

so much mischief to Chimneys, tops of Houses, &c. not to mention the damages at Sea.

During the said Storm, and about 8 a Clock in the Morning, I cast my Eye upon my Barometer, and observ'd, that I had never seen the Quick-silver so low; but half an hour after the Quick-silver began to rise, tho the Storm was not at all abated, at least to any appearance; from whence I concluded, and said it to those that were about me, that the Storm would not last long; and so it happened.

There are some that affirm, that the scattering of this Salt water by the Storm will do a great deal of harm to the Fruits of the Earth; but for my part I am of a quite different opinion, for I believe that a little Salt spread over the surface of the Earth, especially where it is heavy Clay-ground, does render it exceeding Fruitful; and so it would be if the Sand out of the Sea were made use of to the same purpose.

VI. *Part of a Letter from Mr Anthony van Leuvenhoek, F. R. S. concerning the Figures of Sand.*

Delft, Dec. 4. 1703. N. S.

I Take the liberty again of sending you the following Observations.

I remember I have formerly affirmed of Sand, that you cannot find in any quantity whatsoever two Particles thereof, that are entirely like each other, and tho perhaps in their first Configuration they might be alike, yet at present they are exceeding different; the Sand especially that we make use of is obnoxious to so great alterations, that it would be a wonder, if even in its smallest
Par-

Particles, of which there may be a thousand in one small grain, there should be an exact similitude.

For let us conclude (as I have often suppos'd) that our common Sand, of which one grain differs from another in pellucidity, was found at first with smooth sides and sharp points, the said points and sides are so rubb'd one against t'other, that several small pits or holes may be perceiv'd in them, whereby they lose their first figure, and who can conceive what changes those Particles of Sand undergo, that lye next the superficies of the Terrestrial Globe, and especially such as lye some depth under a stony ground where laden Waggon's pass often, for those Particles of Sand, by frequent compressions and collisions, wound each other, indenting holes in their sides, and breaking off the sharp Points or Angles; not to mention what alterations are made in these small bodies by Storms, Thunder, Earthquakes, &c.

After having exerted my poor Observations on these matters, I got some shining Sand from an old Gentleman, a Kinsman of mine, who was Presented with the same by a Book-keeper belonging to the *East India Company*, in the year 1648. and to the best of my remembrance Folks us'd to strow their Letters with such a kind of Sand about that time.

This Sand, tho' very thin, was not transparent, the shiningness being wholly occasioned by the reflexion of the Light from the polish'd sides; several Particles of the said Sand, which were much bigger than the rest, did not reflect any Light, tho' to the naked Eye they seem'd smooth; from whence I concluded, that they had lost their glance by a frequent rubbing their sides against others.

When I view'd several grains of the above-said Sand with my Microscope, I was surpriz'd to see that many of them were hexangular, and the more, when I had sifted the finest from the coarsest; neither could

I observe that any of the Sands were like each other.

I view'd the said Sand with great attention several times, imagining that by some Earthquake or other it might be thrown up from the place where it had lain in rest, to the superficies of the Earth; and many grains, as I fancy'd, had preserv'd their original shape and figure, for they had received little or no damage, especially the small ones, and many of those had such points and sides, that no Diamond, tho polish'd by able Workmen, could equal the beauty of it.

I infus'd some of this Sand into *Aqua fortis*, to try whether it would dissolve them, or deprive them of their shining quality, and tho it lay in the said Water several days, I could not perceive any alteration in it.

Moreover, I tried the said Sand with so brisk a Fire as was capable of melting Silver, and yet it did not affect either its Figure or Glance.

These Particles of Sand being exceeding small, and not unlike what we call white scowering Sand; I thought it worth the while to Design some of them.

Fig. 1. Tab. 1. A B C D E F represents an hexangular grain of Sand that was as bright and shining as any polish'd Metal, and the triangular Figures which appeared upon it were as bright as the rest of the body, which occasion'd a very agreeable spectacle, and could not be contemplated without astonishment.

I plac'd another grain of Sand before one of my Glasses, less than the former, but it was flat, and in my opinion, not the 16th part so big as a coarse grain chosen out of our common white Sand.

This was a surprizing Figure, and the first persons that saw it were 3 Painters, who were fill'd with wonder in viewing it, and one of them, who was not the least among them, offer'd his service to draw the figure of such a wonderful Sand, and another desired him to let him to take a Copy of the same, that he might let other

curious

curious persons see the strange things in such a small body.

In the said Sand, which is describ'd by G H I K L, you may see not only, as it were, a ruined Temple, but in the corner of it G H I appear two Images of humane shape, kneeling, and extending their Arms to an Altar, that seems to stand at a little distance from them; this was still the more agreeable, because it was as bright as any polisht Steel.

