

Temp. Corr.

Having carefully considered the Moons Parallaxes in the observations of this Occultation at *Dantzick* and *Greenwich*, I find from the *Immersion* the difference of Meridians between *Greenwich* and *Oxford* $4^{\circ}.57'$; between *Greenwich* and *Dantzick* $1^{\text{h}}.14'.50''$: By the *Emersion* the first of those differences is found $4^{\circ}.59''$, the latter $1^{\text{h}}.14'.41''$: which near agreement shews the Exactness of all the Observations.

SIR, *The First Letter of* April 7. 1676.

What

What I here present you, is concerning *Mineral* substances ; for, having liv'd some years on *Mendip-hills* in *Somerset-shire*, and residing at present but a mile on the North-side of them, I have had an opportunity to make some Observations in Mines. I find in several of the *Transactions* a mention made of Minerals, but what I shall here insist on, relates chiefly to what I find *N. 100. p. 618* ; where is a description of certain Stones figur'd like Plants, and by some observing men (as you say) esteem'd to be Plants petrified, communicated by Mr. *Lister* ; whose descriptions I shall confirm and enlarge according to my Observations here ; being very joyful, that so good a hand has forestall'd a good part of that little news which I might otherwise have sent you concerning these Mineral productions.

1. All the *Trochitæ* and *Entrochi* described with their figures by Mr. *Lister*, are found on those Hills ; I having had the several species by me these many years, except that figur'd like a fruit. And as to the length of the *Entrochi*, the thinness and thickness of their joynts, the smoothness of some in their outward circle, the ridges and knots of others, the branches, the degrees of greatness and smallness of the *Trochitæ* and the like, my observations generally concur with his ; and so concerning their accidental Injuries. I have that species of *Entrochi*, which is tapering at both ends, and swells in the middle, and I find even the joynts of some are of that make ; so that an *Entrochos* shews like a parcel of little barrels, set one on the other. I have likewise his *Summitates* or *fastigia*, being long and slender pieces with a little button on the top ; but more of these in their due place.

2. As to their *Hollows*, I find them of all bignesses, from a central point to the taking up of more than a third part of the Stone ; some of the *Entrochi* are so hollow, that there is only a thin shell left, smooth within and without : Others have only a thin shell left, but with screws within and without ; and sometimes both these are one entire piece with seeming sutures. The *hollows* are generally round according to Mr. *Lister's* description ; though I have also many single joynts and *Entrochi*, whose hollows are like a cinquefoil ; and though this bore be most surprising (as he says) yet, methinks, 'tis most natural to the *radix*, which has five hollow stirts or feet issuing side ways from it according to the figure : And I find in some pieces of *radix's*,
which

which I have by me, that a little furrow passes inwardly from each foot to the top of the stone, with a ridge on the outside of it: Besides these I have a new species of *Trochites* and *Entrochi*, which has six inlets in the hollow, as the latter has but five; but with this difference, that these Inlets terminate in Angles, so that its a sexangular hollow, whereas the cinquefoil-inlets are round as the leaf is, and not pointed, though I have seen even of these with sharp angles.

3. Concerning the *Rays*, or ridges, and furrows; the joynts and sockets by which the *Entrochi* are joyn'd together, I find a great variety in them; for, as several rays, shooting from a center, must of necessity leave considerable widenesses betwixt them, as they pass towards the circumference, according to the bigness thereof; so, to fill up those widenesses, I find, that in some, betwixt two rays, issuing from the center, a third ray rises about half way on the stone from the center, and shoots to the circumference; some have their rays gently widening from the center to the circumference: Some have a trunk rising from the center, which grows forked towards the circumference: Sometimes betwixt those forks there rises a little ray near the trunk where the forks joyn, which shoots to the circumference; (but note, that these differences are scarce discernable where the rays are fine, but with the help of a Glass;) some again are ramous, having a trunk rising from the center, with three, four, or five branches shooting to the circumference: Some are smooth half way on the stone from the centre, and have a circle of small rays near the circumference: Some are smooth without any rays; these are commonly pretty thick, and are joyned in an *Entrochos* after this manner: one *Trochite* a little within the outward circle in the upper and lower parts where the rays use to be, has round inlets or sockets, pretty deep, so that only a thin *Tympanum* hinders, but the *Trochite* would be hollow at this wideness all through; and in the middle of this *Tympanum* there is a hole, as in other *Trochites*, which is sometimes round, some times like a cinquefoil: The *Trochites*, that answer this, on both sides have smooth joynts (I cannot properly call them *screws*, having no ridges) which enter into these sockets; those joynts being hollow also, and so other *Trochites* with sockets come on upon those again to make up the *Entrochos*. Some of these have both sockets and rays; some have a socket on the
one

