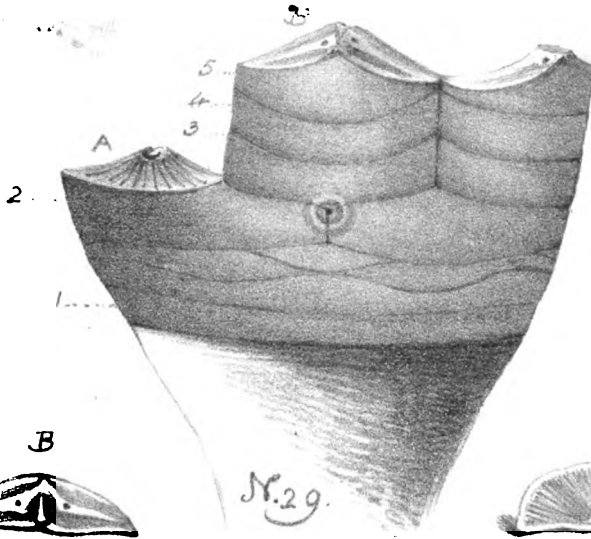
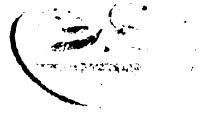




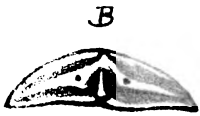
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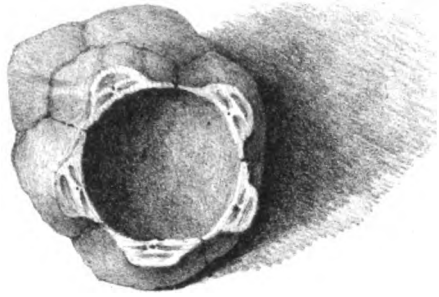
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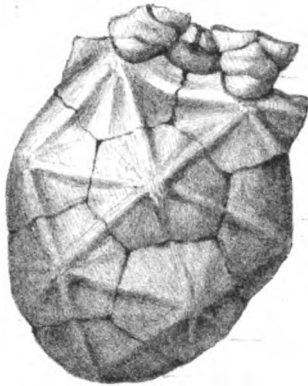
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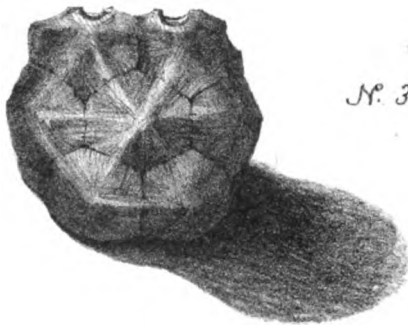


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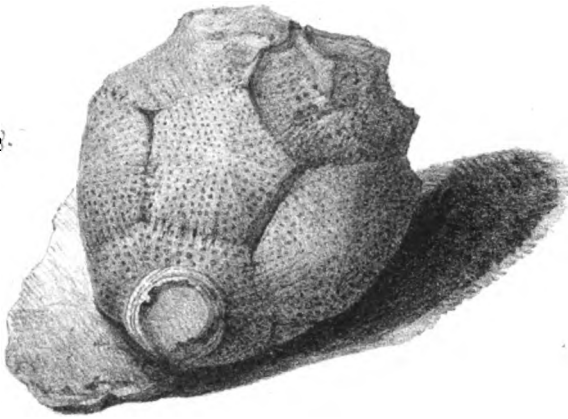