Fig. 3. M N O P represents (as near as the Limner could trace it) another hexangular small Sand, with two sharp points like Pyramids, and each side that compos'd the said points were very smooth and shining: I have seen several such Sands, that on each side had a smooth, shining and oblique superficies, insomuch, that upon one single grain I have counted 24 such polisht sides or faces.

I have also observed several small Sands, that instead of terminating their six sides in a sharp point, ended sometimes in a Triangle, Quadrangle, and even in a Pent or Hexangular shining flatness.

I remarkt several three sided Sands, of which some were regular Triangles, which were very shining and very thin, others were thicker. See Fig. 4. Q. R. S.

I shewed the Painter other Sands that were compleat hexangles, the flat sides of which appeared to us like a Steel Looking Glass in a Frame, and in some of them were little holes, which seemed to some to be likewise hexangular; whence I concluded, that such a hole was made from the pressure of another Sand of the like Figure. See Fig. 5. T. V. W.

When I lookt upon any of these Sands sideways, each of the six sides, which in the Figure appear as a Frame or Border, seem'd to be a Polisht Looking-Glass.

Fig. 6. X Y Z does also represent an Hexangular Sand opposed to the sight a little sidewise, whereby the Reflection is not so full and large as if the flat side were placed

placed directly before the eye; but then it came from the two sides which represent a part of the Frame, and are shown in this figure by the Letter X.

Now when the hinder part of such a Sand is brought before the sight, I observe that it has the same figure, and that then, that part of it, which I should have described as a dark circle of the shining Sand, was compos'd of twelve bright, oval, flat superficies.

I gave the Limner another hexangular Sand to draw, whose bright Superficies or Area was of a different make from its circumference, for there appear'd in the middle of them several triangular figures, which, tho they were something rais'd or imboss, were very bright, which was very pleasant to behold; see Fig. 7. A B C, and altho the circumference in this position appear'd very dark, yet the sides thereof, when oppos'd to view, were no less bright and shining.

I caus'd the Painter to design another grain of Sand, which is represented by Fig. 8. D E F G H with its protuberant parts and their respective sides; but it is impossible to describe with the Pen the beauty and variety of the figures in the said Sand, neither can any body imagin it but those that see it.

I turned the opposite side of the said Sand to my Glass, whereby I discover'd the several shining Angles thereof, as in Fig. 9. I K L M.

I placed another small shining Sand before my Glass, which appear'd as in Fig. 10. O P Q R, several of whose sides were unblemisht; in a word, if I should undertake to give you a view of a thousand others, and should enter upon a strict examination of every one of them, I doubt not but we should discover every one of them to be of a different size and figure, besides several other particularities which might be peculiar to each one, as the great Rent or Breach, which in fig. 8. is describ'd by a a.

I have also observ'd that this shining Sand weigh'd twice as heavy as our common scowring Sand.

Now when I took some of the Pellucid or Transparent Sand (which did not shine, because it reflected no light) I observ'd that the sides and angles of each Grain were freer from scars and blemishes than most others I had yet consider'd, from whence I concluded, that such Sand had not lain long near the superficies of the Earth.

I placed one of these Sands before a Microscope, so as the Painter might have a full view of three of the four oblique sides, see Fig. 11. A B C D E F, one of the flat sides being represented by B C D G, another D E A G, which had a streak or scratch in it, suppos'd to be done by the pressure of another Sand upon it; and the third flat side is described by B G a b.

Having represented this transparent Sand in its shortest position, I put it in another sight, so as you might see it in its full length, as in Fig. 12. H I K L M, and therein streaks or little holes, which I firmly concluded to be occasioned by the collision of other Sands.

I likewise took notice of some, but very few, Sands that were long and slender, and which did not appear bigger thro a common Microscope, than a single hair of ones Beard to the naked Eye.

I have taken several of the shining Sands and broke 'em to pieces, and then viewed the broken pieces thro a Microscope, and observ'd, that many of those small Particles, tho they were a thousand times less than a grain of common Sand, had a glance or lustre when the light fell upon them, and that several such particles, and some that were larger, if you lookt upon them against the light, represented a fine blooming red; but some of them were so but in part, from whence I concluded, that part which was not red was thicker than the rest, and did not admit of light thro it. Among these small broken pieces of Sand, I observ'd some that had six sides, others that were

angular; all these Sands are to be considered as common Sand.

I took one of the above-mentioned long slender Sands, which I judged also to be one of the thickest, and placed it before a Microscope, as you may see in Fig. 13. N O P Q, in which you may distinctly perceive four flat sides.

I have observed in many Sands, that their bodies consisted of unspeakably thin scales or scaly particles.

Among these shining Sands I discovered others that had no lustre at all, neither had any of their particles after I broke them to pieces, but it appeared to be a dark red matter, and in other Sands so broken there was not only a red matter, but even an hundred shining particles, all proceeding from one Sand.