one side, and rays on the other without a socket; some are all smooth, only a small ridge runs round them a little within the outward circle, which enters into a small furrow answering to it; some are all smooth, and joyn'd only *per harmoniam*, as Mr. *Lister* calls it; some *Trochites* hold of an equal thickness of substance from the center to the circumference; some are pretty thick in the circumference, and grow thinner towards the center; so that they have concavities on both sides, to which convexities in other *Trochites* answer: Some hold of an equal thickness half way on the stone from the outward circle, and then grow concave to the center. Mr. *Lister* mentions one *Trochite* he found of an oval figure, the rays scarce apparent, and a very small point in the place of the pith: I have of this species with *Entrochi* of the same (if these, having lost the figure, may retain the name of $\tau\epsilon\delta\chi\theta$;) some of these have good large holes in the middle, like other *Trochites*; but their bore is oval according to the stone. I have many other *Trochites* of this kind, but with this difference, that these have no rays, but are joyn'd together only by one ridge which passes directly along the middle of the stone the long way, there being a furrow in the other answering to it; these have also a small peck in the middle making but very little impression in the stone, and seldom passing through it, though I have of this sort with indifferent holes as the other *Trochites*, but such are commonly pointed at the ends, and not carried out with an oval round as the others. There are some single joynts which are shap'd with a double oval, that is, the oval in the upper part of them stands clean contrary to the oval in their lower part: In some again the ovals do not stand so extreamly opposite to each other, but only the oval in the upper part of the *Trochite* seems a little wrested from the direct line of the oval in the lower part, so that they stand bend-ways to each other, like a *St. Andrews Cross*; and there are *Entrochi* made up after this manner; and I find most of the oval *Entrochi* grow crooked and twisting. There are of these oval kinds of all degrees of thickness and thinness in their joynts, as are found in the round ones, and so for the bigness of their circumference, their smoothness in their outward circle, and their roughness with ridges, knots and branches, the length of the *Entrochi*, their Injuries, &c.

4. I come now to the *Radix's*, of which I have one as perfect

as most that are to be got, and several broken pieces of others. That which is perfect, is about the bigness of a Walnut, answering to Mr. *Listers*, but without any impression of a *Trochite* on it; the top of it indeed is a little flat with a hole in it, but it is withal very smooth, without the least sign of a ray. *Agricola* compares these stones to a Wheel; and truly the body of it well resembles the Nave of a Cart or Coach, the shape of it being conical towards one end till you come just to the top, where it is a little flat (as I said) with a hole in it; and it has another hole in the middle of the broad end just opposite to this, very fit for an *Axis* to pass through; and the five hollow stirrs or feet, issuing side-ways at equal distances from the broad bottom, somewhat resemble Spokes; the said stirrs standing about half an inch out from the body of the stone, so that it may not very improperly be call'd *Modiolus quinque-radiatus*; and at the ends of the stirrs, where the hollows should shew themselves, there grows after a very artificial manner a pretty large seam of the same stone just over the middle of the hollow, from the upper part of the stirr to the lower part of it, parting the hollow in the middle, and covering about a third part of it; not that this seam enters farther into the hollow than the mouth of it; so that the hollow of each stirr presents itself with two eyes: Hence it appears, that those stirrs or feet were never longer than they are, and that no stone ever grew to them; and I think it hard to get one of these stones so perfect as that I have, it being very difficult for a Miner to save these fore-seams, they being very obnoxious to the least injury. Mr. *Lister* says, the feet were like Crescents at the end, whereby I find the fore-seams of his Stones were broken off, as two of them are in mine. The stone seems wrought all over like the Fish mentioned by Mr. *Lister*, being compos'd of Trigonal, Tetragonal, Pentagonal and Hexagonal Plates. The upper part of the Conical end is wrought round with six large Hexagonal plates, and these reach half way the stone; then follows a second round, made up of eleven Pentagonal plates, pretty large, and these reach almost to the broad bottom, which is a little convex; the bottom it self and feet contain Plates of all makes, but most of them are very small. This Stone is in substance a whitish opaque fluor, of the same nature with the *Trochites*; it has outwardly a rusty coat, and is blewish within like some Sea-shells. When 'twas first found 'twas full of a sort of ash colour'd

ashcolour'd-gristy Clay, which is the evident material cause of it, it being found in a bed of the same. I easily pickt out the Clay with a Needle, so that 'tis now all hollow; the shell-like and sparry substance being scarce as thick as a Half-crown. I must own the knowledge of its being a *radix* to Mr. *Lister's* hint, though I have *Agricola* by me, but did not well mind him; and because the perfect *radix* was smooth on the top, and many other pieces of *radix's* which I have by me, they did not well indicate the thing, though upon a review I find one of them with small rays there. I have a great many of the Tetragonal, Pentagonal and Hexagonal Plates, with concavities, convexities; thin, smooth, and indented edges; little round knots on the convex part, others being only scabrous, others smooth, as I find many large pieces of the *Radix's* are. The sides of some are very unequal; in short, they agree in all things with Mr. *Lister's* descriptions. I have one sexangular Plate very pretty, whose convex part has on it a star consisting of six Embost rays, which shoot from the center directly to the middle part of the sides betwixt the Angles, and betwixt every two rays there grows a little stud after a very elegant manner.

