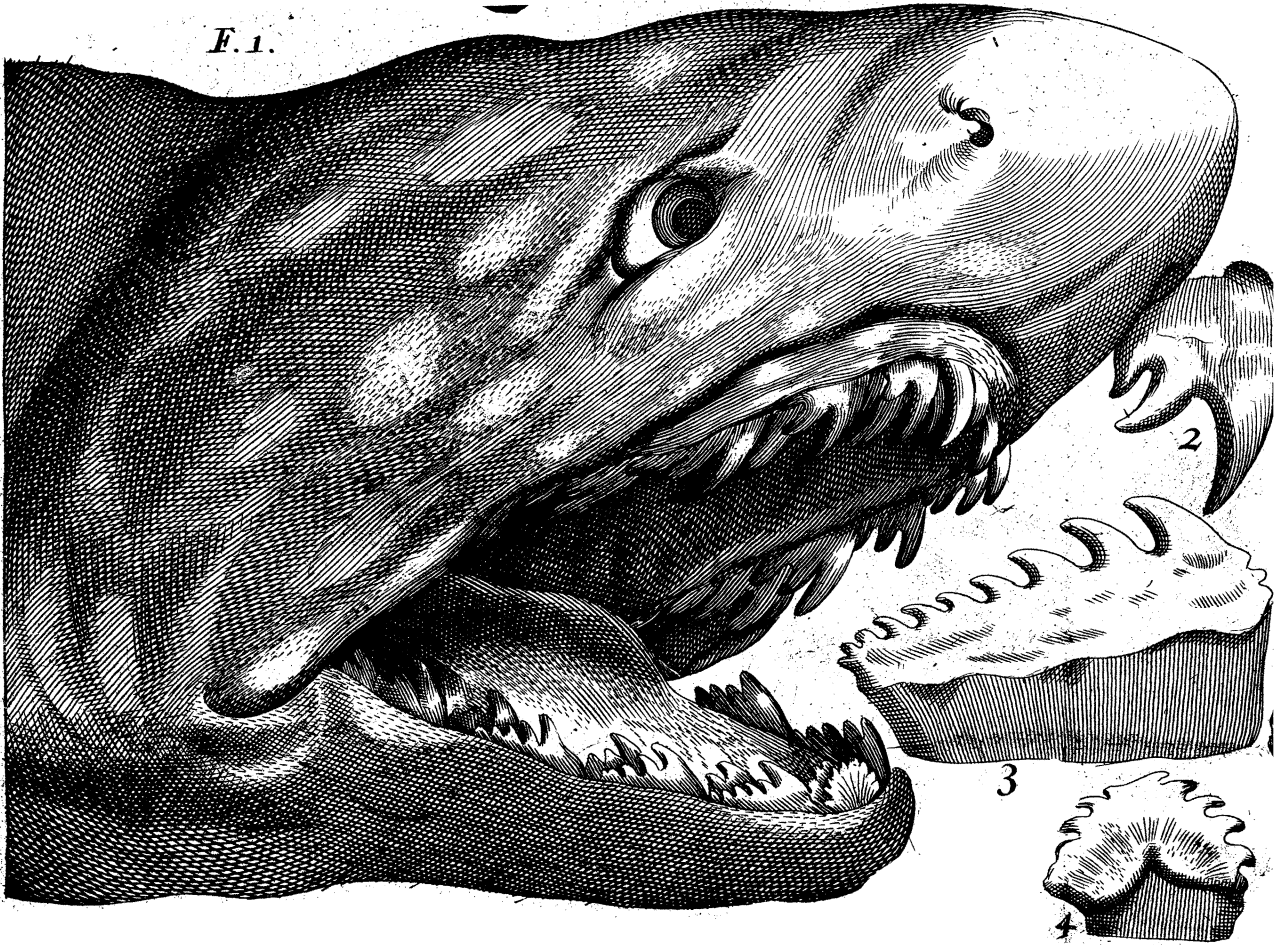
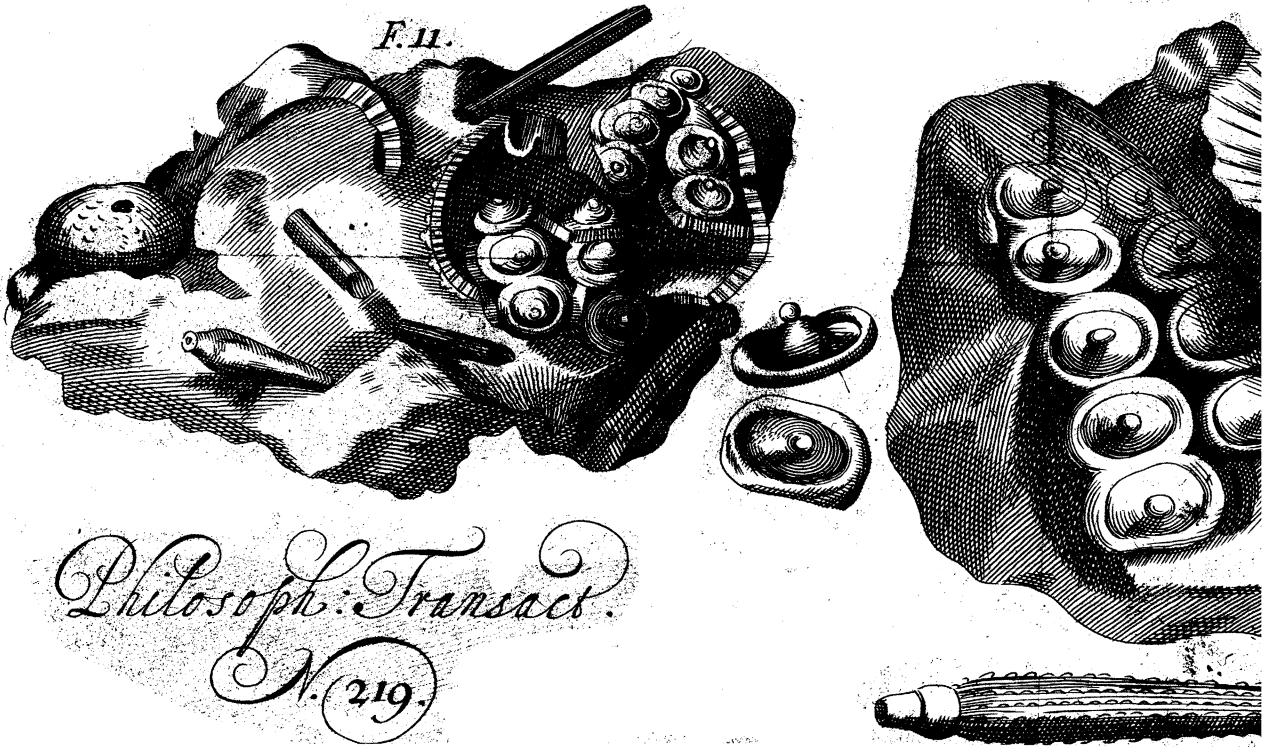


