

XI. *A Letter from Mr. Emanuel da Costa F. R. S. to the President, concerning two beautiful Echinites.*

S I R,

Read May 11. 1749. I HAVE the Honour of laying before you (in order to communicate to the *Royal Society*, if you think it worthy) the Description of two *Echinites*, or Stones moulded in fossil *Echini* Shells, hitherto undescribed, as far as I know.

These *Echinites* are undoubtedly moulded in Shells, of a *Genus* of which we at present find some Species now living in the Seas; mostly in the *West Indies*. The *Echinometra* of *Aristotle*, *Aldrovand*, and of *Dr. Grew* (a), is of this *Genus*. *Dr. Breynius* (b) calls the whole *Genus Echinanthus*; and *Mr. Klein* (c) *Scutum*. *Woodward* (d) in his Distribution of fossil *Echini* calls them the *Pentaphylloides*, from the Rays on the upper Part forming a beautiful cinquefoil Figure; but wrongly fixes their Characteristics in having only one Aperture, and that at the Basis; in which he not only contradicts Nature, but also the very Specimens he quotes in his own Collection, which have all two *Foramens* or Apertures, and are elegantly figured so by *Agostino Scilla* (e) who was the Person that sent them to the Doctor; and

(a) *Museum Reg. Soc.* p. 139. (b) *Schediasma de Echinis*, p. 60. (c) *Nat. Diss. Echinodermatum*, p. 20, TAB. 17. A, et TAB. 18, B. (d) *Cade of foreign extraneous Fossils*, p. 16. (e) *La vana Speculazione disingannata dal senso*, TAB. 9, 10, and 11.

and our late President Sir *Hans Sloane* (f) has also figured and described two Species of this *Genus*, whereof one Species is an Inhabitant of our *English Seas*.

I observed above, that, to my Knowledge, no Author has ever described *Echinites* or Stones moulded in the fossil *Echini* of this *Genus*; nor even have the fossil *Echini* or Shells themselves been ever exhibited by any Lithologist, except by the above-quoted *A. Scilla*, who sent them to Dr. *Woodward*, and found them in *Malta*; to which the Doctor in his Catalogue recounts two other Specimens, which were dug up in *Maryland*; so rare are the Instances of the Fossils of this whole *Genus*!

The two *Echinites* here described (as also some few other Specimens of this sort, which I hear are in some Cabinets in this Metropolis) were all found in the midst of some Rocks, which were blown up at *Port Mahon* some Years ago, and from whence they were all brought.

The first or largest is in the Possession of the Right Rev. Dr. *Lavington*, Lord Bishop of *Exeter* it is composed of a hard or stony arenaceous greyish Substance, and is of an Escutcheon or Heart-like Shape: It measures about $14\frac{1}{2}$ Inches in Circumference, or quite round the Limb or Edge, about two Inches high from the Flat or Basis to the Tip of the *Apex*, five Inches in Length at the Basis, and $4\frac{1}{4}$ in Breadth. On the upper Part it rises nearly gradually from the Edge quite to the *Apex*. A central Point, with a slight declining Space, tops the said *Apex*; from which
Space

(f) *Nat. Hist. of Jamaica*, Vol. 2. TAB. 242, Fig. 3. et seq.

Space the Body regularly divides into five Parts figured like Leaves to the Edge. These Leaves are narrow at the *Apex*, greatly widen toward the Bottom, and narrow a little again at their End. Each Division or Leaf is bounded on each Side by a Row of parallel Ridges, which are accompanied also on each Side of every said Row, with two other Ranges of Points or Knobs; all which Rows do not meet or close together at the lower End of the Division, but leave a void unwrought Space: A Row of larger irregular Knobs runs through the midst of each Leaf. From the Divisions between each Leaf runs a rugged knobb'd Pillar, which is join'd to the Edge: The other Parts between the Leaves and the Edge are Hollows, or void Spaces. The Edge or *Limbus* is of a thick cylindric Make, runs quite round the whole Body, and only has some Signs of being disjointed at the one Extreme of the Length, or where the Aperture was; the Stone answering which is here extended a little cylindrically outward like an Appendage, and was so formed by the stony Matter being too much in Quantity for the Shell, and so was protruded through the said *Foramen*. On the outer Edge of the *Limbus* are some few irregular stony Concretions. The Basis is flat, and is likewise divided into five Parts from the Center, which is one of the *Foramens*; the other *Foramen* (as has been above described) being placed at one of the Extremes of the Length. This *Foramen* or Center is about the Size of a Shilling. The five Divisions extend to the utmost Edge of the Body, or quite over the *Limbus*, contrary to the Divisions on the upper Part, which extend only to it. Each Division is formed by a stony Line edged on each Side with stony cylindrical

Bodies of the Thickness of a Pin, but of different Lengths, so as to appear like the Teeth of a Comb, or the Gills of a Fish; the Interstices between all which is a rugged stony Work, and Hollows pervading quite through the Body to the upper Part.