I have also seen some Sands, that in the middle of their shining sides represented small figures that gave no lustre, but as I viewed them more narrowly, I found it was a red matter, incorporated as it were in the Sand.

I have placed several Sands of the coarsest sort before a Microscope for the pleasure I took in the viewing them, for one seemed to represent an agreeable Rock of Stone, another, a deep Cavern, insomuch, that several persons whom I made partakers of the sight, were astonisht to see such various figures in such small bodies.

These last Sands were not, I suppose, so shaped from the beginning, but those cavities and protuberances which we espyed in them, came from various chances and accidents, as by the collision of other particles of Sand which were bigger than these, which in their turn were again broken by other bodies of a larger size, such as Pebble stones, &c.

I have cleaved some grains of Sand, and discovered figures of Triangles in them.

I have by me some draughts of Stone compos'd of particles of Sand, but because I will not heap up too many things together; I shall break off here.

Delf in Holland, February 1. 1704.

Soon after that the Cathedral Church at *Utrecht* was almost ruined by the dreadful Storm, my curiosity led me to view the fallen Pillars and other parts of that Building that lay about, and I observed, that several of the Pedestals were compos'd of red Stone, as also some Tombstones; and that in another Church there was a whole Pillar of such Stone, and forasmuch as neither in our Town, nor any other Town that I know of, this sort of Stone is made use of by Masons in the building of Houses, I took some of it home with me, in order to observe it with my Microscope, and I did then imagin that that sort of Stone consisted for the most part of large and transparent corns of Sand, and that the redness of the Stone was only caus'd by a certain red matter, which had produced such a continuity or adhesion in the mass of the Sand, as to be able to consolidate it into a red Stone.

Being of this opinion, as I said before, I took the little piece of red Stone, and separated several Sand-particles from it as gently as I could; and because the red matter which clung to some of the Sands more than others, hinder'd me from taking a distinct and clear view of each particular corn, I put some of them into *Aqua Fortis*, to try whether that would dissolve the red matter, and restore its lustre to the Sand; but in vain, for that Menstruum was not able to separate 'em. Then I took several of those Particles of Sand that were surrounded with the least of such Red Matter, and placing them before the Microscope, observed that some of 'em had ten or more sharp

sharp Points or Protuberances, so neatly and regularly fashioned, that no Polished Diamond could out do them. I set one of the largest Corns of Sand before my Glais, and could perceive in the same, and that too in a very small compass, seven neat Prominent Points (exceeding one another in length and bigness) issuing out of very smooth sides; and I judged that one such Sand was furnished with above a hundred flat sides, which were very smooth, and consequently very shining, tho with the naked eye one could discover no brightness worth mentioning; the reason of which I conceive to be, that this Sand being partly transparent, admitted the light thro its Pores, and did not reflect it back like shining Sands.

These Sands, tho I viewed never so many of them, I found to be each of a different figure, and when I pickt out any of them that were somewhat oblong, I seldom failed to discover at the ends a four or five sided obtuse point, so neat and regular as if it had been polishd.

I broke to pieces several grains of Sand upon a clean Glais, and found that they were not near so strong as the shining Sand, and having placed the small particles of such a broken Sand before my Microscope, some of them appeared like whole Sand with its entire sides and angles.

This was a very agreeable spectacle to me, to see so many neat smooth sides, and so many exact points and angles all derived from a single grain.

Tho it is impossible for any Limner to describe these points and sides exactly, yet I caus'd some to be design'd as well as I could.

Fig 1. Tab. 2. A B C D E represents thro a Microscope one of the above-mentioned Sands, of which many together compose the Red Stone; A B C D shows the points, which are much more plainly seen than several others that cannot be distinguisht, because of their different positions.

Fig. 2 shews you another Sand which likewise has several points, tho not so obvious as the former, because they do not stand so far outwards.

Fig. 3. M N O P represents the last mentioned Sand, only with this difference, that you see it in another position.

Fig. 4. Q R S T shews also a Sand of the aforesaid Stone, in which, you may observe the Diamond cut better than the former.

Fig. 5. V W X Y Z represents two grains of Sand that were still joyned to each other, the one is described by V W X, wherein you may observe several points, and particularly between W and X, and the other is shown by X Y Z, and the most of its points lye between Y and Z.

Now as some of the smooth sides of these Sands were large, and others small, and that all of them were not so smooth as polisht Glass, and had several small scratches or flits in them, I do suppose that might happen by the breaking or division of these sandy particles from one another.

That piece of the Red Stone that still remain'd entire was about the bigness of a Pea, and when I beat it in pieces, there flew a spark of Fire out of it.