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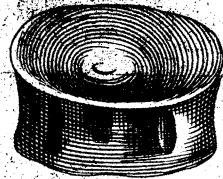
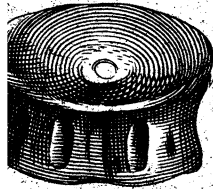
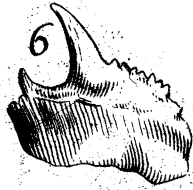
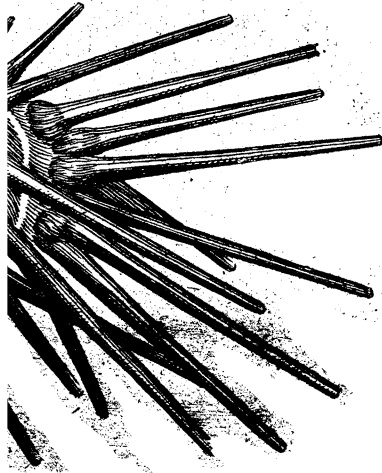


F. 11.



Philosoph. Transact.
N. 219.





La vana speculatione disingannata dal senso : Lettera Risponsiva circa i Corpi Marini, che Petrificati si trovano in varij Luoghi Terrestri.

Di Agostino Scilla Pittore Academico della Fucina, in Napoli, 1670. 4to.

With short Notes, by a Fellow of the Royal Society.

IT will not, I suppose, be wondred at, that a Book which has been so long printed, should now be taken notice of in these Transactions, since it appears to be so little known, even by those who have written upon the self-same Argument, that some late Writers who seem to have omitted nothing that Nature and Books could help them to, to carry on their Work, seem never to have seen it. Otherwise in all probability they would have named this Author, among those who have taken pains to prove, that the Shells, or Stones in likeness of Shells which are found up and down upon the Surface, and in Hills and Quarries of the Earth, were once real coverings of inclosed Fishes, or have been formed in those Shells which were instead of Molds to the liquid matter that got in after the Fishes were consumed. This *Signior Scilla* has not only taken pains to prove, but has brought more Arguments in proof of it, than had been brought by those that appeared upon that Subject before him.

His way of Writing shews little Art, and less Learning, which he owns himself a Stranger to, being by Profession a Painter of *Messina*, who delighted much in designing and painting all Rarities of Nature which were

brought to him, or which he could collect. The great variety of Shells found either in the neighbouring Hills, or brought to him from *Malta*, led him into a dispute with some *Virtuosi* of his acquaintance, concerning their Original: Some asserting that they were formed at first by a plastical power in the Earth; he on the contrary being of Opinion, that they were real Shells thrown by an Inundation, at one time or other, upon the Earth: The proving of which Assertion is the subject matter of this Treatise.

After a great deal of prefacing spent in Verbose Civilities, after the manner of Modern *Italian* Writers, he begins to enquire into the generation of Minerals and Metals, which he believes to be generated by a penetrating Juyce or Vapour arising out of the Bowels of the Earth, which alters and turns all manner of Earths into it self. So that if in Alum works (for example) after they are exhausted, Sand, or Gravel, or Dirt be thrown into the Pits from whence the Alum was dug, by the penetrative and alterative quality of the Aluminous Vapour, they will by degrees be changed into such a substance as had before been dug out of the self-same place. He says he has found Clods of Earth and Gravel which have been so put in, which as they have been more or less distant from the fountain of Allum, from whence these Vapours did exhale, were more or less impregnated with Alum: Nay he pretends that by breaking several of these Clods whilst they were thus digesting, he has discovered the steps by which Nature works in the whole process of this Maturation.

The Fossil Salt in the Mountains of *Ragalmuto* in *Sicily* is, in his Opinion made after the same manner; for after the Peasants have wrought a Pit, if they fill it up again with the loose Earth which they find hard by, in a short time it will be so condensed and purified, that for brightness it will not be distinguishable from that
which

which was dug out not long before. After which manner also he supposes that the harder Minerals are produced.

This Hypothesis is advanced in order to what he has to say concerning the original of those Shells and formed Stones which are found upon the Earth; thereby to invalidate the Argument of those who pretend that they are formed by a vegetative Virtue in that particular Soil, which determines them to that peculiar and regular shape: To which he now proceeds.

He begins with supposing that *Malta*, from whence the greatest quantity of these supposed Petrifications come, was made an Island, as we now see it, some time after the Creation; and that it was once a heap of liquid Mud replenish'd with Shells, Teeth, &c. which (as he afterwards explains himself) settling promiscuously according to its Gravity, hath made that Island a heap of Earth, Stones, Shells, Teeth, and the like, as now we see it.

