

II. *Microscopical Observations upon the Configuration of Diamonds: In a Letter from Mr. Antony Van Leeuwenhoek, F. R. S.*

Honourable Gentlemen,

I Take the Liberty of troubling you again with these my following Observations, which I have had lain by me these three Years, within which time I caused them to be delineated by my Painter, and engraven upon a Copper-Plate; the Draught of which I here send You.

I have been often ask'd, whether I could discover any thing particular in the Configuration of Diamonds; whereupon some Years ago, I took a small polish'd Diamond, and broke it to Pieces with a Pair of Pincers; but having observed nothing more in the broken Particles thereof, than in those of Common Glafs, I laid aside all Thoughts of it for that time:

Some Months ago it came into my Head, that I shou'd have made my Remarks not upon polish'd, but ruff Diamonds.

Whereupon I procur'd a few small ruff Diamonds from a Jeweller, some of which I placed before a Microscope, and observed one of them more particularly; concerning which I concluded, that all those Streaks or Fibres which I saw in it, were nothing more than the several Coagulations or Augmentations it had receiv'd from time to time, and that in a very short space.

Fig. 1.

Fig. 1. A. B. C. D. E. F. represents a small Particle of a little Diamond, as it appear'd thro' a Microscope; in which between A. and B. as also between C. D. E. and F. you may observe a great Number of Lines or Fibres in the said Diamond; each of which Fibres was occasion'd as I suppose by the Increase or Accession of new Matter, which whether it was form'd in one Day or more, is not much to the purpose.

Now that the increase of Diamonds is made in such an Order and Manner, we may conclude the rather, because we are sure that the same thing happens in the Coagulation of many Salts.

I have taken some of these Particles several times, and laid them upon burning Wood-Coals 'till they were red hot, and in that Condition thrown them into the Water, to see whether they wou'd burst to Pieces, or whether there wou'd be any separation of Matter from them; but that never happening, I must conclude that there was no Air nor any Moisture shut up within them.

One Particle of a Diamond appear'd to the Sight, as *Fig. 2.* G. H. I. K. L. after I had made it red hot, and flaked it in Water several times; in this also, between L. and G. you may observe several small Streaks or Fibres: and when I observed it the last time, after I had taken it out of the Water, it appear'd between L. G. H. and I. just as if some small Scales had been separated from it; just like the shining or glistering Parts which I have often seen in several Stones, and particularly in the great Flint-Stone that is brought in Ships from *Greenland* for Ballast, when the Whale-Fishing is not good, and when its Chry-stalline or Diamond Transparency is gone.

Fig. 3. M. N. O. P. Q. R. represents also a Particle of a Diamond, as it appear'd thro' the Microscope, after it had been made several times red hot and thrown into cold

cold Water ; in the middle of which one might perceive such Slits or Cracks as one might compare to the Top or Cieling of an Unwainscotted Church within side, which was no unpleasant Spectacle, but cou'd not be so well traced by the Painter as it ought to have been ; but whether this Appearance be natural to the Diamond, or whether it proceeds from the breaking it in Pieces, is unknown to me ; but my Opinion is, that it was not occasion'd by its being made red hot, and thrown afterwards into the Water, for if it had been so, the Diamond wou'd have been separated into a great many Particles, or one wou'd have discovered several Cracks or Flaws in it: For a certain Goldsmith having bought several small Stones for Diamonds, and which many People wou'd have taken for precious Stones, he gave me three or four of them to view, and I presently judg'd them not to be Diamonds, for they had neither sharp Points nor smooth Sides, but appeared like transparent Particles of Sand, whose Angles or Points were worn off ; he allow'd me also to make them red hot, and to throw them into the Water afterwards, which I did, and observed by the help of my Microscope, that they had got a great many Rents or Cracks in them, infomuch that with a little squeezing they wou'd crumble all to Pieces.