5. To give an account of the *place* of their birth (though hinted before) I may now say this; I find the *Trochites* sticking to rake-mold stones, and in the crannies of Rocks at all depths, from the grass to 20 fathom; and doubtless there are of them deeper: But I find them most plenteously in certain beds of an ashcolour'd-gristy Clay, and particularly at one place within a yard or two of the grass. I found here a fruit with them like a *lapis Judaicus* (though somewhat defac'd) if not a species thereof; its about the bigness of an Acorn, with ridges and furrows running the long way; it differs from those describ'd by Mr. *Lister* N. 110; *first*, that this is not bigger, but rather less in the middle than at the ends; and *secondly*, that its ridges are not knotted or purl'd. It is in substance a whitish opaque spar like the *Trochites*, though (as Mr. *Lister* says) some *Trochites* are of a dark-colour'd spar; and I find some of a white cawky substance, and some have a tincture of red; but these differences proceed from the Clay of which they are made; for, though an ashcolour be the chief in it, yet there are some veins of red in it, some of white, some of a light-blew, some of a dark-blew &c; which cause these varieties in the stones. I find some *Trochites* and *En-*

trochi shap'd in raw Clay before they have attain'd the consistency of a Stone; and these, if laid in the Sun, become light and spongy like a *pumex*. I took up there a piece of another strange Stone, of the like sparry substance; 'tis about the bigness of a Walnut, hollow, and fill'd with the said Clay; it somewhat resembles a Helmet; the fore-part of it is smooth, the upper part, which has a large ridge in the middle, is all wrought with little rings, three at a place, encircled within each other. The Stone call'd *Cornu Ammonis*, shap'd like a Rams-horn, is very frequent in this clay; the largest I have is seven inches in length, four inches in compass at the broad end, and two and a half at the small end; the top being broken off. Tracing its Original, I find some of the first buddings out of it about the bigness of a young Cocks-spur, and very much like it. I have some in raw clay, and one growing from a white Cawky-stone. They generally become at last a whitish Spar, and some milk-white as some of the *Trochites* are: There are of all intermediate proportions betwixt these two, though very few of any bigness are to be found entire, but all broken and imperfect pieces: And I take the seeming *summitates* of Mr. *Lister* to be only little essays of Nature towards the production of this Stone, the alliance being evidently nearer than betwixt them and the *Trochites*. The texture of these Stones is thus: Some have massy spar in their insides, which takes up three parts of the Stone; then from the sharp top there grow thin flat cells, or small pipes of Spar, set edge-ways, one close to the other, all round the Stone, which shoot towards the broad end, and appear outwardly like small ridges or seams; and many of these pipes, running down thus after the stone, shew their hollows, some at one place of it, some at another, and some not till they come to the broad end: And this is the texture of the great Stone, which has rings also, though somewhat defac'd, running round it, tending likewise in their growth towards the broad end as in a Rams-horn. Most of the lesser stones have very little massy spar within them, and some have none, but appear somewhat hollow at the broad end, with cells coming down inwardly from the top of the stone, resembling those in the flowers of Coral, which terminate its branches; and doubtless, if taken from their beds in a seasonable time, would yield the like milky-juyce; for I find in the Cells of some broken pieces of these stones an evident concretion of such a
milky

milky juyce. And I may here acquaint you, that I have a piece of branchy spar, which I found at a Mine on these Hills, growing like Coral, and terminated with buttons or flowers like it. I find very few of the lesser *Cornua Ammonis*, whose Cells do any way appear or shew their hollows outwardly, as in the great stone, whose outward surface is wholly made up (as I said) of those cells, or thin flat pipes, set close the one to the other, many of which shew their hollows at several places in the stone; whereas the cells in the smaller ones appear only inwardly, having one coat outwardly which covers them all, and this coat in some is smooth, in others it's all wrought with little rings like the Helmet-stone beforemention'd; and some outsides have ridges or rings round them as a Rams-horn.

6. The Stones, I have given you an account of, generally move in Vinegar, the juyce of Lemmons, &c. sending forth bubbles, as I find Cawk will very freely, and most of our Mineral stones. *Baptista Porta* tells us, l. 20. *Magie Naturalis*, that he saw a piece of *Alabaster* weighing four pounds, and carved in the shape of a Tortoise, move so. The said motion seems to proceed from the contest betwixt the acid spirit of the Vinegar and the Mineral salt; so that the Spirits by fermentation breaking forth under the Stone produce that effect.