He supposes that this Collection of Matter was occasioned by a Flood, let the Causes of that Flood have been what they will, either an irruption of the Ocean into the *Mediterranean*, or an inundation of the *Tuscan* Sea driven that way by vehement Winds, or any other Cause assigned by Authors; which (namely that the present state of the Isle of *Malta*, was caused by a Flood) being granted, he thinks he may be allowed to affirm, that which every Mans Reason must acknowledge to be highly probable, namely that an infinite variety of things which were born up by the violence of the Waters were carried along by them, some to one place, and some to another.

But to this his Adversary objected, that formed Stones have been frequently found, such as the *Bucardites* of *Imperati*, and others like some sort of *Turbens* or *Periwinkles*, which being all of a hard stony substance,

could never have been Shells. These, says he, are made of Mud condensed in Shells, which were the Molds in which these Stones were formed: and therefore we need not be at a loss to conceive how these Stones should ever contain an Animal within them, since they took the place of the Animal that was wasted away, whilst they were only liquid Paste, which hardning afterwards would retain their Form, when the Crust that covered them, and that gave them their shape, was mouldred away.

And whereas it was further objected, that great quantities of Shells are found in *Malta*, which are foreign to those Seas: That (says he) is of no force, since it is well known that every *South-Easterly* and *Easterly* Wind throws whole Boat-loads of beautiful Shells upon the *Calabrian Coast*, none of which kind of Shell-Fish are ever taken by Fishermen upon those Seas.

Now he comes to particulars. He begins with the *Lapides Bufonitæ*, which he proves to be the true Grinders of the *Sargus Dentex* and *Aurata*, and other Fishes of that Tribe, which have round *Dentes Molares*, to grind the Shells that they find at the bottom of the Sea, that they may come at the Flesh upon which they live. Now to make this beyond contest, he produces the natural Jaw-bones of these Fishes, with their Teeth within them; and compares those Teeth with the *Bufonitæ*, of which there are as many sorts, as there are species of Fishes, which have round, hard Jaw-Teeth. (a).

The great Numbers of *Glossopetræ* sent to him from *Malta*, some intire, some corroded at the Root which never had a Crust over it, some bruised, some whole, do as plainly shew their Original as the *Bufonitæ* did before: For upon comparing he finds that they are not so much *very like to*, as the *very same* with the Teeth of Sharks and other Fishes of the Dog-kind. Nay he appeals to the Senses of all Mankind, whether great Numbers of *Testaceous Substances*, that he is ready to produce, taken out

of

of Mountains and Rocks, were not originally coverings of Animals of their respective kinds, since the very bruises which they received by the weight of the Ambient Matter, as it grew harder, and consequently prest more heavily upon them, are still plainly visible. Some of the *Echini* being robbed of their Prickles, and loosened in their Joints, which being naturally membranous, easily part, being corroded by the humid [and perhaps acid] substance in which they lay. (*b*).

And whereas it may be objected, that these *Shells* may grow by *little and little*, and consequently some may be tenderer than others, as not being exactly formed; he says he can shew Lumps of Stone excessively hard full of *Conchæ*, *Turbens*, *Scallops* and the like, where, within some of them, all the parts of the Animal it self may be distinctly observed; which is not so very rare neither, but that he has several times observed it. This, says he, puts the Original of these Shells out of doubt; since they hapned to be closed before the liquid Mud could get in and corrode the included Animal, and afterwards harden into the exact form which its Matrice must of necessity give it: Whereas the others being first filled with Mud, which hardned into a stony consistence after the Animal was quite wasted, gave occasion to some Persons who had not seen great varieties of Shells and formed Stones of that sort, to doubt of their Original.

He reasons also from the several *Lamellæ*, of which these Land-shells are composed, which are coated over one another in such a manner, that they may be parted into very thin and subtile Plates, such as Sea-shells of that kind are made up of.

But it was objected, that in those Beds where these Shells are found, generally speaking, most of one sort are found together, from whence it has been concluded that they are first formed in those Beds where they are found. Whereas he pretends that this proceeds only
from: 1

from the Motion into which the Waters were put during the Deluge ; it being well known that if Egg-shells, Straws, Pebbles, Shells and several other dissimilar substances be put into a great quantity of Water, and this Water be afterwards moved violently and irregularly, those dissimilar Bodys will after a great many Shocks and impediments, upon the settling of the Water, subside according to their Figure pretty nearly together, and consequently will be thrown into great Heaps, some here, some there, according to that determination which the rolling of the Waters gave them.

The Places where these several Substances are thus separately found, are as he thinks invincible Arguments in proof of his Opinion. The Soil of *Malta* is Marl, which is a natural Balsam for the *Glossopetræ*, that otherwise would have been soon wasted in loose Sand. Besides, *Malta* lies low if compared with the Mountains of *Sicily*, so that 'tis no wonder that Sharks Teeth, which are heavy Bodys, should first subside, and consequently be found there in great quantities, whereas with all his diligence, Signior *Scilla* could never find but five upon the *Sicilian* Mountains, and those extreamly thin, and without any Osseous Matter within them, but filled with a light and subtile Matter ; tho' he does not question but in time he may be able to find, at the foot of these Hills, some *Glossopetræ* which may equal those of *Malta*.

And this, according to him, is the Reason why in *Malta* it self, the *Echini* and *Echinite* are chiefly found upon the strand and above ground in view, all round the Island ; for they are both lighter than the *Glossopetræ*, and by reason of their Figure would more easily float and be buoyed up upon the Water, whereas the *Glossopetræ* being both specifically heavier, and of a closer contexture of parts, sunk deeper into the Earth.