I made a small bit of it so hot, that it was glowing, and so let it drop into water, supposing, that not only the particles of Sand would be separated thereby, but that the red matter also which consolidated the Sand would be divided from it too; but I found that the Sands only were separated from one another, and each particle of Sand was as strong as if it had never been in the Fire, and was also surrounded with the red matter; but in some of them, which had assumed a greater transparency than before, I could plainly discover that each Particular grain did consist, or rather was a congeries of several small particles, of which you should see in some Sands, fifty such standing out, like pointed pyramids, all transparent, and some

some of them had the same figure as the grain of Sand it self had.

By these Observations I was fully satisfy'd, that the Sands of which the above-mentioned red Stone was compos'd, had for the most part preserv'd their original Figure, and that they were so hard and solid, that their falling one upon another could not produce any adhesion, otherwise than by the intervention of that red matter, which was interspers'd and mixt with them.

From these remarks, I naturally turned my thoughts to Diamonds, and my hypothesis is, that all the Diamonds that have or shall be discover'd, do not grow, nor are made in any series of time, but were form'd like other Sands, in the beginning of the World, for how is it possible that such a pellucid body can be produced in the Bowels of filthy Earth, by a congealing or coagulated succus or moisture; and if it were so, why don't we meet with very large Diamonds? for when a small Diamond is once form'd, there would be a more than ordinary conflux of the same plastick matter thereto, as we find in other things, that they have always a strong tendency or inclination to substances of a homogeneous nature with themselves.

I have been assured that in some places, Water does filtrate thro the Rocks into the subterraneous Caverns, and coagulate at the top of those Vaults or Particles like Nine-pins, and at last are really petrify'd.

We may allow this to be true, but if these Nine pin kind of particles, which I look upon to be nothing else but a petrify'd Salt, were observed with a Microscope, and compared with the same Particles of the Rock, from whence the above mentioned Filtration proceeds, I make no manner of doubt, but that the Nine-pin like Particles would be found to differ from the other.

That I might be satisfy'd in my above mentioned Observations, I took a piece of white Marble that was brought
hither

hither from *Italy*; it was of two sorts, the one was strong, and the other light and very brittle.

I broke the brittle Marble as gently as I could, that the configuration of the small particles might not be much altered, and having viewed several of them with my Glass, I saw abundance of wonderful particles, which may justly be stil'd Sands with their regular sides and angles, and many of them of the same figure as the shining Sand.

But not being satisfied with this hypothesis, *viz.* that the above-mentioned particles were originally nothing else but Sand particles, with their angles and smooth sides, and that at the time of their coalition or falling upon one another, they were all soft and flexible, and thereby were so rivetted and joyned together, as to become one solid body, which we call Marble, and consequently the said particles did for the most part change their figure, and assumed another form, proportionable to the solidity of their coalition, and that yet some of them had preserved those smooth sides and angles, which they had at the time of their conjunction, the which angles and sides represent the points that are found in Diamonds; and that in one particle of Sand you may discover three, and in another seven neat and regular points.

From these Observations, I imagined that almost all the Sand of the whole Earth have preserved the figure that was given to it at the Creation, and that the particles thereof before they happened to collide or fall upon others, were compos'd of such hard bodies, that they could not be joyn'd to others, and so have remained what they were originally; saving that by their frequent collisions with other bodies their first figure may be something impaired, and the nearer they lye to the surface of the Earth, the more subject they are to such alterations.

When I oppos'd such a Diamond-like Sand with its point to the sight, I could see the said point, but the sides from whence the points arise, are the more obvious; and such

position the Sand would appear four, five or six sided, and not only so, but where two sides joyned, I could also perceive such a point of a Diamond-cut standing out.

I have thought fit to cause three of the Sand particles of the above-mentioned white Marble, as they were separated from each other to be design'd.

Fig. 6. A B C D E F represents one of those grains of Sand, of which a great number compose the white *Italian* Marble stone, wherein at each of these Capital Letters you may see its points or angles.

Fig. 7. G H I K L M shews you the second Sand, and those Letters the several points.

Fig. 8. N O P Q is the third Sand, wherein there is such a flatness N O P, as is observable in few Sands.

I took a little piece of the said Marble, the parts of which were very close and compact, and making it red hot I dropt it in the Water, in the doing whereof, I observed not only the Sand particles were separated from one another, but some of them broke away with that violence, that they were thrown out of the Water.

I took some of this Water presently, in order to see what Salts were past over from the Stone into the Water; and I could soon perceive a sort of a Membrane, or rather Scum over the Water, without being able to discover any Particles in the said Scum, the which I conceived to consist of coagulated Salts; and that there were some such under the Scum; but they were so obscure that I could not much count upon them; and the more, because they were hid by the said Scum.