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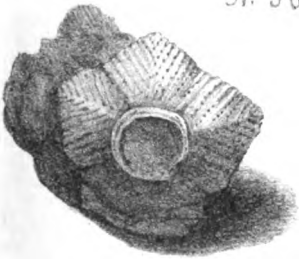
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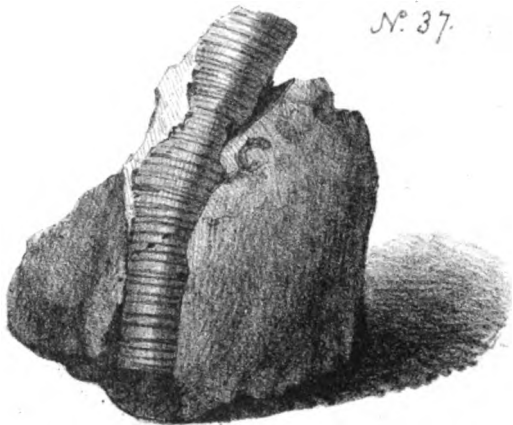
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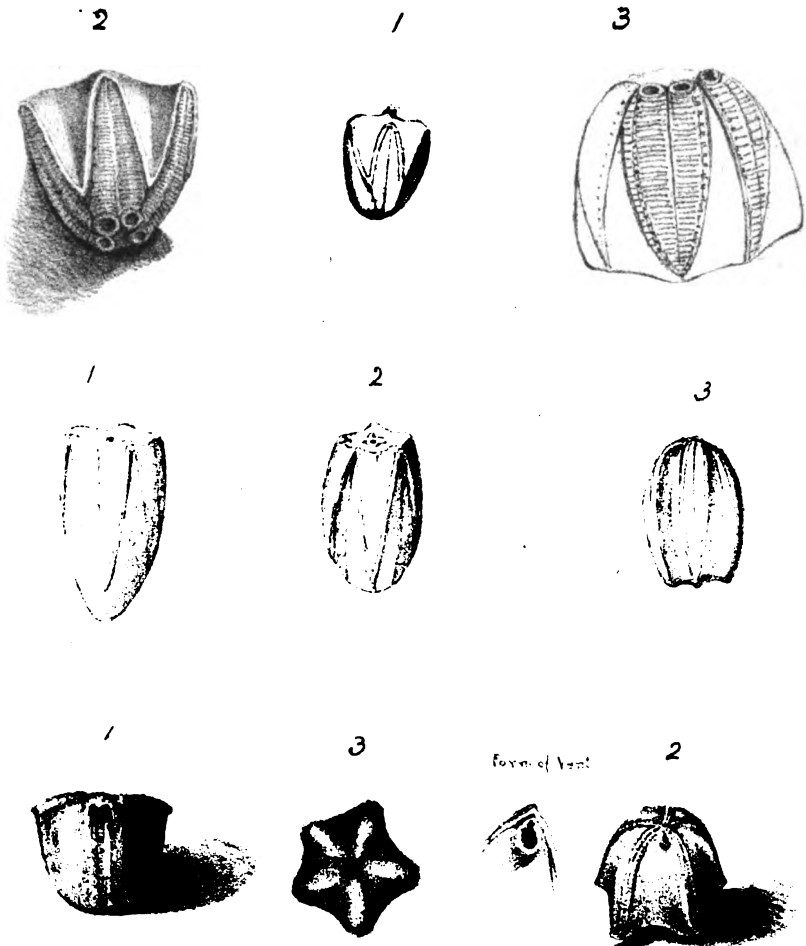
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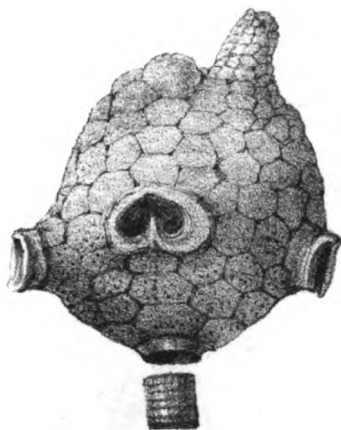
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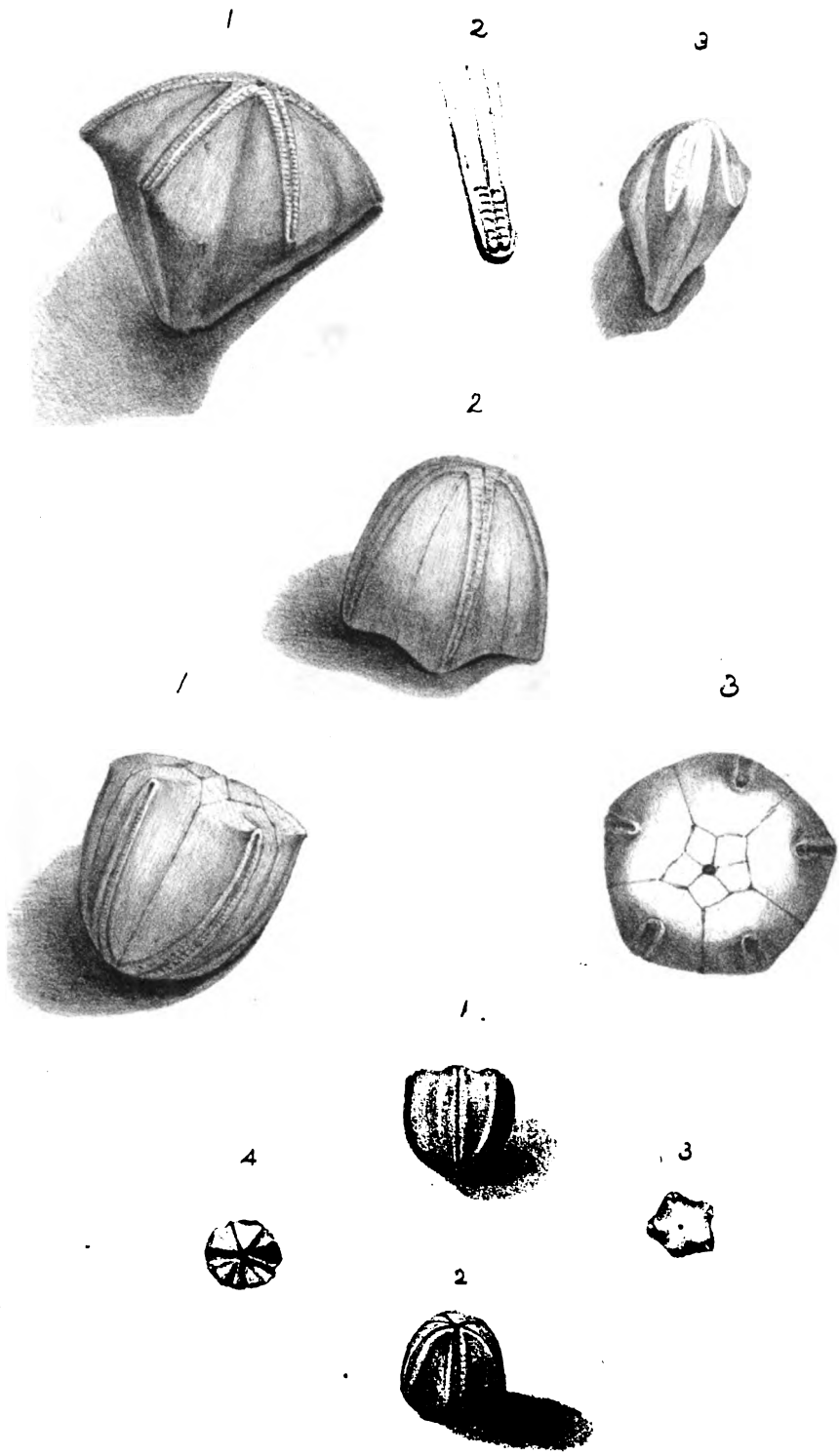


B. AMPHORA