I well know, that an accurate view would discover many nice distinctions (omitted by me) in the shapes of all these Stones, (our Mineral Salts being almost as busie and luxuriant, as the volatile Salts in the Air in the figuration of Snow;) which I judge would be best perform'd by that person who makes it his business to record these things in the History of Nature, he being the most likely to find the aptest terms to specify them; and haply the best service we can afford you from the Country, may be to furnish you with the things themselves, with a diligent account of the soyl and place of their birth, and with as full an intimation of their primary rise as we can possibly arrive at by a close inspection; leaving the minute description of the thing to the worthy Historian.

Should I give you my thoughts concerning their *Vegetation*, it would lead me beyond the bounds which I am willing to allow this Letter, though I shall readily do it, and what other service I may, if you please to command it. If I had had the conveniency of an Artist to help the failings of my pen with his design,

sign, haply these things might have been more acceptable to you, and to those other worthy Persons, who make it a part of their delight to behold these curious sports of Nature, as they are represented by a skilful hand, when they cannot see them in themselves; but I know your Candour will excuse what could not be procur'd by him, that is very much, Sir,

Stony-Easton, Apr. 7.

Your humble Servant,

1676.

J. Beaumont Jun.

SIR,

The Second Letter of June 17. 1676.

SINCE my last having used some diligence in searching Mines, it has been my chance to make good the suspicion of Mr. *Lister*, to wit, that the *Trochites* are parts of Rock plants; for, viewing the Earths and Stones cast up out of several Mines where those stones were, I came at length to a Mine, where well near all the *Entrochi* (so called hitherto) or bodies of these plants grew tapering and ramous, some of them having branches issuing from them near two inches in length, and other small branches issuing from those; and upon a nearer search I discover'd an Entire plant, though small, growing up after the side of a Stone: I found also, that all the cliffs in some Mines are made up of these Stone-plants; whereof some, as appears, were converted into the nature of those Lime-stone-rocks, whilst they were in their first tender growth; others being become *Spar* compose rocks of that substance.

Considering that all the Cliffs for a very large circumference in some places are made up of these Plants, we may truly say, that there have been, and are, whole fields or forrests of these in the Earth, as there are of Coral in the *Red-Sea*. In the Courses, (or Loads, as some call them) betwixt the cliffs I find of these Plants growing up in the gristy clay, mention'd in my last, being rooted on the rake-mold stones; many of them being above a foot in height, and about the bigness of the stem of a Tobacco-pipe: All I have yet seen of this length, are either raw clay, or of the consistency of a Lime-stone, and some of them have outwardly evident beginnings of circles and futures. The small Plant which is entire, and the branched bodies of many others have attain'd their full term of growth, being become perfect *Spar*: If these had ever a height answerable to their bigness, (some of them being near three inches about, they must have been much higher than those before-mention'd: The branches are all joynt-

ed,

ed, and have the same bore with the trunks, and are terminated with round and blunt joynts, but very small. I find the bores or hollows of such as are found to be commonly fill'd with a milky crudeled substance, which probably in their time of growth was fluid like that in Coral. As it cannot be doubted but many of these Plants grow on those admirable *radix*'s of which we have given an account, and whereof I have at present some pieces which have a cinquefoil-bore on the top, others with the impressions of oval joynts there, and many other differences; so I am now fully satisfied that many of them grow from plain roots, that is, from plain *Spar*, or *Limestone*, without any such figure, as the entire Plant does, and many other trunks which I have noted.

Another observable is, that these plants do not alwaies grow up with one trunk or body, but sometimes five or six sprouts, near of an equal bigness, shoot up together from the same root; as it usually happens with Coral. As in my last I acquainted you, that I had some single joynts and pieces of many joynts, which had six inlets in their hollows; so I have since met with some which have only four; others with seven, and doubtless there are of other varieties in this kind. Mr. *Lister* is pretty full in his account concerning their outward differences; to which I may add, that some trunks have a circular edge on every other joynt; the intermittent joynt being smooth without edge or knot: Some Trunks have circular edges on the middle of every joynt, but so that the first and fifth edges are the highest; the second and fourth the lowest; the third is higher than the latter, and lower than the former; the joynts themselves being great and small accordingly, and this order holds all along the Plant. Some Trunks have edges according to the same order, only the edges on the second and fourth joynts are round and blunt, the other three being sharp; some have edges after the same order, which are all round and blunt. There are some Trunks wrought after the same manner, only the first and fifth joynts have a circle of knots round them, the other three have edges: Some Trunks have no circles, nor knots, but are only a little scabrous like the plates which compose some Roots, of which Plates I have also now some of different figures from what has been observ'd hitherto. It may be a *Quere*, whether these differences in the bores and outward coats of these plants do argue them to be of

of different species, diversity of figure being usually a mark of a specifical distinction; but since the texture of their substance appears to be wholly the same, and we find no qualities either by the smell or taste which manifest any such diversity, it may, perhaps, be as hard to make them out to be distinct species, as to shew a specifical difference betwixt several Snow-blossoms.

