To Charles L. Walcott

Donation from Jules Harcourt

Purchased at the sale of Conybeare's
library in London in 1857 or 58.

Chas. Walcott
U.S. Geol. Survey
1888.

DESCRIPTIONS

A N D

FIGURES

O F

PETRIFACTIONS,

Found in the

Quarries, Gravel-Pits, &c.

Near B A T H.

COLLECTED and DRAWN

By *JOHN WALCOTT*, Esq.

Nor are those innumerable *petrifications*, so various in species, and structure, to be looked upon as vain curiosities. We find in our mountains, and even in the middle of stones, as it were embalmed, *animals, shells, corals*, which are not to be found alive in any part of Europe. These alone, were there no other reason, might put us upon looking back into antiquity, and considering the primitive form of the earth, its increase, and metamorphosis.

Of the Use of Curiosity. By *Christopher Gedner*.
Stillingfleet's Miscellaneous Tracts. p. 175. Ed. 2d.

Printed for the A U T H O R,

By *S. HAZARD, BATH*:

And sold by *J. MATTHEWS*, No. 18, *Strand*, LONDON;
FLETCHER at OXFORD; *FLETCHER and HODSON* at
CAMBRIDGE; *S. HAZARD*, BATH; and all the Book-
sellers in Great Britain and Ireland.

1777

27014 11.2.20

10.11.20

10.11.20

P R E F A C E.

THIS small volume contains descriptions, and Figures of some, of the many remains of animals lodged in stone; and found in almost every part of the environs of Bath, in so great abundance that every ploughed field produces a plenteous harvest of them. They are in my opinion undoubted natural proofs of the universal deluge, which is circumstantially described in the 6, 7, and 8, chapters of Genesis: nor does England alone possess these

proofs, it being no difficult task to bring witnesses, that they are to be met with in other parts of Europe, viz. Italy,* Germany,** Norway,† &c. nor are the other parts of the world without them, viz. Asia,‡ Africa,|| North¶ and South§ America.

In

* Sir W. Hamilton's observations on Mount Vesuvius, Mount Ætna, and other Volcanos. p. 116. Ed. 1774.

** Ray's Travels. Vol. I. p. 96. Woodward's Nat. Hist. of the Earth illustrated and enlarged. p. 21.

† Bishop Pontoppidan's Nat. Hist. of Norway. Vol. I. p. 54.

‡ Shaw's Travels. p. 344.

|| Hæffelquist's Voyages and Travels in the Levant. p. 95. Adanson's Voyage to Senegal. p. 270.

¶ Kalm's Travels through North America. Vol. I. p. 120.

§ Ulloa's Voyage to South America. Vol. II, p. 257.

DSI

In my possession are many imperfect specimens of shells, which are specifically different from those figured in this volume; this I hope will be an irresistible motive to encourage those who have taste and leisure to collect the works of their Creator, to make further researches: In this pursuit they cannot fail meeting with such new subjects, as will gratify their curiosity, and excite their admiration: for “in the instructive book of nature are many leaves, which, hitherto, no mortal has thoroughly perused.”*

STONES

* Preface to Bishop Pontoppidan's Nat. Hist. of Norway,

S T O N E S

Which represent the concave or interior form of bivalve shells, in which they were moulded when soft.

WOODWARD's* account of their formation is as follows. " That at the time of the deluge, while shells, sustained and upheld in the waters, floated, together with sand, and other the constituent matter of stone, flint, spar, and all other minerals, reduced to their primary particles, the dissolved matter of these, entering the shells, filled them up, so that they gave their own form, or figure, to the matter so received into them, and were as *Matrices* and *Moulds* to it : that of these shells, whether so filled or empty, sinking together with the matter of stone, clay, chalk, and all the rest that this terrestrial globe is composed of, are made those strata, of which
this

* Woodward's Nat. Hist. of the Earth illustrated and enlarged. p. 27.

this our earth consists: that the strata of mountains afterwards, being laid open by the force of rains, torrents and accidents which often happen in all parts, were broke up, and the shells contained in them, which lay uppermost, with some which lay deeper, were thrown out, and left exposed at the surface: that at length those shells, so laid open, thrown out, and exposed, were worn away,* or broke, but the matter enclosed in these shells, whether stone, flint, spar, or any other, of a constitution firm and solid, did still retain, and represent the *concave, or interior form* of those shells, in which it was moulded."

The figures are of the size of the subject they represent, unless where mention is made to the contrary.

F I G. I.

Roundish: depressed: surface unequal: margin, where perfect, slightly notched. *Free Stone.*

Found upon the plowed fields.

F I G.

* The shells are often destroyed in the strata in which they were lodged by water containing in it vitriol, or other like salt, which pervading the strata, it dissolves them. Woodward's Nat. Hist. of the Earth illustrated and enlarged. p. 29.

F I G. II.

One end pointed ; with a short beak on each side : the other end dilated : thickest near the pointed end, diminishes to the other end : surface unequal. *Free Stone.*

Found in a free stone-pit, near the Oxford road, about half a mile beyond the monument on Lansdown.

F I G. III.

Smooth : one end pointed, the other dilated : The shell remains on some parts, it is very thin, and of a yellowish color.