I cannot but think these five pectinated Divisions on the Basis owe their Figure to some Parts of the included Fish; which I am more confirmed in, as I have seen some Specimens of the common pileated and galeated *Echinites*, which have been hollow'd at their *Apex*, and mark'd star-wise; that Concavity, and the stellar Mark proceeding from the Interposition of the Fish between the stony Matter then filling the Shell, and the Top of the Shell itself.

The other *Echinite* I have the Honour of producing before the *Society*, belongs to Mr. *Edward Jacobs* of *Feverham*. It is of a different Species, though of the same *Genus*, of a heart-like Shape, and about one third the Size of the above-described. This is greatly copped, the *Apex* lying very high, and the five Divisions running near perpendicularly down to the Edge. The upper Part of this is elegantly perfect; the Work is near the same as on the other; only that, by the Perfection this preserved is in, we observe that the Rows of parallel Ridges, which adorn each Side of each Leaf or Division, rise into a kind of arch'd Work or Bridge, made up of arch'd cylindrical Bodies, through which the middle Row runs, joined or connected in a long strait cylindrical Stem, in a most curious and elegant manner. The Basis or under Part of this Specimen is very imperfect, and only seems to differ in the Center being greatly excavated or concave, answering to the great Copping

Copping or Height of the *Apex* or upper Part. This Fossil also consists of a hard stony arenaceous Substance like the other.

From the Inspection of the several Hollows of these *Echinites*, it is evident they were not immediately moulded in the Shells, but were form'd in Cavities which those Shells formerly filled in the Rocks they were lodged in. The Rocks were apparently of a loosened arenaceous Texture, and the Water &c. continually pervading them, rotted and destroy'd the inclosed Shells, and bore away their whole Substance. In the same manner, and by the same means, were the stony Particles replaced into those very Cavities which the Shells formerly filled; consequently these Bodies were moulded exactly to the said Cavities.

This Remark carries a Conclusion with it, if Observation be made, that the Hollows and solid Parts of these Stones exactly answer to the Hollows and solid Parts of the very Shells themselves; which, had they been moulded in the very Shells, must have happen'd directly contrary; the solid Parts of the Shells forming Hollows in the Stone, and *vice versa*. In all sandy or lax earthy Matter fossil Shells are very seldom found, but only the moulded Stones; the loose Texture of those Substances giving free Access to Water, Vapours, and mineral Exhalations, &c. which intirely corrode and destroy the Shells buried in it.

I have taken the Liberty to produce before the *Society* a recent *Echinus* of this *Genus* from the *West Indies*, to elucidate my Subject; as also two Drawings done by Mr. *Nynde*; *viz.* of the Basis of

the large *Echinite*, and the upper Part of the small *Echinite* : All which are engraved in T A B. IV. I am, with Respect,

S I R,

London, April 27,
1749.

Your very devoted, and

obliged humble Servant,

Emanuel Mendes da Costa.

References to the Figures.

See T A B. IV.

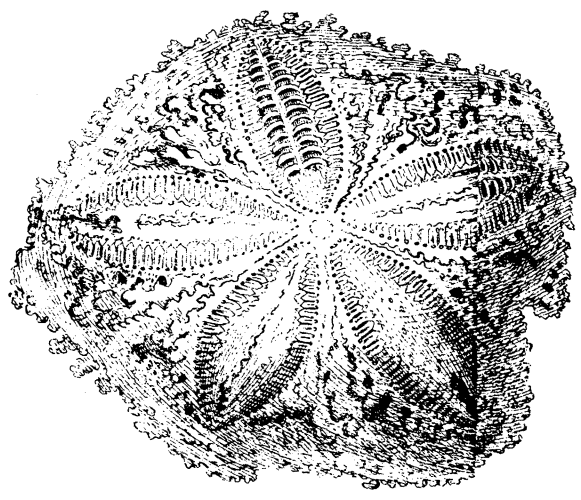
Fig. 1. A View of the upper Part of a curious *Echinite*, in the Possession of Mr. *Edward Jacobs*, of *Feversham* in *Kent*.