Considering the reason of that strange and mangled disorder which these plants usually lie in, some of them appearing to have been deprest in their infant growth, others to have been broken after they were come to their full consistency, &c. I gather it to be this: Whilst these plants were growing, the clay wherein they grew was soft as a Quag mire, these probably requiring such a substance to support their growth, as Coral does Sea-water: afterwards as they began to settle to a Stony consistency, and as part of the clay became of a rocky nature, the whole mass sank from its first position, and the moisture passing away made some concavities, washing down some broken pieces of those stones with it; and lumps of clay and other stones, falling down through those crannies, added to their confusion, being very apt to be disordered by the least concussion, either whilst they were in their first growth, or after they were become Spar, their joynts being very tenderly set together; and hence these Stones are generally found in *Leirey* places (as they call it) that is, *Cavernous*.

The best way to explicate their *Vegetation* will be, *first*, to represent the several ways of the growth of *Spar*, which (to pass by the account from *Helvetia*, that Snow by long lying and continual frosts is hardned into Spar) I observe to be three: *Either* it takes a being from Steams alone; or from Steams coagulating either Dew as it falls on the ground, or Waters issuing from the joynts of Rocks underground; *or* it grows from Earths and Clays. We have an Instance of the *first* in many Grotto's, where some Spars, produc'd from Steams alone, hang from the roofs like Icicles; Lead-ore often growing in the same manner; and as this Spar grows downwards, so in many places from the sides of it, there issue little Plants of Spar, which shoot upwards contrary to the growth of the other: Thus Spars grow from steams about the Baths at *Buda* in *Hungary*, according to the relation of Dr. *Browne*. An example of the *second* is given in the *Transact. N. 83. p. 4068*. where 'tis said, that at a certain place in
Italy

Italy Cryftals (which are a fort of Spars) are produc'd in clear evenings by a coagulation of Dew falling on Nitrous ftreams. We have fome of the like rife on *Mendip-hills*, our Miners finding fometimes in roads, where the earth is bare, triangular Cryftals about two inches in length, and an inch over, not with fharp angles, like the Triangular glafs, but with round and blunt angles, and carried up round at the ends like a Coco-nut, none of thefe being ever found in digging: I have feen of the fame fort which were taken up in *Glocefter-fhire*. So again its commonly feen in Grotto's, that ftreams, coagulating waters iffuing from the joynts of the clifts, produce Spars of all colours. As to their *third* way of generation, to wit from Earths and Clays, becaufe I do not remember to have met in any Author with a fatisfactory account thereof, I fhall briefly relate to you what I have obferv'd herein.

There are on *Mendip-hills*, and generally where Mines are, fubterraneous Vaults or Grotto's, whereof *fome*, which are pretty deep, and admit not air too freely, and have other conditions requir'd, are faid by our Miners to be quick, having often oar in them, and ftill lively colour'd Earths, with fome moiifture and lively Spars: *Others*, admitting air two or three ways, and having in them black and moiift rocks, and dry and rotten fhelly Stones, dark Earths, barren Sands, and the like, being faid to be dead. I have often fearch'd both, and in fome of the former, particularly in one of them, which is 35 fathom deep by a perpendicular Line (though the oblique defcent of it makes it above 50 fathoms to thofe that go into it,) I discover'd this procefs of nature in the formation of Spar: There are in the bottom of this Grotto fome beds of Clay, and others of a Liver-colour'd earth, which I take to be as good a *Bole* as any now in ufe; it is infipid to the tafte, but fmells well, efpecially when dry'd; for, as it lies, it is moiift and like pafte, made fo partly by the diftilling waters, and partly by a ftream incumbent on the place raifed from thofe waters by the Mineral ferments. This Earth and Clay there fhoots up every where in fpires in all proportions in height, from the firft buddings out of it, till it comes almoft as high as a mans finger; the biggeft of them being in thicknefs about an inch diameter: Thefe fpires are all rul'd up with irregular ridges and furrows, and fome fooner, fome later begin on the top to be congeal'd into Spar, and fo, gathering a cruft down-