Fig. 4. S. T. V. W. X. Y. represents the small Particle of a Diamond, no bigger to the naked Eye than a small Grain of Sand, from whence you may judge also of the largeness of the other Diamond Particles, represented by the preceding Figures ; this last mention'd Particle was not put into the Fire. You may also observe at S. T. V. W. and Y. the sharp Points of the said Particle.

From whence I conclude, that I was right in my former Remarks concerning the Particles of Sand ; to wit, that the said very small Particles consisting of regular

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Points and smooth sides like Diamonds, were soft at their first Coagulation, but grew greater and larger by the Accession of new Matter, 'till they became large Grains of Sand; and moreover, that some Diamonds were form'd just after the same manner.

Now as we find, that in the Dissolution of Silver by *Aqua fortis*, some of the small Silver Particles are Coagulated in Chrystals of the figure of Diamonds; and that the Sugar which is boiled to a Syrup in order to make Sugar Candy, is also Coagulated into such Particles; so we may likewise suppose, that at the time when the Diamond Particles coagulate, a great deal of the same Matter whereof they are compos'd is in the Air, but not to be perceived by our naked Eye, nor the Quantity thereof to be known 'till it is Coagulated into a Body: And who knows but if a Shovel of that Earth, out of which they dig Diamonds, were brought over and carefully Exam'd by a Microscope, one might discover abundance of exact and compleat little Diamonds of an unspeakable smallness.

I know there are a great many People who are of Opinion, that many things lying in the Bowels of the Earth, and especially Diamonds, grow bigger and bigger, and that their Increase is occasioned by subterraneous Fires driving the Damps up higher and higher, which Damps they say are impregnated or loaden with Mineral, Chrystalline or Adamantine Particles.

But I am not of that Opinion, for if it were true that an Adamantine Matter were produced by the Subterraneous Fires driving up the Damps, we must conclude, that that Matter wou'd be fluid, and then that fluid Matter so driven up, wou'd Coagulate with the Diamonds it met in its way, and make them greater; but if that were true, this Adamantine Matter so driven up, cou'd not have the Power to disperse the Earth or Sand with which the Diamonds

monds were surrounded, in order to its own Accretion or Coalition therewith, but this Coagulating Adamantine Matter wou'd involve Earth, Sand, or whatever other Particles lay in its way, by which means there would be no such Thing as a clear and clean Diamond digg'd out of the Earth.

I know that there are some ruff Diamonds in and about which there is an earthy Matter, but that does not seem strange to me, because it happens, as I imagine, in the very Coagulation of the Diamonds, and when the Parts thereof were soft.

Among several Hexangular Pieces of Rock-Chrystal, I have observed some whose sides appear'd very smooth to the naked Eye, and whose Points did not at all resemble Chrystal, but rather a dark Earth; which I conceive to be only occasion'd by the neighbouring Earth's insinuating itself into the Points of the said Chrystal, at its first Coagulation, and when it was soft.

Let us now suppose a Diamond lying in the Earth, and growing continually greater, whose Axis was the 4th part of an Inch, or 150 Hairs breadth, and that such a Diamond in the space of Ten Years was so much increas'd, that its Axis or the Bigness of its Body was augmented on every side half a Hairs breadth, and so proportionably every Ten Years; by consequence then in the space of 3000 Years its Axis wou'd be Three Hundred Hairs breadth greater, by which means the Diamond wou'd be Twenty Seven Times bigger than at first.

Now if we suppose, that a Diamond in the space of Ten Years does increase on all sides a Hairs breadth, its Axis wou'd be two Hairs breadth, which in 3000 Years wou'd be 750 Hairs breadth, and then the last mention'd Diamond wou'd be 125 times bigger than the Diamond whose Axis was 150 Hairs breadth: Now supposing a Diamond whose Axis was 150 Hairs breadth, and its

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Weight 7 Carrats, what a prodigious Diamond wou'd that be whose Axis is 750 Hairs breadth, and where shall we find such a Diamond? I hope that your Honours will find something in these Observations which may be acceptable to you, and in the mean time I shall remain,

Honourable Gentlemen,

Your most Humble Servant,

Antony van Leeuwenhoek.

III: Part

Fig: I.