F I G. IV.

Oval : *a* shows where the beaks of the shell were. The surface is often covered with spar of a bright gold color. The shell in which it was moulded was marked with striæ parallel to the margin.

Found in the lime-stone quarries.

F I G. V.

Oval : smooth : beaks broad, hooked : formed in FIG. 16.

A

FIG.

Common upon the ploughed fields. The quarry men at Warley rocks,* who find it lodged in masses of stone, call it the *heart of the stone*.

F I G. VI.

Oval: smooth: beaks broad, hooked. *Free Stone*. Formed in some species of *Mya*† which are bivalve shells gaping at one end.

This is five inches long: and, its size excepted, varies little from FIG. 5.

Found with FIG. 2.

F I G. VII.

Nearly rhomboidal: at one of the angles are the beaks, which are hooked.

Length four inches.

Found upon the ploughed fields.

FIG.

* Three miles and a half east of BATH.

† Linn. Syst. Tom. I. Pars II, p. 1112. Ed. 13.

F I G. VIII.

Oval : thick : beaks are hooked, and meet : seven ridges from the beaks to the margin, they are crossed with small furrows. *Free Stone.*

Found upon the ploughed fields.

F I G. IX.

Oval : beaks distant, hooked : a strait ridge from the beaks to one side. *Free Stone.*

Found in a free-stone pit near Tog-Hill House.*

F I G. X.

Roundish : margin imperfect : beak conic, flat, strait : the shell in which it was moulded was marked with concentric furrows. *Free Stone.*

Found at Midford† on the right hand a little beyond the turnpike.

A 2

F I G.

* A Public House five miles from BATH on the Oxford road.

† A Village three miles from BATH on the Frome road.

F I G. XI.

Nearly rhomboidal: at one of the angles are the beaks, which are hooked, their points curved outward: striated from the beaks to the margin.
Free Stone.

Found with FIG. 9.

F I G. XII.

Oval: beaks-strait, long, conic: the left hand margin is continued up betwixt the beaks. *Free Stone.*

Found in a free-stone pit near the Oxford road about half a mile beyond the monument on Lansdown.

F I G. XIII.

Round: thick: beaks short, hooked. *Free Stone.*

Found with FIG. 9.

F I G. XIV.

Round: beaks small, hooked, their points curving outward. *Free Stone.*

Found in many places near BATH.

F I G. XV.

Triangular: beaks small, hooked, their points much curved outward. *Free Stone.*

Found with FIG. 14.

OBSERVATION.

So far as I have observed shells are never filled with stone different from that in which they are lodged.

M Y A.

A bivalve shell gaping at one end.

F I G. XVI.

Oval: marked with concentric *striae*: beaks not in the middle, short, hooked. The shell is destroyed

destroyed, but its place is supplied by spar:* it is filled with *Free Stone*.

This very much resembles the *Mya pictorum*.
 Lin: (a shell found in great plenty *recent* in the river Avon, which runs between the hills in the environs of BATH) excepting that the shell here figured is thicker in proportion to its breadth.

I am not acquainted with any names which I could with propriety give to any of the shells from FIG. 17. to FIG. 22. inclusive.

Valves

* This happens when *water* containing in it *vitriol*, or other-like *salts*, pervades any *strata*; it dissolves the shells lodged in such *strata* by little and little, carries their dissolved particles away with it, and leaves the *spaces*, before filled and possessed by those *shells*, empty; so where it happens, that the *water*, passing through, carries with it, besides such *salts*, particles of *spar*, or other *minerals*, it frequently lodges them in those *cavities*, and there leaves them till at last it fills them up. Wherever this happens, it always follows, as of necessity it must, that the matter of *spar*, or other *minerals* so formed, exhibits and represents the very *sizes*, and perfect *figures*, interior, and exterior, of the *shells* whose places it had filled. Woodward's Nat. Hist. of the Earth illustrated and enlarged. p. 30.

F I G. XVII.

Valves thick, round, marked with concentric furrows. The shell is destroyed, but its place is supplied by spar.

Petiver* has given a figure of a shell very like this: he names it *Pectunculus Americanus cordatus, fasciis crassiss.* He received it from Jamaica.

F I G. XVIII.

Oval: marked with concentric *striae*: beaks in the middle, small, hooked.

Found on the side of the road between Monkton-Farly† and Farly-Wick; among a surprising quantity of broken shells.

FIG. 19, 20, 21, and 22, agree in having shells of equal valves; one side truncated; and small ears on each side the beaks.

F I G.

* Vol. I. tab. 25. FIG. 9.

† About four miles east of BATH,

F I G. XIX.

Round, excepting the dexter side, which is truncated: marked with small furrows from the beaks to the margin.

Found at Midford on the right hand a little beyond the turnpike.

F I G. XX.

Shaped like the last: striated from the beaks to the margin: a few *striæ* parallel to the margin: some are of a light brown, others of a blackish color.

Found in the lime-stone quarries.

These are the shells mentioned in the tour thro' the whole island of Great Britain,* to be found about Twiverton,† in a field, called Marbury-field, with but little quantity of earth upon the rock; which was full of *fossil-shell*, which had preserved their natural color of blue and white as perfectly as at first.

F I G.