ward by degrees, are all at last turn'd into an absolute white Spar, with some *Diaphaneity*. I discover'd the same Earth in some places there growing spherical, which whilst it is Earth, it is still sticking to its bed; but afterwards, as it comes to be crufted over, and at last to be turn'd into Spar like the other, it grows clear off from its root, as fruit falls from the tree when ripe. I have by me of these Spherical stones, from the bigness of an ordinary Bullet to that of a great Pins-head, some turning to Spar sooner than others: I found some quite grown off, some half grown, some white Spar outwardly, and raw Earth in the middle, so that the process was as plain to me as I could wish. I saw the same Earth in some places there growing in an exact oval form, and turning into Spar not oval, but rais'd on both sides with an edge round it like an Apricock-stone: And as these spherical and oval stones are most exact in their figure; so, notwithstanding the Reclor fails in this Vault to give a true sexangular figure to those which I said shoot up pyramidally; yet there is a certain place on these hills, where the Spars grow all sexangular, both points of them terminating into a pyramidal figure, sexangular likewise, as the veins of Crystal, found in *Italy*, produc'd by a coagulation of Dew; these with us probably having the same rise, lying also on the surface of the earth. Here I may acquaint you, that I find *Talc* on these Hills growing sexangular; the rust, which often lies over veins of Lead-ore, in many places shoots up pyramidally, and is bounded round with six angles, and sometimes with five: Lead-ore it self often shoots up pyramidally with rough irregular lines round it, and in some places I find it bounded round very regularly with four angles; in other places it grows branched like a Plant, as I have seen in a Mine where the Stone-plants grow.

To come now to the *Vegetation* of these plants, I find, they begin their growth from the finest parts of clay, being commonly white, soft and smooth at first, and by degrees come to have ridges, knots and sutures, as they grow towards a stony, and so to a sparry nature. The pith continues still soft and white, as the whole is at first, and its continually refresh'd by the Mineral streams, and moisture, which have free access to it through the five hollow stirts or feet in the figur'd roots, or through the mass of clay which commonly lies under the plain roots; this free supply of moisture being probably more necessary for the support.

port of these plants than for those which appear to the day ; since Nature carries-on her Mineral generations with a stronger effort than other : Wherefore Field-plants hold a communion with the steams and moisture of the earth by perspiration only, as they breath through the roots, which have no open passage for them. Nor can it be said but those Stone-plants have true life and growth ; for since in the curiosity of their make they may contend with the greatest part of the Vegetable kingdom, having parts to assimilate nourishment by attraction, retention, concoction and expulsion, I know not why they may not be allow'd as proper a vegetation as any plant whatsoever. And indeed what has been said hitherto against the vegetation of Stones, to prove that they receive their increase only by *juxta-position*, has been chiefly meant of Common stones, which have no parts that carry any analogy with plants ; whereas these are shap'd like them, having inward pith or sap, and likewise joynts, and runnings in their grit, and sometimes cells, which may very well supply the place of veins and fibres. Nor does that argument which is brought in the *Transact. N. 99.* against the vegetation of Coral seem to convince us : For though that Person can produce a Salt of Coral, which after dissolution will upon coagulation shoot into a little grove of Plants, as it were, resembling the growth of Coral, this cannot disprove its Vegetation ; for, it's well known, that all Plants may be so prepar'd, that from their ashes they will rise again in their proper species after such a manner.

As to that opinion which generally solves those various *Phænomena* of the several figur'd Stones, which we find in Mines and elsewhere, by saying that they are parts of Plants and Animals, or whole ones, petrified ; it seems not to be grounded on practical knowledge : Thus when we find several sorts of *Shell-fish* in Mines, as there are some in the clay where those Stone-plants grow, we must not flie to petrification, as though they had been brought there by the Sea, or otherwise, and so petrified ; but we must take that to be (as it is truly) the natural place of their birth ; some of them being raw-clay, others of the same texture with the Rock where they grow, and others of as absolute a shelly substance as any in the Sea ; these being only different gradations of Nature, which can as well produce shells in Mines as in the Sea, there being no want of Saline nor Earth-

thy particles. Nor is there any great difference betwixt some sorts of Spars, and Sea shells; neither do I know, why Shells might not as well be produc'd in Mines, as any sorts of Spars are in the Sea; for instance, the *Fungi Marini*, which are of a sparry substance, some of them having their surface all wrought with flowers, as it were, which are only the terminations of sparry cells, as in Coral, and Coral it self is a sort of Spar, which so well resembles our Stone-plants in its growth, especially if some of it be joynted, as Mr. Ray informs us, that I know not a more apt name for these than to call them *Mineral Coral*; unless some haply will rather say, they are *Fluores arborecentes internodiis distincti*; and as I find the bodies and branches of some Coral are all rul'd up with lines, so are many of these in some Mines, and are terminated with cells like it.