But

But if there were no other Argument, the situation of the *Glossopetræ* in their Beds from whence they are dug, puts their Original out of controverſie: Midling ones here, ſmall ones there, great ones in a third place, without any ſort of order and regularity: Some with their Roots uppermoſt, others directly downwards, others acroſs: vaſt numbers broken, every one with a different Inclination, all plainly proving how they firſt came thither, ſince had they grown there at firſt, their Roots would have been all downwards, unleſs we ſhould frame to our ſelves a different Notion to the Production of *Glossopetræ*, from any thing elſe in Nature that is generated and increaſed from ſome one fixt Seminal Principle. And, beſides, were there ſuch a ſeminal Principle, 'tis not likely that it ſhould be common to *Glossopetræ* and *Shells* too; and yet *Shells* of all ſorts, and in all poſitions are very often found in the Clay amongſt theſe *Glossopetræ*:

It is objected however, that the *Glossopetræ* may be eaſily taken out of their Beds by their Sides, or at the Point; whereas at the *Base* they adhere very cloſely, from which there often comes forth a plain Root, which is oftentimes longer than the *Glossopetra* it ſelf. This, ſays Signior *Scilla* is a plain proof of my Aſſertion. For that Root is not made by Nature to *suck out* [or rather convey] any nutritive juyce into the *Glossopetra*: from the Mud, but from the Jaw of the Shark where it originally grew. It was no wonder therefore that their ſides and point, which are naturally very hard and ſmooth, did not ſtick ſo firmly to the Mud, or Stone wherein 'twas lodged; but it would have been a wonder if the Root, which in all Sharks Teeth is very ſpongioſous and very porous, had not been filled with liquid Mud, that would eaſily have fixed it in its Bed, when it once began to harden. And accordingly he appeals to all that ever compared Sharks Teeth and theſe

these *Glossopetræ* together, if they be not exactly alike, some hard, some soft, some incrustated towards the point, some quite thro'; with every one a spongy Root, where they are inserted into their proper Muscle.

His Adversary had asked, *Why the Black and Ash-coloured Conchæ and Turbens, are only found in the Chalk and Clay, and not the White ones which are dug out from among the Rocks?* To which he answers, That those which are found in the Chalk and Clay, are not true *Turbens* or *Conchæ*; but Stones formed like them: Whereas those that are found in Rocks are real Shells, which are enclosed and so preserved in the Rocks. One *Turbinites* which his Adversary had sent to him, was a clear Evidence of this Matter. For it was molded within a Spiral Shell, which turned into it self, as all the turbinated Kind constantly do, the inner Twirls of which Shell were preserved entire amidst the lapideous matter, when the outward ones had been quite worn off; from whence he positively concludes that all these formed Stones, which seem to resemble Testaceous Animals of the turbinated and bivalvous kinds, were actually cast in the real Shells of those Animals, and were never in another form besides that in which we now see them.

But 'tis objected, *Glossopetræ are natural Chrystallizations of Salt*; to which he makes this reply: That then the whole substance would be all of a piece. Salt would be Salt as well within as without; a Granate and a Topaz is a Granate and a Topaz throughout: Diamonds and Rubies are Diamonds and Rubies all over: they are aggregates of similar Particles which compose the whole Mass, be it greater, or be it less; whereas these *Glossopetræ* (c) like all other *Vegetables*, are made up of various and dissimilar Corpuscles, put together in such a manner, as is peculiarly subservient to the end for which they were made. Accordingly the *Cortex* is of one
Sub-

Substance, and the *Medulla* of another, and that lodged in proper Cells, with a Root distinct from them both ; (*d*). Besides, says he, Nature sometimes produces monstrous and defective things. An Animal sometimes wants a Limb, a Tree is without some principal Branches, a Fruit may want some of its chiefest parts, Yet still we may observe that Nature supplies and covers that defect with a Skin, or Bark, or Rind, so that it never appears torn off or rent to the naked Eye, as it would, if it were torn off by a Hand, or cut off with a Knife. This is Nature's constant course; which evidently shews that the *Lusus Naturæ*, (as these are erroneously called) were never produced in the Earth; since all the bruises and fractures, which they have met with, are apparent without any disguise to hide them, as Nature always employs to hide the Effects of her own irregular Productions.

He argues likewise from the Beds in which they are found, wherein, Gravel, Clay, Teeth, Bones, Shells of all sorts lay confused in one Mass. As also from the impressions which they leave behind them in the Marl, even to the minutest Lines and Cracks in the Tooth, which appear exactly in both, like an Impression upon Wax, and the engraving on the Seal which made it. The *Apophysis* also, or *Processes* in the *Glossopetræ* demonstrate their Original, were there nothing else; since they exactly answer to those in Sharks Teeth, whereby every Tooth is inserted into his Neighbour in the living Animal; with those parts porous, and those spongy that are so in the Tooth of the Fish. Nay whereas Sharks Teeth are mortised into one another such a manner, that a man may easily tell which belongs to which side, which lie near the Throat, which near the Snout, which lie to the Right, and which to the Left. And whereas in a Sharks Jaw, the Teeth on the Left Side will not fit on the Right, nor those above serve

below ; so that upon seeing a Tooth, one may tell which Side, and what Jaw it belongs to : He has observed every one of these things in his *Glossopetra*, which punctually answer in every part to the several ranks of the Teeth of living Sharks. His Cuts at the end of his Book, which are very beautiful, make these Arguments of his, very convincing.

He has drawn a piece of Marl, wherein a *Glossopetra*, a *Lapis Judaicus* (e), a piece of a Scallop-shell that would part into *Lamellæ* like the Sea-shells of that kind, and a rotten peice of Bone lie all confusedly by one another.

He produces the Crust of an *Echinus Spatagus* lying in its Bed of Marl, which within was filled with Marl, and incrusted with it without. This Shell meeting with an accidental pressure, was crackt ; these cracks do clearly shew that it was an original Shell, and also the Reason how it came to be so crackt ; since thereby it appears that the Shell yielded as far as the inclos'd Marl would give it leave. And whereas it has been objected that *Echini Spatagi* are very rarely seen, and yet that great Numbers of this Species of *Echinitæ* have been found in Malta : This to Signior Scilla is no objection at all, he himself having in less than an hours time taken them up by hundreds in the Port of *Messina*.

He produces an *Echinites* whereon appeared the five Lines from one common Centre, within which, upon breaking it, he found five correspondent Cells, and the place for the Mouth exactly agreeing to an *Echinus* taken out of the Sea.