* Vol. II. p. 291.

† A Village about a mile and half from BATH on the lower Bristol road.

F I G XXI.

This is a full grown shell of the last, it differing only in size; being sometimes found eight inches and a half long.

Found with FIG. 20.

This is perhaps the large bivalve found by Woodward* "on the ploughed lands, in Weston fields, about a mile from BATH. There were, as usual in the sea, other lesser shells, seeming to be of *Balani*, affixed to it."

F I G. XXII.

Oblong oval: about one third of the shells smooth, the remainder ridged from the beaks to the margin.

MYTILUS.

I have named these three shells Mussels, from their resemblance in habit to some of the recent ones; as the principal character the hinge which distinguishes recent shells, cannot be seen in fossil shells.

B

FIG.

* Catalogue of fossils. Tom. II. p. 94. c. 1.

F I G. XXIII.

Oval: three very distant, concentric *striæ*.

F I G. XXIV.

Shells, oblong oval: thin: of a yellow color: marked with concentric *striæ*: from the widest part arises a projection which is extended to the beaks.

Found upon the ploughed fields.

F I G. XXV.

Long: rounded at each end: marked with *striæ* parallel to the margin; the back of the shells marked with short furrows.

Found at Lyncomb.*

A N O M I A.

Bivalves: with unequal valves, and never eared; the beak of the largest or under valve, is greatly produced, and rises or curves over the beak of the smaller
or

* A Village about half a mile south of BATH.

or upper valve ; and is perforated or pierced through like a tube.

F I G. XXV.*

Pundibs. Shells oval : smooth : of a chefnut color : common size little more than an inch in length.

The dimensions of two remarkable large ones is worth noting, one found at Hampton rocks is two inches in length, and two in breadth : the other found in a garden at Bathford (perhaps brought there with the gravel for the walks) it is two inches long and but one in breadth.

Found in great numbers upon the ploughed fields. A white variety is sometimes met with, lodged in free-stone.

F I G. XXVI.

Woodward's fossils, Tome. I. Part II. page 46. f. 215. 216.

Differs from FIG: 25.* the end opposite the hinge being truncated.

Scarce. Woodward found them at Tog-Hill, and I have met with one or two nearer BATH.

B 2

F I G.

F I G. XXVII.

Shells smooth: of a chefnut color: margin with five folds.

Common upon the ploughed fields: recent upon the coast of Norway.

F I G. XXVIII.

Shells striated both their length and breadth: margin with three folds.

Found amongst the rubble under the turf upon Hampton-down, and lodged in free-stone with FIG. 25* and 30 upon King's-down.

F I G. XXIX.

Upper valve convex: lower valve nearly flat: beak very small: Shells striated from the hinge to the edges.

F I G. XXX.

Woodward's fossils. Tome I. Part II. p. 50. f. 366, 367, 368.

High waved cockle. Shells with many ribs from the hinge to the edges: beak pointed: margin with a high wave.

Common upon the ploughed fields.

F I G. XXXI.

Ribs smaller and more numerous than in the last: the edge of the ribs is armed with rows of short spines.

Found without the spines upon the ploughed fields, with the spines when lodged in free-stone.

F I G. XXXII.

Shells oval: ribed from the hinge to the edges: margin even: beak imperfect.

Found upon King's-down.

The living *Anomia* have all been found lurking in the nooks between the branchings of corals, or cavities of rocks. They lie therein lifted upon their flat surfaces, or horizontally, without any prop or solid body to rest on; but are upheld or sustained only by a strong adhesion of their tubes or perforated beaks to the sides of the cavities, as if in the action of sucking; and

and this position is the general one of the recent kinds.

The recent *Anomia* have always a remarkable interior structure:* as have the two fossil ones FIG. 25* and 33, the former, though found near BATH, filled with a hard clay or with free-stone; is found in Hornton quarry, Oxfordshire, filled with spar; sometimes shot into irregular figures, but for the most part forked; the basis, or place where the branches of the fork are conjoined, being rooted at the commissure or hinge of the valves, and the branches extending themselves in the broader parts of the shells.†

F I G. XXXIII.

Shells with many longitudinal folds, the middle the largest: hinge on a perfect strait line: beak of the lower valve does not curve over the upper.

The

* Da Costa's Elements of Conchology. p. 258.

† Plot's Nat. Hist. of Oxfordshire. p. 103.

The shell here figured was found in a lime-stone quarry at Camerton, about six miles and a half from BATH on the road to Wells: those found in lime-stone quarries on the upper Bristol road near BATH, are smaller; their shell thin; white; a triangular hole between the beak of the lower valve, and the hinge: and have the body.

FIG. 33. A. B. within them; it consists of two hollow cones joined to each other by part of their base and to one of the valves, but not so close as to prevent the animal, or part of it from retreating into them: the surface of them are beautifully covered with circular rows of small pyramids of spar.

F I G. —

Shells two inches broad, and near two inches long: striated from the beaks to the edges: a high wave in the middle of the margin: beak of the lower valve does not curve over the upper, but is divided from it by a strait broad furrow: hinge strait.

I have given no figure of this shell, as I am not certain it was found near BATH.