I took then a larger piece of the above-mentioned Stone, and heating it red hot, I let it fall into the Water also, whereupon there came a thicker Scum over the Water, which I let lie upon it 24 hours, and then breaking it, and taking a little out of the Water, I found it hard and petrify'd, and placing it before my Microscope,

to discover (if it were possible) the figure of those Particles ; I could not however compass my Intentions, tho I often repeated the Tryal, by reason of the smallness of the Particles, and their strict union with each other ; only a few of them appear'd to me four and six-sided, and to reflect the Light from so many Parts ; others that were bigger were compos'd of some three, some four smaller Particles, which we may thus reckon to be Salt Particles.

Several thousands of these little Particles lay in a very small space, which being separated and broken in pieces, I judg'd that each Particle did consist of many more and much smaller ones ; and indeed they were so small that they almost escap'd my sight, thro the best of my Microscopes.

I try'd some of the above-mentioned particles in a pretty strong Fire, and found that they lost some of their transparency thereby, and were divided into smaller particles that were quite dark and obscure.

After this, I took a little of that Water which lay under the superficies of the supposed coagulated Salts, imagining I should find some Salt-particles in the said Water, and putting it upon 3 several clean Glasses, I observ'd after the space of 4 hours the Water to be quite exhal'd, and that there remain'd many thousands of Salt particles out of one single drop of Water, the which Salts were all separated from one another, many of their superficies being very bright, but their sides dark ; and I could clearly perceive that some of their superficies were shining, and their figure quadrilateral ; the darkness of whose sides I judg'd to be, because those Salts were squares, in shape like Dice ; between these Salt particles lay others that were much smaller, and I believe of the same figure too, but because of their smallness I could make no certain judgment of them.

After that, the Water which lay very thin was suddenly exhaled, I saw several Salts that were larger than the rest,

rest, and more irregular in their figures, but coagulated together, some of 'em were squares, but not regular.

I took about ten times as much Rain-water, and mingl'd it with the above-mentioned Salt water, and then observ'd that the Salts were not dissolv'd, but emerg'd to the top of the Water, but when I prest the same Salt Particles under Water, so as to wet them all over ; they subsided to the bottom, and remained there without being dissolv'd, or uniting themselves to the said Water.

Now seeing the great number of Salts extracted from the aforesaid Stone are of so obstinate and tenacious a figure that nothing but Fire can divide them, and then too they are such inflexible bodies, that they cannot be dissolved in Water ; we may well conclude that the grains of Sand which compose such Stones were not only soft at the time of their coalition or union with each other, but also at the same time there interv'ned a very inflexible fixt Salt (in lieu of Mortar) between the particles of Sand, unless you will chuse to say, that each particle of Salt do in some degree consist of such fixt Salts.

After this, I took a piece of Hearth-stone called *Benthemer* stone, because it is found in Quarries in the County of *Benthem*, and is brought to us in great or small Blocks or Parcels ; this Stone was so soft that I could easily crumble it between my fingers, as I did, and viewing it with one of my Glasses, could perceive nothing but particles of Sand, without the least smooth side, or regular corners ; and it seem'd to me moreover, that this Sand had acquir'd a sort of conglutination, or was grown into a solid substance, which we call Stone, a long time after it had been nothing but Sand, and its particles had been worn and collided against each other ; my reason is, because this Sand that had been lately Stone, in the sides of every grain of it was as full of small holes and breaches as any Sand I ever saw ; and in viewing them one would imagin that they were compos'd of thousands of smaller particles, and that some of them were of a triangular, others of an exact

act flat quadrangular figure ; and when I observed these Sands in rest, I judged that the original shape of many of them were hexangular, and many were pointed like Diamonds, and those points proceeded or issued forth of smooth, flat sides.

The chips and pieces of the *Benthem-stone*, as well those that are found in the Pits, as those that are chizel'd off in the working of the same by our Stone-cutters, are not thrown away as useless ; but they break them with Hammers almost as small as Sand, and the Powder or Crumbles of 'em is what we call *Bik-stone*, and is used to clean Wooden-work, being very proper to fetch off the filth from Wooden Vessels, which is not strange, considering what sharp Angles such beaten Stone consists of, not unlike our common Sand. I took a small bit of the said Stone which was very hard, and wrapping it up in Paper, with a little Hammer broke it in pieces, but could observe no other difference between the former Sand and this, excepting, that the particles of the last were much smaller.

I took a piece of another Stone, which we call Alabaſter Stone, and of which, little or none comes to us, save what is wrought into Images, &c. and having viewed it several times, I observed after breaking or beating it very small, that the little particles were very thin and pellucid, and their figure a long and flat square, with two sharp corners and two blunt ones ; and tho I saw among them some others that were not quite so regular, yet I fancy'd that that exactness and regularity of their figures had been lost in the violent separating them from one another.

The above-mentioned particles, were for the most part so exceeding small, that they could hardly be seen thro my best Microscope, but some of them (whose figure being greater, I could more easily discern) appeared to be composed of very thin parricles lying upon each other.