He produces likewise part of a Jaw-bone of a *Dog Fish* lying in a Bed of Stone, with three Teeth in it : Tis partly rotten, partly sound ; porous with Channels for the Marrow in the midst, covered without with a hard osseous Crust, peculiar to the cartilaginous kind :
Upon

Upon the same Bed there are also little Shells, and many round Knobs proper to that sort of *Dog-Fish*, (*f*) which seem to be beginning Teeth, called by the *Maltesi*, *Serpents Eyes*.

From these Observations our Author proceeds to philosophize upon the Phænomena ; and taking it for granted that these Land-shells are the remains of a Deluge, he enquires into the contexture of that Soil wherein they are chiefly found. His Habitation being at *Messina*, gave him better opportunities to make his enquiries there : In pursuance of which he observes that the Mountains near that City consist of *Strata*, which lie in this Order, *first Gravel, then midling Sand, then very fine Sand* : That the Lines described by these *Strata*, are all *Horizontal*, with a small declivity towards the Sea ; which declivity going thro' all the *Strata*, proceeds in his opinion from the original inclination of the Floor or Basis on which these *Strata* were at first laid : That *after three Layers* of Sand and Gravel of different finenesses, *come three other Layers* in the same Order with the former ; first Gravel, then coarser, then finer Sand again, and so on several times one after another.

This he supposes to have proceeded from repeated Tides : From whence he concludes, that the Water coming with great violence, sustained whatsoever came in its way ; but upon its going off, the force abating, it let fall the terrestrial matter that subsided according to its specifick Gravity ; and that these repeated flowings and ebbings of the Water hapned during some one very great Inundation, the Time whereof, or its Cause, he does not determin.

He observes that these Shells are not found certainly in such or such particular places, but casually some here, some there, just as the rolling of the Waters hapned to carry them, and accordingly they subsided, where-ever the strength of the Waters Motion, by which they were buoyed up, abated.

He ſays that all the Hills about *Meffina* are not made up of ſuch looſe Sand, ſome conſiſting of a hard Rock, others of a white *Tophus*, or a dirty Marl; in all which one may obſerve either the former Order of the *Strata*, or horizontal Lines of different Bodies and different Colours.

He obſerves that the Land-Shells differ in hardneſs and conſiſtency according to the Matter in which they lie: An *Echinus* petrified in a *Tophus*, is not ſo hard as another *Echinus* petrified in a Rock; ſo that according to the diſpoſition of the ambient Matter, they acquired a greater or a leſs degree of hardneſs; and in ſome they continued juſt as they were at firſt; all which he urges to ſhew, that theſe Land-shells could not be Petrifications made in Water, according to the common Notion of the Word.

Having thus laid down his Hypotheſis, he ſubjoins ſeveral of his own Obſervations; which (as he ſuppoſes) put this Queſtion beyond Diſpute.

I. He obſerves, that there are no *Sharks Teeth* found any where at Land but in *Malta*; the *Gloſſopetræ* in other places are ſmall, or light the Cortices of large ones. This he reſolves into ſpecifick Gravity, and the different make of *Sharks Teeth*, of which ſome are quite hard, others only cortically ſo; theſe laſt are filled with a mucilaginous juyce; ſuch were thoſe three that he found upon the Hills near *Meffina*, which were filled with fine ſoft Marl, inſtead of that Mucilage wherewith they had been naturally replenished.

II. He broke great Numbers of petrified *Echini*, and other Bodies naturally hollow, which were filled only with ſuch Marl as that they lay in, or elſe fragments of Shells, Sand, Pebbles, Spines of the *Hystrix Marinus*, and ſuch like ſtuff. And he affirms that he nor no Body elſe did ever ſee within theſe Shells any thing but what might get in at the Mouths of the *Echini*; which ſhews, that

that after the Membranes which closed the Mouths of the *Echini* were worn, thro' the Chalk, and other little Bodies mingled with it, got in and filled the Cavity, now void by the wearing away of the Body of the Shell-Fish it self.

III. He examined the petrified Vertebres of the Spines of Fishes, which he found exactly to correspond in their several Articulations both into each other, and into the Ribs which issue from them, with real Vertebres of Fishes found at Sea.

IV. He examines some *testaceous Bodys*, that he found in *Calabria*, which exactly answer to the *Dentales* of *Aldrovandus*, and according to him, are found only in hollow Stones at the bottom of the Sea, unless they are at any time thrown upon the Shore by great Waves.

V. He produces the Claw of a Sea-Crab found in the Hills near *Messina*, with a piece of a Scallop-Shell clutch'd within it.

VI. Also a Stone in which pieces of Coral, and all manner of Shells were disorderly petrified, as chance had laid them, and in some the Animal it self petrified within, so that one might discern the small interiour Membranes proper to each Shell. Others in the same Bed, were full of the Matter in which they lay: others half full of a pellucid *Flour* like Crystal; others again had a sediment of turbid Matter; all which Spars and Sediments, let the position of the Shell, which contained them, have been what it would, gravitated at first exactly towards the lowest part of the Shell, as it was there situated; which plainly shews that they once were fluid, and carried thither by their own weight.

VII. He produces pieces of petrified Coral, which tho' they had lost their Red Colour on the outside, yet had a reddish tincture within, as all that Species of Coral has; from whence he concludes, (1.) That Time had begun to destroy them. (2.) That the
Acci-

Accidents of the place rather concurred to their Destruction than Generation.

VIII. As also pieces of Fistulous Coral, which tho' they were broken in the *Tophus*, yet might be put together just as they were naturally joyned together in the Sea.

IX. Together with some of the *Joynted Coral of Imperati*, which resembles the *Shank-bones* of Animals; this also joynted right, tho' the pieces were found apart in the *Tophus*.