It is figured in Plot's Nat. Hist. of Staffordshire. Tab. xi. FIG. 17. to one valve of this shell I imagine, (or of FIG. 15, 16, of the same plate, which is somewhat of this kind, and always found with its valves apart,) was fixed FIG. 13. Tab. XIII. of the same work : my reasons are its being found at the same place, viz. at Bereford in Staffordshire ; and the latter FIG. agreeing very near in shape to FIG. 33. A. B. of this work. Plot having with deference to his readers described a stone, as the stone of an almond, to which it did not in all respects agree ; thus writes* of FIG. 13. of Tab. xiii. " And I must beg the same license for another of this kind, (stones formed like the fruits of trees) though one of the greatest curiosities of this nature I ever met with, for notwithstanding it represents in general the true shape of the bicapsular seed vessel of *Digitalis ferruginea*, or of some of the *Verbascums*, having that patulous fissure at the top, which the seed-vessel of that plant naturally has when it is ripe ; yet in the most protuberent part near the bottom, it is perforated with a small hole, round which there are several *striae* or lineations bent (not equidistant) but accord-

ing .

* Page 196 of the Nat. Hist. of Staffordshire.

ing as the form of the stone does permit, which indeed are not found in the seed vessels of that plant, but in all other matters it truly resembles them, both in shape and magnitude."

F I G. XXXIV.

Woodward's fossils. Tome I. Part II. p. 44. f. 192.*

Crow-stones.* Upper valve flattish: lower concave, the beak of which is much hooked over the upper valve: shells thick, formed of several imbricated plates: the beak is not perforated.

Da Costa† says this shell is by all its characters a true oyster. Linnæus‡ places it in his 314 genus, he calls it *Anomia Gryphus*.

The Scotch call this shell *Clach Crubain*; value it as an amulet, and attribute to it the virtue of curing all pains in the joints.§

C OSTREA.

* Merret's pinax rerum Natur. Brit. p. 216.

† Elements of conchology. p. 254.

‡ Linnæus's systema naturæ. p. 1151. Vol. I.

§ Pennant's tour to the Hebrides. p. 232.

OSTREA.

Bivalves; with unequal valves; viz. one flat, the other concave.

* *Without ears. Oyster.*

F I G. XXXV.

A. B. Crooked near the hinge, then dilated; lower valve with several ridges parallel to the margin.

Found in clay banks on the sides of hills: commonly with their valves apart.

F I G. XXXVI.

A. B. Round: lower valve very concave; formed of one or two imbricated plates.

Found with FIG. 35.

Mr. Jos. Glanville, in an account of the Baths in Somersetshire, says, it is affirmed here, (in the city of BATH) that the town for the most part is built upon a quagmire, though the places all about it are very firm ground. Some workmen, that have been employed in digging, have

have found a mire ten feet deep, without the north gate, the highest place of the town, at seven. The earth between is a kind of rubbish; sometimes they find pitching a man's length under ground, and passages for the water to pass; seven or eight feet down they have met with *Oyster-shells*.*

** *With ears. Scallop.*

F I G. XXXVII.

A. B. Upper valve with five rows of small erect scales, from the hinge to the margin: Lower valve marked with fine concentric *striae*.

Found in clay on the side of the road leading from Claverton-down to a village of that name. Single valves are also met with lodged in stone at the quarries near Kings-down.

F I G. XXXVIII.

Valves equal; with about twenty sharp ribs radiated from the hinge to the edges.

C 3

I am

* Philosophical transactions abridged by Lowthorp. Vol. II. p. 336.

I am aware that this shell contradicts the character I have given of the genus; the hinge is the essential character of the recent shells of the oyster and scallop; but as the hinge cannot be always seen in fossil ones, it is placed here from its agreeing in habit with some recent species of scallops which have equal valves.

F I G. XXXIX.

A single flat valve, marked with a few concentric *striae*: ears equal.

Found in a slaty loom at the lime-stone quarry near the Crescent.

AMMONIA.

AMMONIA.

Univalves, whose inside are divided into many regular and nearly equidistant cells or chambers, the partitions of which are not roundish and with an even edge, as those of the Orthoceros and Nautilus; but are flashed, or jagged, into processes or appendages, which laid together tally and close into one another so strongly and curiously, that, when joined, the flats or surface of the whole Cornua Ammonis are embellished with a beautiful leaved work, exactly similar to that on the skulls of animals: and this by fossilogists is called the foliaceous sutures of the Ammonites. The cells have a pipe or siphunculus, that opens into, and communicates from chamber to chamber,*

The spires are cylindric, and connected to each other: they gradually diminish or taper (on both levels equally alike) from the circumference to the center; so that by the gradual tapering of the spires to the center, the centers of both flats are concave.†

* *With*

* The name originates from their resemblance to the ram's horns wherewith the antients represent Jupiter Ammon: whose celebrated temple was situated in the burning sands of Libya.

† Da Costa's elements of conchology, p. 154, &c.

* *With a plain prominent ridge on the back between two furrows.*

F I G. XL.

Camden's Britannia. by Gibson. Vol. I. p. 93. 1722.

Woodward's Fossils. Tome I. part II. p. 28. d. 74.* 82.

Owen's observations on the earths, &c. about Bristol. p. 192.