Mr. Lister N. 79. of the *Transact.* p. 2282. judges, that Shells found in Stone-quarries were never any part of an Animal; and gives this probable reason for it, because Quarries of different stone yield us quite different species of Shells, not only one from another, but from any thing in Nature besides, which either the land, salt, or fresh water does yield; and though some seem of the same species, and much like each other, yet there is distinction enough to hinder them from being sampled by any. *This Mr. Lister.* I observ'd the same thing some years since, when I endeavour'd to satisfy my self of the process of Nature in this kind; and have now by me several species of Stones resembling *Shell-fish*, which I gather'd from Plow'd-fields and Quarries, that are scarce to be parallel'd, as I judge, by all the Collections of Sea-shells extant.

To examine this opinion of *Petrification* further; perhaps it might seem rash to deny a petrification of Animals and Vegetables, so many instances being alledg'd on all hands by judicious persons attesting it; though I cannot say, that my own observations have ever yet presented me with an ocular evidence of the thing: I only find, that the thing suppos'd to be petrified becomes first crusted over with a stony concretion, and afterwards, as that rots away inwardly, the lapidescent juyce insinuates it self by degrees into its room, and makes at last a firm stone resembling the thing in shape; which may lead some to believe it really petrified. But, though a real petrification were allow'd in some cases, it would not be rational to plead this in all the figur'd

figur'd stones we see, in regard of those many grounds we have for the contrary. But I take these to be the chief reasons which make some so ready to embrace so generally this conceit of petrification, because they are prepossess'd with an opinion against the vegetation of all Stones, and for that they think it impossible for Nature to express the shapes of Plants and Animals where the Vegetative life is wanting, this being a faculty peculiarly belonging to that soul, whereas they seem to erre in both: For, as what has been said concerning our Stone-plants, may suffice to prove their vegetation; so it will be as easie to shew, that Nature can and does work the shapes of Plants and Animals without the help of a Vegetative soul, at least, as it is shut up in common seeds and organs. To be satisfi'd of this, let them view the figurations in *Snow*; let them view those delicate Landskips which are very frequently (at least in this Country) found depicted on stones, carrying the resemblance of whole groves of Trees, Mountains and Vallies, &c; let them descend into Coal-mines, where generally with us the clifts near the Coal are all wrought with curious representations of several sorts of *herbs*, some exactly resembling *Fern-branches*, and therefore by our Miners call'd the *Fern-branch clift*; some resembling the leaves of *Sorrel*, and several strange Herbs, which haply the known Vegetable kingdom cannot parallel; and though it could, here can be no colour for a petrification, it being only a superficial delineation. The like may be said of Animals, which are often found depicted on Stones; as all Mineral histories will sufficiently inform them. Now since here is no place for Petrification, or a Vegetative soul, we can only say, that here is that seminal root (though hinder'd by the unaptness of the place to proceed to give these things a principle of life in themselves) which in the first generation of things made all Plants, and, I may say, Animals rise up in their distinct species; God commanding the Earth and Waters to produce both, as some Plants and Animals rise up still in certain places without any common seed.

It seems to be a thing of a very difficult search, to find what this *Seminal root* is, which is the efficient cause of these figures. Many of the Ancients thought it to be some outward mover which wrought the figures in things for some end; the *Peripateticks* rather judg'd it to be some vertue implanted in the seed, and in substances having an analogous nature with the seed. As

I have now and then essay'd to find the nature of this Efficient, which works these figures in stones: It seem'd to me not very unapt to explicate it according to the saying of *Heraclitus*; *Lux sicca, anima sapientissima*, that is, where there is a strong internal light to expand the Idea's, and a drought to terminate them, the vertue of a soul is still present which imprints them in the matter: Hence we find Nature is most busie in the kind where her intentions are highly rais'd by the presence of her chief principles, Salts, Sulphurs, and Mercuries promoting her ferments, which cause some internal light and drought, the *ignes fatui* being only shadowy results from them: Thus we see over and in beds of Clays and Marles, which have strong ferments, being well impregnated with Salts, there often lie beds of Marchasites full of luminous particles, and there we frequently find great numbers of *Lapides Serpentarii*, and Marchasites resembling Snakes; and so several other figur'd Stones, as the *Belemnites*, &c. In the joynts of the Lias-stones, growing over beds of Clay, we often meet with a great plenty of elegant Landskips. In Coal-mines, where the Sulphurs are strong, we find great lumps of very bright Marchasites, and great varieties of Herbs depicted, as is said before. In Mines of Metals, where the Mercuries are generally predominant, there are landskips and representations both of Land and Sea-animals, whereof some carry a bulk, others are only superficially delineated. Those who endeavour to explicate those figurations mechanically, seem to have a harder task; for, if they say with *Hippocrates*, l. de *Nat. Pueri*; *Spiritu distenta omnia pro generis affinitate distant*; as though, when the Mineral spirit had extended the matter, it fell into those figures upon a spontaneous recess according to its proper weight, which gives order and measure to things; as he mechanically shews by a Bladder, into which if earth, sand, and filings of lead be put, and water be added to them, and we give them motion by blowing in the Bladder through a reed, first they are mixt together with the water, but in a while continuing in a gentle motion they separate themselves and retire each to its like, the lead to the lead &c; I say, if it be explicated thus, it seems difficult to conceive, how the matter should come to have such a determinate weight to run into such figures, without a specific *Rector* to intend and dispose it, unless a general one be admitted, in whose vertue all known and possible species are, which, first introducing