X. He compared some of the *Echini Spinis longissimis* of *Aldrovandus*, with the Shells of those *Echini* found at *Messina*, and in *Malta*; and he found them to agree exactly. He observed the same situations and dimensions of the *Mammillæ*, and the *Spines* which turn upon them, as upon a *Pivot*; and when broken, the same Ligatures of every part of the Crust, which covers the Animal.

XI. He produces one *Echinus*, bruised in the *Tophus* in which it lay, wherein after he had washed off the tophaceous particles that it was filled with, he found several of the *Spines* that had formerly been upon the Crust: As also a *Spatagus*, with the Prickles on, which he found in a Valley in *Calabria*.

He concludes at last with taking notice, that all the *Echini*, or other Land-shells, that he had found bruised upon the *Calabrian* or *Messinese* Hills, or had been brought to him from *Malta*, were bruised by a perpendicular pressure: This he explains thus; The Crust of all *Echini* has two Centers, one directly opposite to the other; so that if they hapned to lie in the liquid Mud, in such a manner, as that the lowest Center was perpendicular to the Horizon, they were bruised, so as not to lose their circular Figure; only they were much compressed. If they lay on one side, they were squeezed out of that shape, and the Membranes of the Ligatures parted

parted from each other variously, according to the variety of the situation of these Shells in the Mud at that time. All which plainly shews, that as the Mud dried, the super-incumbent Weight pressed perpendicularly upon the inclosed Bodies, which were then compressed together in that posture they then hapned to lie in: And were more or less compressed, according as the Mud got into their Cavities in greater or lesser quantities, and as it dried, propped them up on the inside against the pressure of the Matter in which they lay

*Short Notes upon the foregoing Account ; by a
Fellow of the Royal Society.*

(a) pag. 4. **M**R Willughby says the *Sargus* has none of these *round Teeth*, which he calls *tubercula Ossea*, and makes that one of the Characteristics to distinguish it from the *Sparus*, and *Scarus*, and other Fishes of that Tribe. However I retain the word, because *Scilla's* word is *Sargo*; and perhaps *Willughby's* *Sargus* may not be *Scilla's* *Sargo*, or, which is more probable, he might overlook that particularity in that Fish which he dissected.

(b) *ibid.* By these *testaceous Substances*, which he here speaks of, he means the *Crusts* of the *Echini*, of which he has given us so many curious Designs in the annexed Figures. He seems to think that the *Echini Marini* are of the *testaceous Kind*, as also several very great Naturalists have thought before him. *Gesner*, after *Aristotle*, in his *Nomenclator Animantium Aquatiliun*, ranges them with the *Conckæ*, *Cochleæ*, *Scallops*, *Pur-*
puræ

puræ, and the rest of the *testaceous tribe*; and yet he owns that *Rondeletius* reckoned them among the *Crustaceous Kind*, and accordingly discoursed of them after *Crabs* and *Lobsters*, just before he treated of those Animals, which are confessedly *testaceous*; wherein he followed *Pliny*, who was of the same Opinion before him. And they certainly were in the right, tho' for want of stating the true difference between a *Crust* and a *Shell* properly so called, the due place which the *Echini* ought to hold in a *Natural History of Shellfish*, as the word may comprehend both Kinds, has never yet, that I know of, been ascertained.

A *Shell* properly is such a hard Substance, as covers an entire Animal, or at least one whole side, without Joynts or Ligatures, as in *Buccina*, *Purpuræ*, *Murices*, *Oysters*, *Scallops*, *Cockles*, and the like. A *Crust* is such a hard Substance as covers only one particular Joynt of the inclosed Animal, so that in the whole *Crustaceous Tribe* there are as many *Shells* upon every Animal, (if I may be allowed to use that word in a larger sense) as there are Joynts in that Animal. This is plain in *Crabs*, *Lobsters*, *Cray-fish*, and *Shrimps*; for which Reason *Crustaceous Animals* may truly be called *Multi-testaceous*, and the other simply *testaceous*, or *bi-testaceous*. And therefore as in *Scaly Fishes*, every *Scale* has a correspondent *Muscle*, to which, by a particular *Tendon* it is annexed; so all *Crustaceous Animals* have *particular Muscles*, which are inserted into every *Crust*; all which *Crusts* are also connected each to the other by common Membranes, which here are in a more especial manner necessary, because they do not lie *imbricatim* upon one another as *Scales* do.

As plain as this seems to be, *Aristotles* definitions of *Crustaceous* and *Testaceous Animals*, or, (as he calls them) *Μαλακώσεα* and *Ὁσεακώδεσμα* have been universally

verfally acquiefced in; and they being infufficient have caufed this whole matter, (by the generality of Naturalifts, even in this Age,) to be mifunderftood. (1.) *Crufteaceous Animals*, (Μαλακόσχερα) fays *Aristotle*, are *foft within and hard without, but whofe covering is not apt to be parted by contufions, tho' one part of it may eafily be torn from the other* : (So I underftand his ε̄ θεαυζὸν ἀλλὰ φλασόν). (2.) *Testaceous Animals* (Ὀσσεκνόδεγμα) are *foft within and hard without, whofe covering may be bruifed or broken to pieces, tho' its parts are not liable to be torn from each other*) θεαυζὸν ὄν κ̄ κ̄τάκλιον ἀλλ' ε̄ φλασόν.) The Confequences which *Aristotle* puts into his Definition as Characterifticks, neceffarily arife from the Doctrin already delivered. For when that *Shell* is but *one*, as in the *whole testaceous kind*, it may be *bruifed*, or it may be *broken*, according as it is more or lefs *brittle*, but *torn afunder* it can never be. Whereas in the *whole crufteaceous kind*, the coverings which are over every feveral part, as Claws, Feet, Back, Belly, and Tail in Lobfters, are joynd each to other by *Membranes*, which, tho' tough, may be *torn afunder*, when the particular Crufts, here as well as in the *testaceous kind*, cannot.