Snake-stone. With large transverse ribs, whose ends bend towards the mouth of the shell: the volutions are marked in some places with a foliage like the sinuated edge of the leaves of some plants: varies in size. viz. from five inches and under, to two feet and an inch in diameter; and eight inches thick: shell very thin of the color of mother of pearl. B. a section.

Found in the lime-stone quarries near BATH and at Keynsham† a Village seven miles from BATH on the road to Bristol. So far as I have observed the flats of this shell lay parallel, and conformable

† Formerly the credulous inhabitants of this Village believed these Snake-stones to have been real serpents, changed into stone by one Keina, a devout British virgin,

conformable to the surface of the stratum in which they are enclosed.

The recent shell has not yet been discovered, one reason given for their not having been found is, that they are bred in the inmost and deepest parts of the sea; where they have their abode, and never of themselves come near the shores, nor are flung out of their native seats, even by the violence of tides, or storms. Most of those shells which are cast upon the shores, by tides, or storms, are such as were bred not far off, and among the shallows and flats. The disturbances given by tides, or tempests, never reach the inner and deeper recesses of the ocean.* It is therefore less to be wondered at, if the shells produced in those places, and there residing, are seldom found cast upon the shores.†

FIG.

from whom they likewise denominated the name of the place.

A tour thro' the whole island of Great Britain. By a Gentleman. Vol. II. p. 291.

* Boyle's works epitomized. Vol. I. p. 271. octavo, 1699.

† Woodward's Nat. Hist. of the earth illustrated and enlarged: as also defended. p. 12. octavo. 1726.

F I G XLI.

The outward volution for half its breadth next the back is transversely ribbed, their ends bending towards the mouth of the shell: the inner volutions, and the outward one for half its breadth next them, are smooth: diameter near two inches: shell thin of a brown color.

*** With a plain furrow or channel along the back.*

F I G. XLII.

Volutions transversely ribbed: those of the outward volution alternately simple; the intermediate ones for half their length simple, then bifid.

Found at Midford.

**** Whose backs are ribbed.*

F I G. XLIII.

Volutions transversely ribbed: those of the outward volution at first simple, then bifid; pass the back and unite again before they reach the inner volution.

This

This is of free-stone : it is small when compared with one I have, which I am informed came from the island of Portland ; it is near thirteen inches in diameter, and near five inches thick.

NAUTILI.

Univalves ; whose inside are divided into many regular and nearly equidistant cells or chambers, the partitions of which are roundish and with an even edge: in the center of the spires is a pipe or siphunculus, that opens into, and communicates from chamber to chamber. The spires never appear externally, but lie latent or quite hidden within the body of the shells.

F I G. XLIV.

Round : smooth : a round mark in the center of each side. *Free Stone.*

F I G. XLIV.*

Oval : nine inches long ; seven and a half broad ; near five thick. *Lime Stone* : also of *Free Stone*. B. a section.

D

Found

Found frequently in the lime-stone quarries where the workmen call them *Lobster Tails*; they are also met with in free-stone pits.

They were moulded in the common thick Nautilus which is found recent in the Archipelago, and in the Eastern seas: this proves the vast distance to which creatures were carried, from the place of their original residence, at the time of the universal deluge.

BELEMNITES.

Strait; one end pointed; at the other a conic cavity; which is divided into many chambers or cells with a siphunculus upon the verge of the partition of each cell: When broken (FIG. A.) appears to be composed of horizontal fibres, radiated from the center to the circumference.

FIG. XLV.

Thunder-bolt. Two inches and a half in length: it terminates at one end in a blunt point, from whence it gradually swells to about one third of its length, where it is near three eighths of an inch in diameter; thence gradually lessening to near one fourth of an inch in diame-

ter; where there is a conic hollow three eights of an inch deep.

FIG. B. Is part of a *Belemnite* lodged in free-stone. The conic cavity was filled with the same stone, which is divided into many round joints FIG. *b.* that are at one side concave; the other convex.

The following attempt to account for the origin and the formation of the extraneous fossil commonly called the *Belemnite*, is taken from the Philosophical transactions Vol. LIV. being part of a paper by Mr. Joshua Plott.

“ The *Belemnite* belongs to the testaceous part of the animal kingdom, and to the family of the *Nautili*. The siphunculus is always upon the verge of the chamber, or cell; and in the siphunculus is a little gut or ductus, proceeding from the body of the animal, by dilating or contracting of which the animal, it should seem, may go out or into its cell at pleasure. This is the only stay, which the animal has to secure its retreat: nor does the gut or ductus pass through all the cells to the end of the spiral cone, either in this shell or the *Nautilus*: For the ends of the spiral cone of concamerated shells are shut up in the
same