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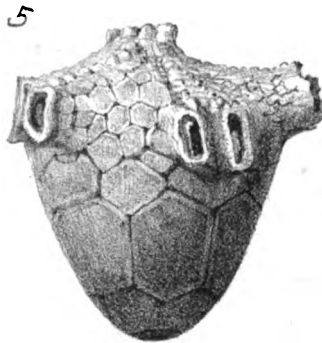
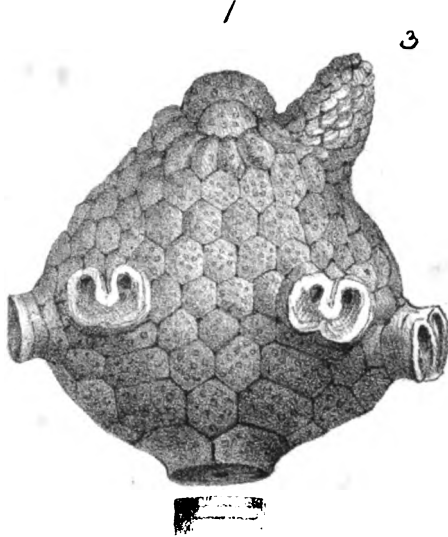
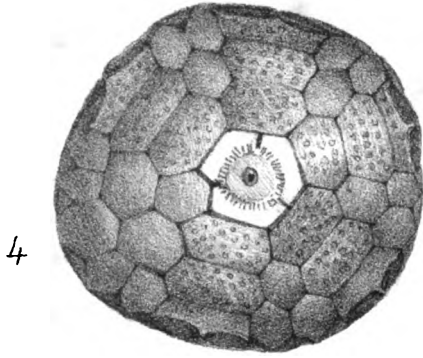
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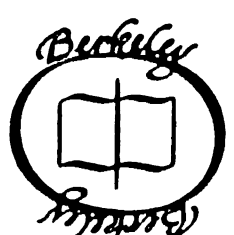
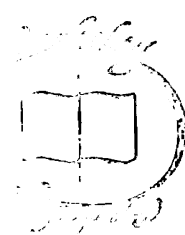
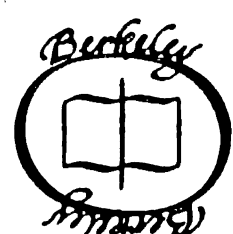
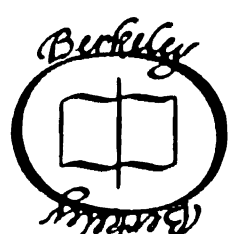
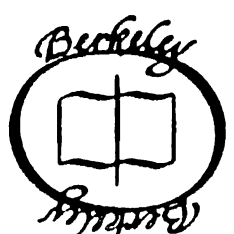
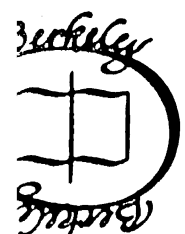
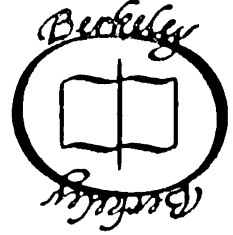