According to this Diftinction 'tis plain, that *Echini* are truly *Crufteaceous Animals*, for they move upon their Spines, which demonftrates that their Covering is

(1.) Μαλακόσχερά εἰςιν ὅσα τὸ μὲν σφερόν ἐκτός εἴχουσιν, ἐντός δὲ τὸ μαλακὸν κ̄ σαρκῶδες. Τὸ δὲ σφερόν αὐτῶν ε̄ θεαυζὸν ἀλλὰ φλασόν, ὅιον τὸ τῶν καρσάων γένος, κ̄ τὸ τῶν καρσίνων.

(2.) Ὀσσεκνόδεμα ἔστιν ὧν ἐντός μὲν τὸ σαρκῶδες, ἐκτός δὲ τὸ σφερόν θεαυζὸν ὄν κ̄ κ̄τάκλιον, ἀλλ' ε̄ φλασόν, τοῖσιν δὲ τὸ πρὸ κοχλίων, κ̄ πρὸ ὀστράκων γένος ἔστι.

moved by parts; and indeed every Spine is rivetted into its proper Crust, which also by consequence must have its peculiar Muscle, that guides the motion of the Spine, whereby the Animal rolls about which way soever it pleases. It being peculiar to this Tribe of Animals alone, for any thing yet known to the contrary, that its progressive motion is by *turning* or *rolling upon its Spines*, and not *walking* as all Animals, that have Feet, properly do. Which Motion of theirs (if we (3.) may believe Monsieur *Menage*) has given occasion to an old French Proverb, *a la venue des Coquecigrües*, i. e. *when Echini walk*, by which they would intimate, that that particular thing concerning which it is made use of, shall never come to pass.

Besides, it is plain by ocular Inspection, that all the *Crusts* of these Animals are *united by Membranes*, as they are in *Crabs* and *Lobsters*. *Scilla's* Draughts, some whereof are here annexed, put this Matter out of doubt; from which it evidently appears, that *Echini* are properly *crustaceous Animals* in the strictest acceptation of the word.

(c) pag. 188. By *Vegetables* he means *Substances*, which *encrease from præexistent Seed*, as all Plants and Animals properly do.

(d) pag. 189. This will be fully understood, if one consults *Steno's Anatomy of a Sharks-Head*, which is annexed to his *Elementorum Myologiæ Specimen*.

(e) pag. 190. These *Lapides Judaici*, which Signior *Scilla* often calls *Bastoncini di San Paolo*, or *St. Paul's Batons*, are Spines of some Species of *Echini*, of which he gives the Figures, which are not found upon our Shores, and are (perhaps) of the *Pelagian* Tribe.

(*f*) pag. 191. Signior *Scilla* calls this *Dog-Fish*, *Pesce Vacca* (the *Cow-Fish*.) It being described by no Naturalist (that I know off) before him, its hereunto annexed from our Authors Draughts, some of which, for their great exactness and curiosity, it was thought fit to Copy. *Vide Fig.*

An Explication of the said Figures in the Plate, with further Remarks thereon, By another Fellow of the Royal Society.

Fig. 1. **T**H E Head of the *Pesce Vacca*, drawn from the Life, with the Teeth in both Jaws. It seems to be of the long cartilagineous kind, a-kin to the *Dogs* or *Hound Fishes*.

Fig. 2, 3, 4, 5, 6. The Teeth of the same out of their Sockets. These are found petrified in Beds up and down the Island of *Malta*, with those of *Dog-fishes*, *Sharks*, *Pesce Aquila*, &c.

Fig. 7. A Jaw of a Fish call'd *Dentex*, with the round grinders; the like *Dentes Molares* are observed and drawn by the Author in the Jaws of other Fishes, as the *Aurata* and *Sargus*, with several *Bufo* lying by them. These convex ossæous Tubercles are found commonly petrified in *Malta*, and are call'd there *Serpent's Eyes*. They are of the same kind with our English *Bufo* or *Toadstones*, which Dr. *Merret* first declared to be the round Jaw Teeth of the *Lupus Marinus* or *Wolf Fish* of *Schonfeld*. See Mr. *Rays Travels*, p. 321. These *Bufo* are properly call'd by Mr. *Lhwyd*, *Ichthyodontes Scutellati*. *Philosoph. Transact.* N. 200. p. 751.

Fig. 19.

Fig. 8. The petrified Teeth of *Dog-Fishes* and *Sharks*, (call'd *Glossopetræ*) lying in several postures and situations in their Beds of Earth. These, with all the foregoing, may be reduced to Mr. *Lhwyd's Classis* of *Ichthyodontes*.

Fig. 9. A *Sea Urchin*, with long Prickles, *Hystrix Spinis longissimis Imperati*. The Fishermen of *Sicily* often brought it alive to the Author. The Spines break off, and are easily disjointed. Of the *Echinites* the Author hath drawn above 18 Species.