same manner with those of the turbinated kind : and it is common for all turbinated shell-fish, as they increase in bulk, and enlarge their shells, to leave their bottom or first formed convolutions. Therefore I make no doubt but the same is done by the concamerated tribe ; for if the gut go through only one or two valves, it will be a sufficient stay to the animal, and being contracted or dilated, will serve all the purposes above mentioned. How far this is practicable by our little inhabitant, cannot absolutely be determined ; but if it be constantly fixed by the gut to the siphunculus, it has a surprising power of contracting and dilating its body, to extend so far as the bottom or point of the *Belemnite*, which is more than thirty times the length of the cell, into which it returns. I am apt to think, this gut or ductus, as well as the body of the creature, is capable of being extended very considerably, to serve all the uses of forming the *Belemnite*, without leaving the siphunculus ; and that the gut serves for the same purposes with the tendons of the oyster ; the latter to open and shut the shell ; the former to allow the animal to go out and in at pleasure. And as the oyster feeds altogether in the shell, by opening the verge, the *Belemnite* (whose residence is in the great deep, which is seldom disturbed)

very

very likely goes out in quest of food, but travels only upon the guard, or rampart, leaving a trail behind, as all land snails do; which hardening into a testaceous substance, increases the dimensions of the outer wall, both in length and thickness, from the cell or chamber, to the bottom or point of the whole *Belemnite*. The animal in its progress and return clasps the whole guard, as a snail does a small branch of a tree in the gardens; and where the two sides meet, there the fulcus is formed, as is evident from the laminæ.

FIG. C. represents the *Belemnite* split up the middle, with the siphunculus in the front: *a, b*. exhibit the first formed cell, or seat of the animal ab ovo. As the animal grows larger, it forms a second cell or chamber *b* to *c*, at the same time covers the first cell, by forming the appendage or guard *c, i*, which is the first stage of the *Belemnite*. In forming the third cell *c, d*, fresh laminæ or coverings are carried on from *d*, to *k*, and so of the rest, *e, f, g, h*; or *l, m, n, o*. The conical cavity and its nucleus are always proportioned to the bulk of the *Belemnite*, but not to its length: some are four times longer in proportion to the alveolus than others; the apex of the conical cavity,
where

where the alveolus is first formed, in some runs up about half the length of the whole *Belemnite*, in others not the sixth part of the whole: but the aperture, or upper chamber is equally proportionable to the bulk, or circumference of the *Belemnite*, of whatever size or shape; and is the seat or dwelling place of the animal, that forms the *Belemnite*.

FIG. D. Shews the *Belemnite* in the most perfect state we ever find it.

FIG. E. Is the fusiform *Belemnite* found in chalk, and the pricked lines. *b, c. b, c.* show what the fusiform *Belemnite* was, when perfect, with the alveolus *d, e*,——*a* shews where the alveolus terminates."

FIG. F. Is part of a *Belemnite* with the *Angular Serpula*. *Serpula Triquetra*, *Lin.* adhering to it: marine bodies attached to the *Belemnite* clearly prove it to be of marine production.

It was found near Lansdown in the lane leading from the down to Langridge, Wolley, &c.

FIG. 45. and B. Were found in a free-stone pit near the Oxford road, about half a mile beyond the monument on Lansdown.

The

The *Belemnite* receives its English name *Thunder-bolt*, from the vulgar, who suppose it to be indeed the darts of heaven. The *Belemnite* if rubbed will take up chaff, and other light bodies like amber. Burnt or scraped with a knife, they yield an odour like rasped horn. After calcination, has all the properties of the *Bolognian Stone*, which, if exposed a few minutes to the sun, and immediately taken into a dark room, will shine like *Phosphorus* for some time; and when the light diminishes, if again exposed to the sun, its splendor will be renewed.

STONES.

Which represent the interior form of univalve shells; in which they were moulded when soft.

F I G. XLVI.

Of a cylindric form rounded at one end, at the other four spires. *Free Stone.*

FIG. 47. Is a recent shell of the same genus with the shell in which this stone was formed.

FIG.

F I G. XLVIII.

Volutions three, their sides roundish.

Formed in a trochus or top shell. The shell (as may be seen by an impression taken in the hollow made by the shell which is destroyed) had the ridges of the spires rising into blunt distinct tubercles, with intermediate *striae*.

Found in a lime-stone quarry.

F I G XLIX.

Volutions four, their sides flat.

This was formed in a trochus with a perforated base: the shell was striated, parallel with the volutions.

Found in a free-stone quarry.

F I G. L.

Somewhat depressed: three inches in diameter: volutions four, their sides flatish: base perforated.

Found in a free-stone quarry.

F I G.

F I G. LI.

Volutions four, not joined to each other.
Free Stone.

F I G. LII.

Number of volutions uncertain, all I have met with being imperfect: spires marked with several small ridges: largest volution an inch and half broad. *Free Stone.*

F I G. LIII.

Oval: volutions four, smooth.

The figure is something larger than the fossil.
Free Stone.

F I G. LIV.

Taper: five volutions, which are distant from each other. From FIG. 48. to FIG. 54. inclusive are called by the quarry-men *Screws.*

Found in a free-stone quarry.

F I G. LV.

Depressed : volutions two, round, distant from each other. *Free Stone*

F I G. LVI.

Depressed : volutions three, a sharp ridge runs in the center of the upper surface of the volutions. *Lime Stone.*

S E R P U L A.

Tubular shell adhering to other shells.

F I G. XLV. F.

Angular Serpula. A triangular shell : irregularly twisted.

Adheres to (in a creeping form) part of a *Belemnite* and frequently to FIG. 27. In a recent state adheres to stones and other substances upon the coast of Great Britain.