Now, when I viewed those particles of Stone that were as large as grains of Sand, I found that each of them was

composed of several thousands of smaller particles, whose shape I could not for my life discover ; and when I made a little bit of the said Stone red hot and dropt it into the Water, it dissolv'd into a white substance as fine as Meal or Flower, and thereby lost all its transparency, and each particle, tho its figure had been a longish square, was now compos'd of such small particles, that it was impossible to perceive any shape it had.

After this, I took another little piece of Stone, which is called a Mineral-stone, and was brought hither from *Sumatra* ; the which was so rich, that the hundred weight of it contained near fifty Guilders of Silver, and thirty in Gold.

I took of the said Stone about the bigness of a common Bean, and putting it over a pretty smart Fire, the Sulphur, of which there was a great deal in the Mineral, stood in bubbles, and remained upon the Stone in the figure of round, black, burnt Globules ; then I dropt it red hot into Water, where it remained whole, only with this difference, that whereas before it was very hard, now it became very brittle, and having broken it, I perceiv'd it to consist of irregular particles chiefly, tho some few were of an exact Diamond-cut ; but that which pleased and satisfied me most, was, that I could behold much more plainly than before, the globules of Gold and Silver lying separately from one another, but some of the former were so exceeding small, that they almost escaped the sight in the Microscope ; and forasmuch as the Gold is not near so easy to be melted as the Silver, I saw some that the Fire had not force enough to reduce it to globules, and upon it lying a small globule of Silver, which the Fire had brought into that figure ; and tho the Gold and Silver toucht each other, yet they were not united, because the Fire where that Gold lay was not strong enough to reduce it to a fluid body.

I have often observed in these Mineral Stones, that one
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part of 'em was white, and another a little lower in the same Stone a dark grey, and that they are brought to us in little pieces, the biggest not exceeding a joint of ones Finger, and that in some few pieces there were little cavities or breaches, wherein I never met with any Metal, either of Gold or Silver (for in that Mineral there is no other) but oftentimes with very small Crystals; I call them so, because of the analogy of their Figures with those of Rock-Crystal, for like them they are transparent, hexangular, and end in a point or spire.

These Crystals were in the white part of the Stone, for those that were in the grey were not pellucid.

I caused a small particle of such Crystal, so as it appeared thro my Glass, to be designed by the Limner, and Fig. 9. R S T V represents it as bright and clear as ever you saw any Crystal; I have seen some that were not near so transparent, but indeed they were taken out of Mineral stones that were of a dark grey colour.

Some are apt to believe that these Crystals are form'd by the exhaling damps or moistures deep in those Mines, from whence the Mineral stone is dug; but this is contrary to my sentiments, for upon that hypothesis, the whole cavities should be fill'd with the particles, whereas we find the contrary, for I have observ'd that not one fourth part of the cavities are filled therewith; and I have found some of the said Crystals in such small cavities that a pins head would have fill'd them, and in breaches of the Mineral stone that were not so broad as a small pin is thick, whereas I could meet with none of these Crystals in other cavities that were much larger.