roducing dispositions in the matter, he intentionally works; and, as sometimes he gives that weight to the matter, not endowing it with a principle of life, so he often disposes it to receive life and introduces it: which Position I conceive will hold good, notwithstanding some late industrious essays to prove that there is no Equivocal birth.

Thus, *Sir*, I have inform'd you, that the *Trochites* are parts of Rock-plants, and have given you something of what I conceive and practically know concerning their vegetation, essaying withal to render some account of those various figures which are found amongst Minerals: Not but my thoughts are very poor of these things, which can make but a very slender addition to that rich store sent you by your learned Correspondents. I shall conclude with a request to you concerning a thing, which may prove very much to the advantage of those who are concern'd in Mineral adventures: It is a constant opinion amongst our Miners, that *Lead-ore* discovers it self by an Oily-smell, and that chiefly in a morning a little before the rising of the Sun, especially when some show'rs have fall'n in the night: This being so, I find two things in the *Transact.* which give me hopes that this way of discovery may be much improv'd by Art: The *first* is an intimation of a way shewn by *Sr. William Petty* in his Tract of *Double proportions*, whereby we may discover a smell at a great distance, and so consequently the intenseness and remisness of it near at hand, wherein the chief difficulty will consist; for, where these Smells rise, they commonly diffuse themselves to a furlongs circumference or more, so that we are more at a loss to find exactly the place whence they rise, than to make a first discovery of them. The second thing is the *Statical Baroscope* of *Mr. Boyle*, which I conceive may give us some light of their true source, there being probably at that place a considerable variation in the pressure of the Atmosphere by reason of the Mineral-steams which are there in the greatest abundance. I am not ignorant, that some strongly fermented beds of Mineral-earths and rusts, which are sometimes barren, send forth a ranker smell than *Oar* it self, which may now and then deceive us; but because for the most part these are concomitants of *Oar*, we may not look upon the attempt as fruitless. Now, *Sir*, my humble request to you is, that you will be pleased to oblige me with your opinion of the probability of the success, and to instruct me in the way which *Sr.*

William

William Petty proposes in his *Double proportions* ; for I have not read the Tract; and if I understand you judge the thing rational, I shall endeavour to procure the Instruments, and proceed to practice, and shall pay you my hearty thanks with a ready return of any service that lies in me, being, Sir,

Stony-Easton, June 17.

Your obliged and humble Servant,

1676.

J. Beaumont Jun.

An Account of some Books :

I. *Ephemeridum Medico-physicarum Germanicarum ANNUS IV & V, Anni 1673 & 1674, &c. Cum Appendice* : Francofurti & Lipsiæ, 1676. in quarto.

THIS industrious Collection contains 210 Observations ; among which not a few seem considerable and uncommon ; E.g. *Menses* coming at 8 and 9 years of age : A Prince that lived a great while with great and dangerous diseases : The Errors of Nature in one part, supplied by another : A preservation from drunkenness by the gaping of a Suture of the Head : A cure of the Scurvy by a Dog's licking the Patient in the parts most affected, together with the cure of that Dog, becoming altogether scabby, by *Mercurius dulcis* : Two men monthly troubled with the Hæmorrhoids, from their youth, the one unto the eightieth, the other to the ninetieth year of his age : An Ague recurring every eighth day : Worms of divers sorts fallen down with Snow in *Hungary*, not far from the Copper-mines of that Country : Of a young woman, that though she did for a while drink wine, yet came afterwards so to abhor it, that she could take nothing physical, that had any thing prepared of Tartar in it, but did sweat, and faint away when it was given her, though she knew nothing of it before hand : The juyce of Hemlock mixed only with a little Sugar, for several days taken inwardly, to the quantity of three ounces at a time, to allay the heat of the Liver ; follow'd by no other noxious effect but a debilitation of the strength of the Patient : The Preparation of the Helmontian *ludus*, together with an account, that the Oil, drawn of black Flints, such as we strike fire with, cures the Stone of the Bladder ; as also, that the Spirit of Sea-salt, especially of *Spanish*-salt, is a potent remedy against the Strangury : A wound in the Breast and Lungs not mortal : Fontinels or Issues naturally arising in the Arms and Feet, and curing a Patient of a violent Head-ache, and troublesom pustules of the Head ; as also of an Issue in the