ECHINUS

MADREPORA.

Coral, with cavities lamelloso-stellated.

F I G. LXII.

Porpita. Button-stone. Round: one side flat, the other convex: finely striated from the center to the circumference. The *striae* are caused by the edges of the thin perpendicular plates of which this coral consists, and which are radiated from the center to the circumference.

E. a variety of a conoid shape: there is another variety both sides of which are nearly flat.

Found in the gravel-pits: and upon the ploughed fields.

F I G. LXIII.

The surface elegantly marked with quinquangular cells, which are formed by perpendicular thin plates, radiated from the center of each cell to their edges which are a little prominent: the lower part is of a conoid shape marked with fine circular *striae*.

Found beneath the turf upon Hampton-down.

Mr.

Mr. Pennant has given a figure and description of this *Coral* in the Philosophical Transactions for 1756. Vol. 49. Tab. 15. FIG. 5. p. 514. He received it from Italy, under the name of *lapis subluteus Veronensis stellis majoribus*.

B O N E S, &c.

F I G. LXIV.

At one end are two vertebræ, three inches in diameter, and a little more than an inch thick: one of them has slid a little from beneath the other.

At the other end is a bone an inch and a half thick, and four inches broad at bottom: the upper end is round and about three inches in diameter.

Found in a lime-stone quarry near the Crescent.

F I G. LXV.

Six inches long: triangular: the two broadest sides are flat, and fluted: the other side is roundish, smooth, except near the top, where there are a few tubercles.

FIG.

ECHINUS.

Shell hemispherical, or nearly so.

F I G. LVI.*

Five double rays (each composed of two lines of very small holes) proceeding from the center of the top of the shell, to the aperture in the middle of the base; between the rays there are many very small tubercles. One inch in diameter.

Found upon the ploughed fields, in the gravel pits, &c.

This is perhaps the *Echinite* valued as an *Amulet* which Mr. E. Lhwyd mentions in his observations in natural history, &c. in Scotland.*

“ *The Cock-knee stone* is an *Echinites pileatus*, minor of flint; which they firmly believe to be sometimes found in the knees of old cocks; and a fellow in Mul protested to me, (though I was never the nearer believing him) that he had with his own hands taken one of them out of a cock's knee;

E 2

and

* Philosophical transactions abridged by Jones. Vol. V. p. 123.

and named two or three others who had done the like."

F I G. LVII.

With many rows of small equal-sized tubercles, proceeding from the center of the top of the shell to a large aperture in the middle of the base.

Found in a free-stone pit near Tog-hill house.

F I G. LVIII.

Half the shell is lodged in free-stone; the other half has four nearly equal distant rows of round tubercles, with several smaller between them: in the center of the top of the shell is a large aperture: the bottom of the shell is covered with the stone: the sides are round.

Found near Mr. Keynton's house in the bank of the road leading from BATH to Claverton-down.

F I G. LIX.

Woodward's fossils Tome I. part II. p. 67. h. 58.

Five double rays (each composed of two rows of very small holes) proceeding from the center of the top of the shell, to a small aperture in the base: near the center of the top of the shell is a small aperture, from which to the margin there is a broad channel: the base is a little concave; the aperture in it is not in the center.

Not uncommon upon the ploughed fields near the brow of the hills; and in the gravel and stone-pits.

ASTERIA COLUMNARIS.

F I G. LX. A

Starstone. Cylindrical, but pentangular, often crooked; a cinquefoil at each end, composed of very short transverse ridges: it consists of several joints: a piece of fourteen joints is exactly an inch long. Single joints are sometimes found.

Pieces about an inch long are not uncommon in the lime-stone quarries near the upper Bristol road.

The animal to which this belongs is found recent on the coast of Barbadoes: Mr. Ellis has
given

given a figure and description of it in the Philosophical Transactions for 1761, p. 357. He names it

Encrinus, Capite stellato, ramofo-dichotomo ;

Stipite pentagono, equisetiformi.

ENTROCHUS.

FIG LXI.

A conoid body of seven joints. B. C. two views of one of the joints, except a small breadth from the edge, which is flat, both sides are concave, which makes the edge of the hole in the center very thin.

D. *St. Guthbert's beads*. A small single joint : thin : round : the utmost round smooth : a round hole in the center, from which to the circumference are drawn small rays : when two joints are joined together the rays of one enter into the furrows of the other.

Found in the pits from whence they dig stone to make the new road leading from King's-down to Bradford, &c.

MADREPORA.

F I G. LXVI.

Part of the under jaw of some quadruped: *a*, *b*. two cutting teeth; they are round where lodged in their sockets, compressed towards the top. *c*, a canine tooth pointed and sharp-edged at top; it has two fangs: *d*, *e*, *f*; three grinders, their tops rising into conic projections: *d* has two fangs: *e* five: those of *f* are broke off, and the tooth is sunk into the jaw. At* part of the jaw is broke off, and the teeth that were lodged in it are lost, all the teeth are figured out of their sockets: *g* a tooth belonging to the same animal. *h* a bone found near the jaw, and probably belonging to the same animal.

Found at Midford on the right hand a little beyond the turnpike, lodged in loam about four feet deep.

F I G. LXVII.