I will rather suppose that most of the stony matter where those cavities are found, was of the same configuration as the said Crystals, and at the same time of the coalition or union of the particles of Stone, the intercepted Air occasioned some cavities, in which the Crystals were shut up, and in which they acquired the figure which they
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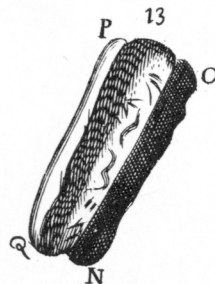
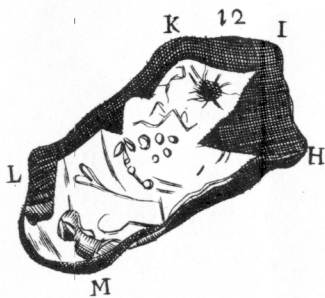
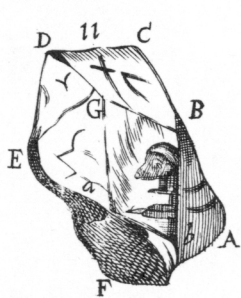
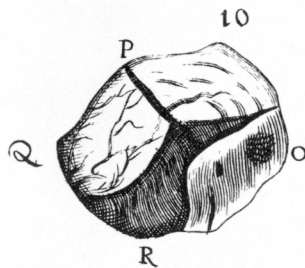
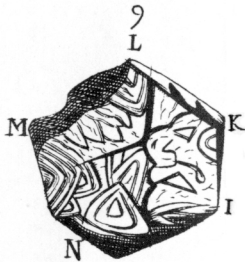
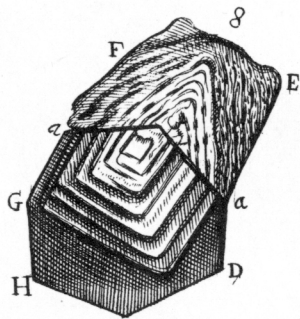
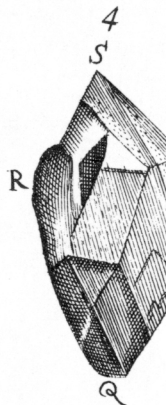
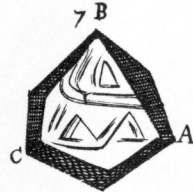
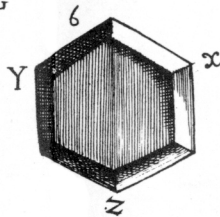
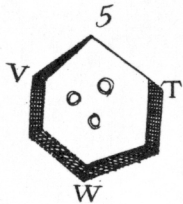
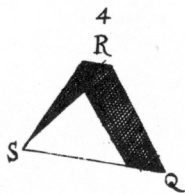
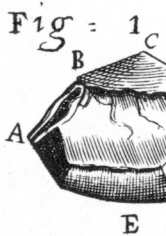
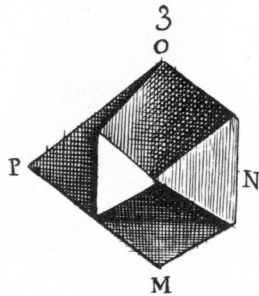
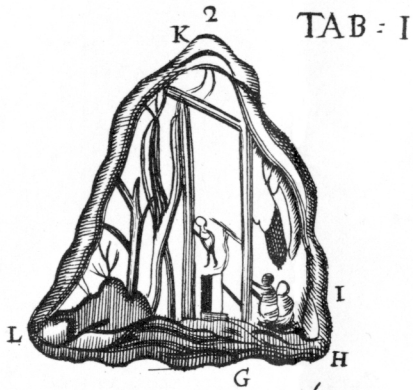
now retain ; in the mean time the other parts about these cavities were so firmly united as to become a hard and solid Stone.

Before that I consider'd the conjunction of the particles of divers Stones, I imagined that these particles were united to each other by such a fixt Salt, that nothing but Fire could separate them ; but I am convinced now that this supposition will not hold in all Stones.

VI. *Part of two Letters from Mr Thoresby, F. R. S. to the Publisher, concerning an Earthquake, which happened in some places of the North of England, the 28th of December, 1703.*

YOU have heard, no doubt, of the late *Earthquake* that affected some part of the North, as the dreadful Storm did the South ; it being most observable at *Hull*, I was desirous of an account from thence, that might be depended upon, and therefore writ to the very obliging *Mr Banks*, Prebendary of *York*, who being Vicar of *Hull*, was the most suitable person I knew to address my self unto, and he being pleased to favour me with a judicious account of it, I will venture to communicate it to you, with his pious reflection thereupon. ' As to the ' *Earthquake* you mention, it was felt here on *Tuesday*, ' the 28th of the last Month, which was *Childermas* day, ' about 3 or 4 minutes after 5 in the Evening ; I confess I ' did not feel it my self, for I was at that moment walking ' to visit a sick Gentleman, and the noise in the Streets, ' and my quick motion, made it impossible, I believe, for ' me

Fig: 1-



TAB : 2.