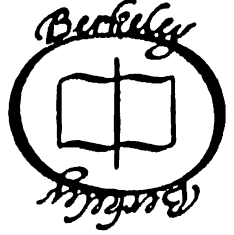
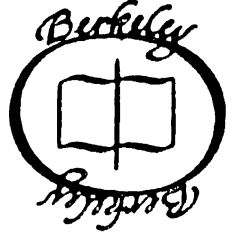
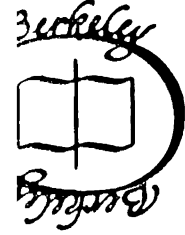
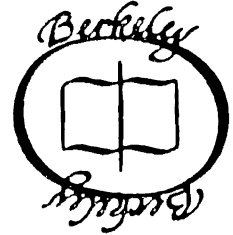
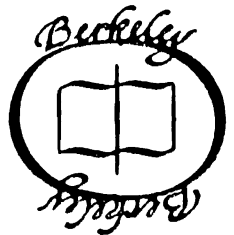
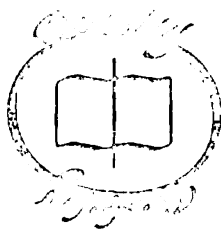
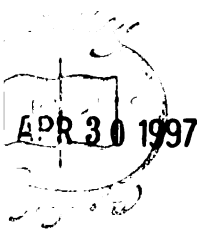
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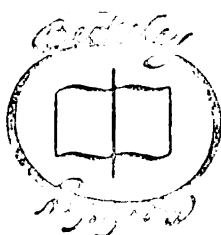


British Museum.

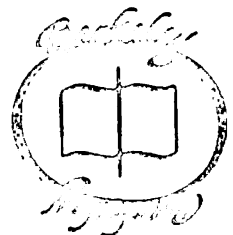
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