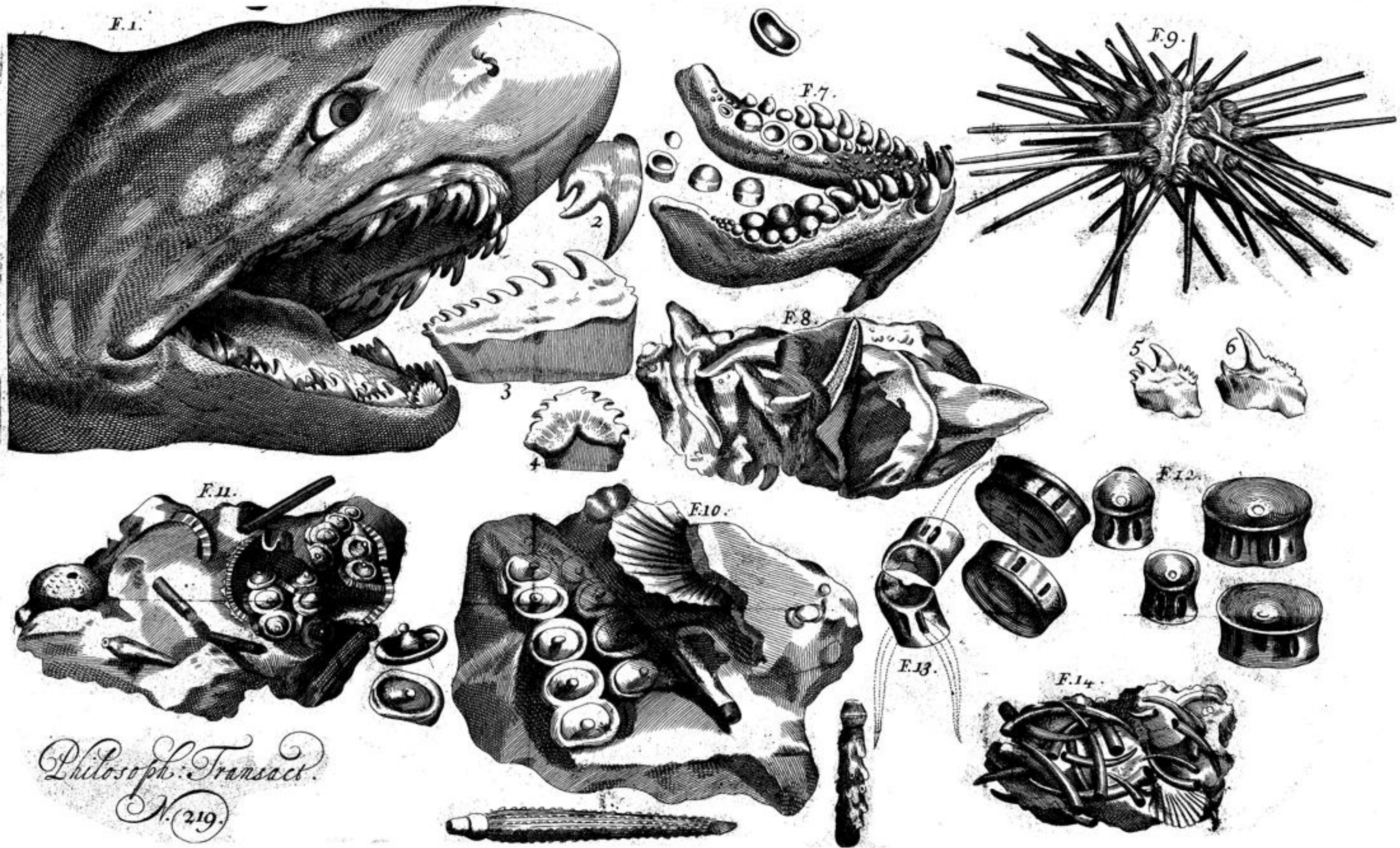
Fig. 10. A *Sea Urchin* found petrifi'd (*Echinites*) in white Stone, on the Rocks and Hills near *Messina*, with some stony Spines or Prickles lying by it; The Teats or Pivots (on which they have been inserted) lie naked and broken off. See Mr. *Ray's three Physico Theological Discourses*, Tab. 3. pag. 162, 163.

Fig. 11. A mass of petrifi'd *Sea Urchins*, one entire, another bruised, with the stony Prickles broken off, and lying by in the same *Bed*; there may be as many *Species* of this sort of figur'd Stones, or petrifi'd Spines, as there are of the *Echini Marini* themselves; some short, thick, roundish, and cannulated (as the *Lapis Judaicus*) other long, slender, tuberculated, and ragged (as *St. Paul's Batons* in *Malta*) all belonging to the several *Echinita* and *Ombria*. See the *Riccio Marino in Pietra, Imperati Istor. Natural. Venet. edit. 1672. p. 586.* and his Chapter *delle Pietre Giudaiche*, pag. 575, 576. These may come within the *Classis* of the *Spondylites*.

Fig. 12, 13. Petrifi'd *Vertebres* with their Articulations and Insertions, with the Ribs, See *Fig. 13.* These may be reduced to Mr. *Lhwyd's Tribe* of *Ichthyospondyli*; for Stones resembling *Vertebres*, and other Bones of *Fishes*, See Mr. *Ray's Travels, in the Preface*, and p. 116, 294. The *Entrochi* and *Asteria* come under this division.

Fig. 14. Petrifi'd *Dentalia* and *Cochlites* found lying in the same Bed, in the Rocky Mountains of *Calabria*.

N. B. That *Dr. Robert Hooke* publish'd some Observations upon this Subject in his *Micrographia*, p. 109, 110, 111, 112. and afterwards discoursed of it at large in several of his publick Lectures in *Gresham College* (which the Publick have long expected, and still desire from him) before *Steno*, *Scilla*, and *Boccone*, communicated their curious Observations to the World. See *Philosoph. Transact.* N. 32. pag. 628. also N. 72. pag. 2186 to pag. 2190. See *M. Denis his Memoirs and Conferences*, (printed with the *Journaux des Sçavans*) An. 1672. Mem. I. Also the Italian *Giornate di Letterati Ephem.* 5. of the same year. See *Dr. Hook's Lecture upon Springs* pag. 48, 49, 50. But above all, Justice is to be done to that Noble Natural Philosopher *Fabius Columna*, who hath two admirable Discourses upon the several parts of *Aquatick* and *Terrestrial Animals*, as also of *Plants*, which he himself observ'd to be dug up in the Mountains of *Andria*, *Apulia*, and other Places; and thereupon remarks how they were left there by the *General Flood*; why in some places they remain uncorrupted, in others wasted, and mouldred, in others only by their impressed Figures, and exact Forms. That they all answer in every delineation, and every part the very Bodies they resemble, and are truly the very same *Species*. See *Columna* in his *Observ. Aquat. & Terrest.* Cap. 21. pag. 43 to pag. 55. Also *de Purpura, Dissertat. de Glososopetris*, pag. 31 to pag. 39. 4to *Rome impress.* 1616.



Philosoph. Transact.
N. 219.