Fig. 2. A View of the under Side of the same *Echinite*.

Fig. 3. A View of the under Side of a curious large *Echinite*, in the Possession of the Right Rev. Dr. *George Lavington*, Bishop of *Exeter*.

N.B. The upper Part of this *Echinite* having nothing remarkably particular or different, it was not judged necessary to give a Figure of it.

Fig. 1.



p. 148.

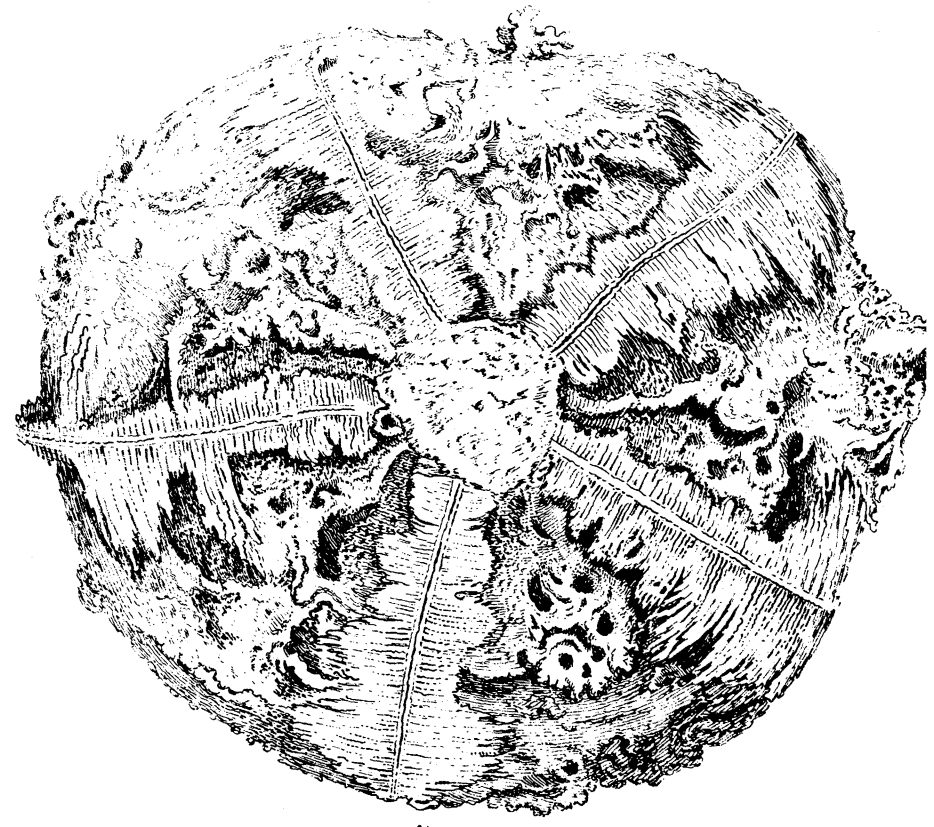
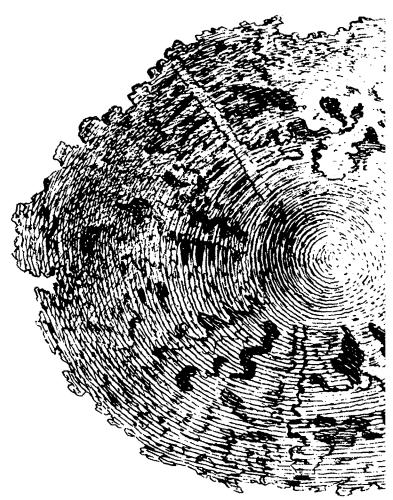


Fig. 3. p. 144.

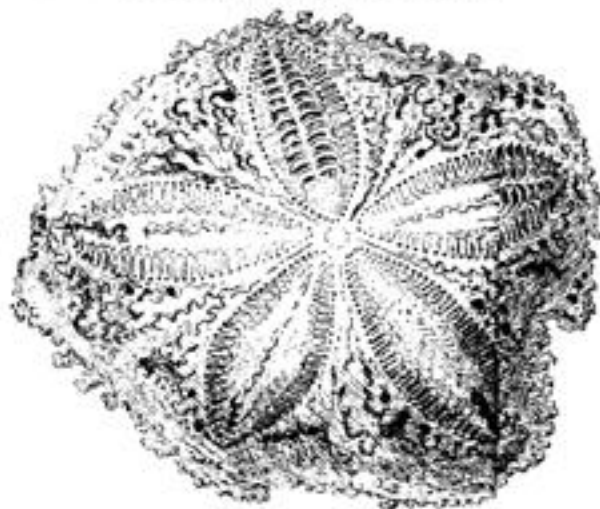


Fig. 2.