Fig : 1

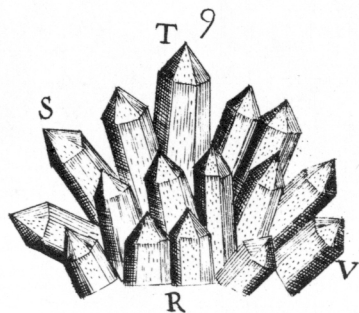
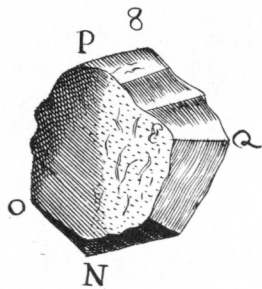
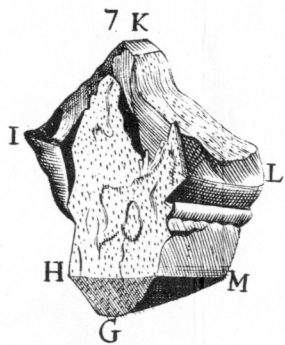
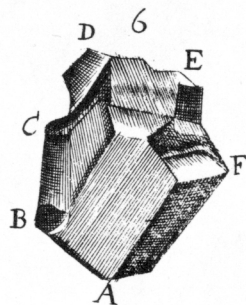
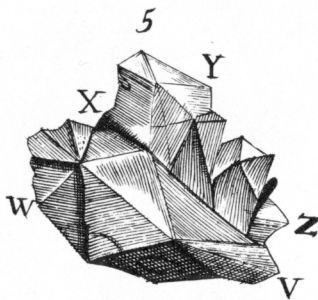
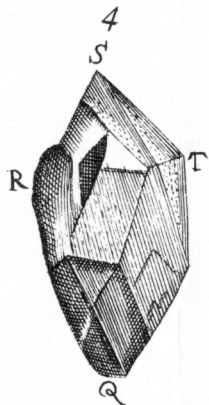
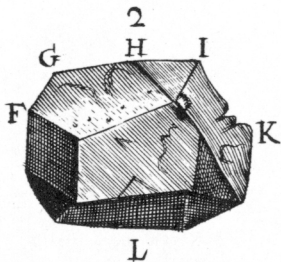
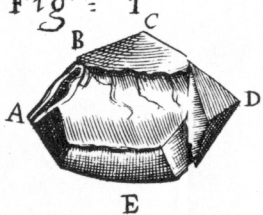
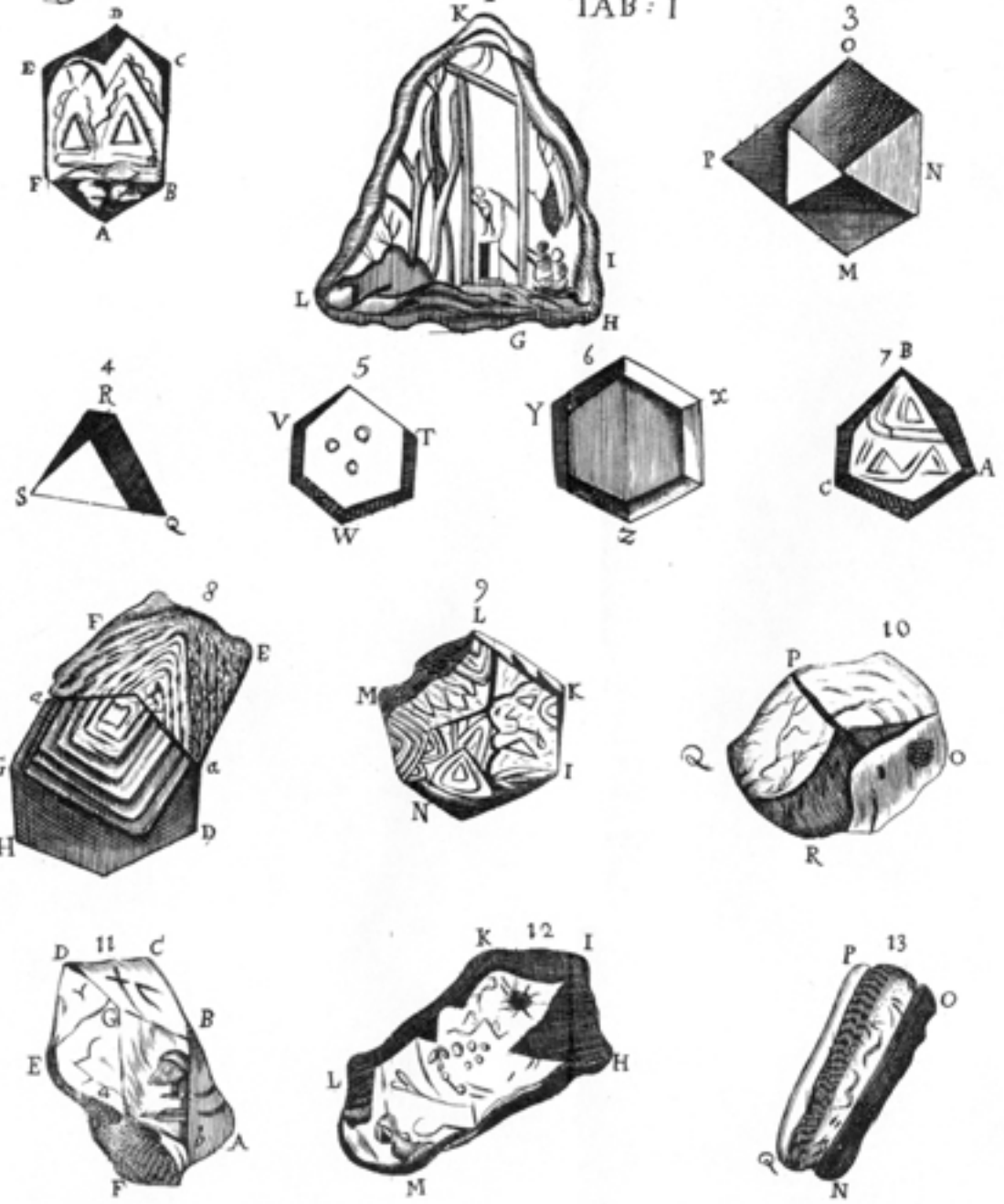


Fig: 1-

TAB: I



TAB: 2-

Fig: 1