A single tooth: the top is divided into four conic parts: several very fine ridges from their points to the base: it is quite black: the tooth is imperfect.

Found in a lime-stone quarry; in a piece of which stone it is lodged.

F

F I G.

F I G. LXVIII.

Consists of several oblong black bodies; in the middle of each runs a very small ridge; from which to their margin are numerous, very small ridges: five of the largest of these bodies are in a row at bottom; two of which next each other are smooth in their middle: above these are six smaller placed in a row, one of them has its middle smooth, it is directly above those two in the bottom row whose middle is smooth: above these two lower rows is a row consisting of three of these bodies of a rhomboidal shape. On the other side of this mass (which is not in its thickest part above an inch) are three more of these bodies; two of them are even with the bottom row on the opposite side; they appear to have slid: one of them, (which is nearest those on the other side) has its middle smooth: the third on the same side is even with the second row on the opposite side: these bodies lay length ways of each other, and quite close: and are joined in a mass by a very hard bone.

This was found (as I am informed) in a limestone quarry near the Bristol road, about six miles from BATH: at the same place was found
another

another mass* consisting of 25 of these oblong bodies placed in four rows. The mass here figured had another row, as appears from part of one of these bodies which remains fixed at the bottom.

The quarry-men call them *Leeches*. Woodward† supposes them to be the palates of some fish, and that the smooth part of them was worn by long use in grinding and breaking of shells.

* Now in Sir Ashton Lever's Museum.

† Catalogue of fossils, Tom. I. part II. p. 85. n. 100.

N O T E.

FIG. xxxiv. p. 25. is found in great numbers in the Lime-stone quarries.

F I N I S.

16

17

18

19

20

A

35

B

A

36

B

A

37

B

38

39

*

44

I N D E X.

A		Bones, &c.	48
Amber	39	Boyles works	31
Ammonia	29	Bradford	46
Ammonites	29	Bristol road to	30
Amulet	25. 43	Button-stone	47
Angular Serpula	38		
Anomia	18	C	
—— Gryphus	25	Camden's Britannia	30
Anomiæ living	21	Camerton	23
Archeipelago	34	Clach crubain what	25
Afteria Columnaris	45	Claverton-down	27
Avon river	14	Cock-knee stone	45
		Cockle high-waved	21
B		Conchology elements	
Balani	17	of	22
Barbadoes coast of	45	Coral	47
BATH city of	26	Cornua Ammonis	29
Bathford	19	Crow-stones	25
Belemnites	34	Crescent	28. 48
Beresford	24	Cuthbert's beads St.	46
Bolognian stone	39		

ii. I N D E X.

D		Hebrides tour to the	25
Da Costa	25	Horn rasped	39
Deluge universal	34	Hornton quarry	22
Digitalis ferruginea	24	I	
Down Claverton	27	Jamaica	15
———Hampton	20	Italy	48
———King's	20	Jupiter Ammon	29
E		K	
Eastern seas	34	Keina a British vir-	
Echinus	43	gin	30
Ellis Mr.	45	Keynsham	30
Encrinus	46	Keynton's Mr.	44
Entrochus	46	King's-down	27
F		L	
Farley Monkton	15	Lansdown	9
———Wick	15	Lansdown monu-	
Frome road to	11	ment on	9
G		Langridge	38
Glanville Mr. Jos.	26	Leeches	51
Great Britain	16	Lhwyd Mr. E.	43
———coast of	42	Libya	29
H		Lime-stone quarry	9
Hampton-down	20	Linnæus	25
———rocks	19	Lobster's-tails	34
Heart of stone	10	Lyncomb	18

M		Oyster	26
Madrepora	47	----- shells	27
Marlbury field	16		
Merret's Pinax	25	P	
Midford	11	Pearl mother of	30
Monkton-Farley	15	Pectunculus Ameri-	
Mother of pearl	30	canus	15
Mul	48	Pennant Mr.	48
Mussels	17	Petiver	15
Mya	10. 13. 14	Philosophical Trans-	
----- Pictorum	14	actions	27
Mytilus	17	Phosphorus	39
		Plot	24
		--- Mr. Joshua	35
N		Porpite	47
Nautili	33	Portland island of	33
Nautilus	29. 33	Pundibs	19
----- Common			
thick	34		
Norway coast of	20	Q	
		Quarry-men	10. 41. 51
O			
Orthoferos	29	S	
Ostrea	26	Scallop	27
Owen's observation		Scotland Nat. Hist.	43
on the earth, &c.		Screws	41
about Bristol	30	Serpents	30
Oxford road	11	Serpula Angu-	
-----shire Nat.		lar	38. 42.
Hist. of	22	----- Triquetra	38

iv. INDEX.

Snake	30	Top-shell	40
— stone	30	Trochus	40
Somerfetshire	26	Twiverton	16
Spar of bright gold			
color	9	V	
Staffordshire Nat.		Verbasiums	24
Hift. of	24	Vitriol	8. 14
Star-stone	45		
Stones formed in		W	
bivalve-shells	7	Warley rocks	10
Univalve shells	39	Wells road	23
		Weston fields	17
T		Woodward	7
Thunderbolt	34. 39	Wooley	38
Toghill-house	11