J. Mynde sc.

Fig. 1.



p. 148.

Fig. 2.

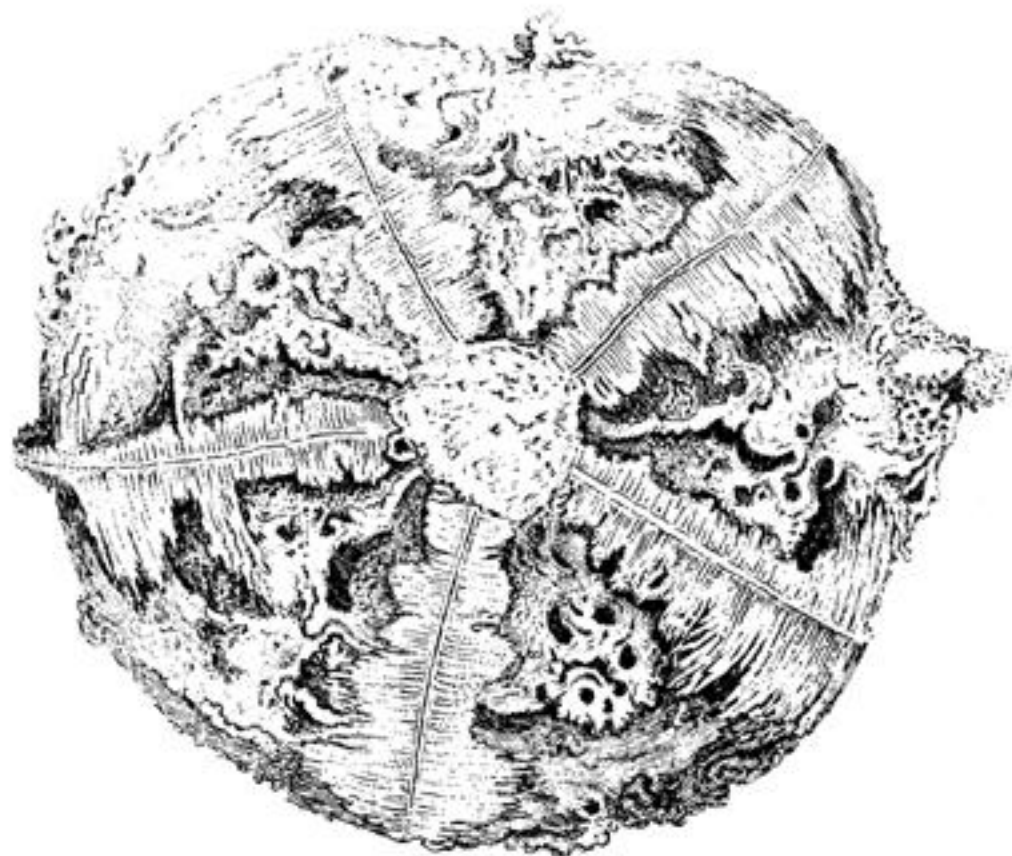
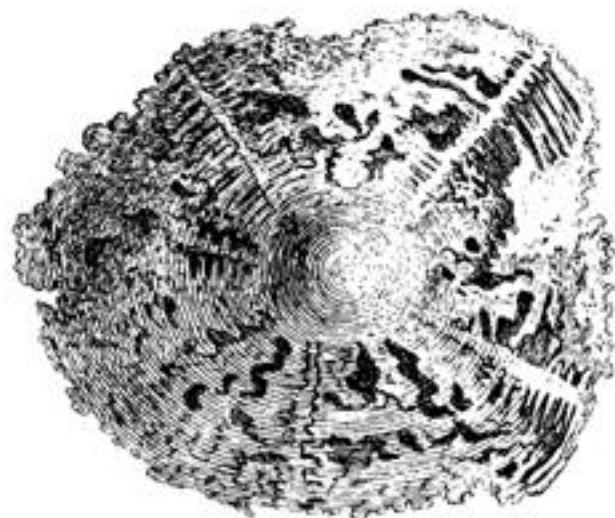


Fig. 3. p. 144.