

Directions for Inquiries concerning Stones and other Materials for the Use of Building; together with a suggestion for retrieving the Art of hardning and tempering Steel for cutting Porphyre and other hard Marbles.

1. **T**O observe the great difference in the degrees of hardness in Free-stones, together with the other qualities to be found in them, and to inquire into their Causes: There being (e.g.) a sort of gray Free-stone at *Paris* every where on the South-side of the River *Sene*, which is of a reasonable course greet, and so soft when first taken out of the Quarry, that 'tis drest and hewn with broad sharp Axes almost as easily as dried Clay; but grows harder and harder in the Air very durable and exceeding fit for building. The Port-land-stone of a fine chalky greet, fit for all curious hewn and carved work, though not so fit for Water or Fire. *Quere*, the Cause of this unfitness. On the contrary, the Free stone in *Kent*, of a whitish gray colour, lasts well in Air and Water; the greet thereof less fine and chalky, than that of *Portland*. The *Derbyshire* Freestone, though it endure the fiercest fire, yet brittle, and so unfit for fine and curious Workmanship.

2. Concerning *Marbles*; whether *Salisbury* Marble be a true, though coarse, Natural Marble? Whether *blew* Marbles, coming much from *Genoa* and *Legorne* for ballast, be harder than *white* Marble, but take not so good a polish? Whence comes the best *black* Marble? Whether *Porphyre* differ in nothing from Marbles, but in hardness?

3. To inquire after the wayes of making *Artificial* Marble; and whether that, with which the Elector of *Bawaria* hath adorned his whole Palace at *Muncken*, so as to one that suspects not the artifice, it looks as rich and beautiful as any Palace in *Italy*, is made (as some affirm) of such *Gypsum*, as makes the Plaster of *Paris*; which being put over the Fire and let boy till it cease of it self, after being cooled is kept dry for use; mixing Painters colours with it for tinging or colouring it according to pleasure, and using it as the burnt *Gypsum* is at *Paris*?

4. To

4. To advance the Art of tinging white Marbles, so as to make the tincture penetrate and colour them at a considerable depth ; and to endeavour to bring this way of colouring to as great perfection, as Enamelling is, by Painting faces and Stories, and all kind of Landskips and Perspectives upon white Marble with colours not delible by any thing, that does not destroy the Marble.

5. To take notice, whether *Flint-stones*, to be met with in great abundance in *England*, are constantly found in the Chalky rocks, that abound here in many places of the Kingdom ; they being oft encompassed with crusts of Chalk ? And whether Chalk turns into Flints ?

6. Whether *Brick-walls* do not make a room much wholesomer, than Freestone or Marble ; Bricks imbibing the moist vapors of a room so that they never sweat, as Marbles and some Freestone are found to do, by coagulating the vapors into drops by the coldness of their surface ?

7. To try the truth of *Vitruvius* his Note, importing, that the Romans anciently let their Bricks stand to dry a whole year, sometimes longer, before they were burnt : It being observable, that those stupendious remains of that ancient Amphitheater of Roman Work being all Bricks, near *Bordeaux* ; are still as firm as a Rock, excepting such places, as the rains and storms have spoiled by getting in at top : Which may also be seen in divers other old structures in *Italy*, *France*, and elsewhere.

8. To inquire after the antient way of Plaistering, used by the Romans, which to this day, where it hath not met with violent knocking or breaking is to be seen as free from cracks or crevices, and as smooth and polished, as if it were Marble : Witness their *Aqueducts*, whose bottoms and sides were thus plaistered, and particularly that, whereof some yards are still to be found on the top of *Pont de Gare* neer *Nismes*, for the support of which that famous Bridge was built to carry water to the said Town.

9. To take notice of the roofs of Houses and the floors of Rooms at *Venice*, covered with a kind of Plaister, that is said

said to endure the Sun and weather for whole ages without cracking or spoiling, and without much wearing in a very long time.

10. To try, whether such a kind of Plaister may not be made by taking powder of *Gypsum* so prepar'd, as is the artificial Marble abovementioned, and mixing with it a certain proportion of Rosin, Colophon or Pitch, as also Brimstone and crude Shells, all beaten to dust; adding thereto some water, and heating all upon the fire, and then using it hot; it being pethaps not amiss also, to add some wax and oyl of Terebinthin, as being very binding, and ingredients in some Cements.

11. Whether Mortar or Limestone will become much harder and more tenacious by using strong *Wort* instead of Water? And what proportion of Malt will serve to what quantity of Lime?

12. As for Quarries, 1. Whether a Bed of any kind of Stone be usually upon the matter equally thick all over, and the superficies above and below do lye always in parallel and straight lines, or not considerably nor frequently varying? 2. Whether these Plains are seldom or never, nor frequently, parallel to the Horizon, but for the most part alwaies reclining; so as to make an angle with the perpendicular? 3. Whether sometimes, when such Beds of Stone or other things do lye in Hills or high grounds near the superface, they terminate and are cut off every where at the grafs (as they call it) or the day, or some place above the valley about it; and yet, after such interruption, or being intersected by rivers or brooks, and even arms of the Sea of considerable breadth, a Bed of the same kind of Stone or Mineral will be found lying in the same plain with that so interrupted or cut off in the adjacent plain, or opposite high ground, or on the other side of such river or arm of the Sea? And whether instances of this are seen in the Cliffs in Kent, and Picardy; and in Fife and Lothian, &c? And whether in the last of them the Beds of Coal and other Minerals be cut off so deep and wide, as to make way for the passing of the *Frisb* there between them; yet the same Bedds run cross it under ground un-interrupted, having the very same kinds of Coals, with the same thickness and position; being at *Cochenny* about

about *Dyfort*, from which it lyes about South-west, the Sea being there some ten miles broad: And the like at *Cubross* and *Burrow Stomness*; distant some four miles. In Testimony whereof this last hath been (by very credible relations) wrought under the Sea, almost half way over, there being a *Mote* half a mile from the Shoar, where there was an entry that went down into the Coal-pit under the Sea, made in a kind of round key, or *Mote*, as they call'd it, built so as that it kept out the Sea, which flow'd there 12 feet; on which the Coals were laid, and where a Ship of that draught of water could lay her side to the *Mote*, and take in her coal. Which colliery is said to have belonged to the Earl of *Kinkardin's* Fore-fathers; in which this is also said to have been remarkable, that the fresh water, which sprang from the bottom and sides of the Coal-bed, was drawn out upon the shoar by an Engin, moved by water, that drew it 40 fathom; though at last a high Tide drown'd all.

13. Whether, as most Trees have the long way such a texture and cohesion of parts, as render them apt to split end-ways, and to break short of the cross-way; so most Stone (Marbles as well as others) have somewhat analogous to Wood in this, that they are much more apt to split or cleave one way than another? And if there be any streaky variegation in the Stone, it runs that way most usually, as also frets and crevices; in so much that in some places, where there scarce appears any crevice or future, being struck on that line where the fissure is, the Stone will cleave or part asunder in the same manner (so to speak) as the halves of a Bean or a Nut-kernel use to do? Lapidaries have attained the skill to discern those fissures even in Diamonds, of which they often make good advantage, by splitting them with a small knock of a hammer and chesil, when their shape requires it, or will afford it; for so the principal part is rendred more beautiful, and the piece broken off preserv'd to be reduced to a convenient figure by the mill, by which it must otherwise have been ground to dust.

14. To take particular notice, that in the heart or body of a Stone there are frequently found entire distinct Stones, of a quite different kind from the Stone, in whose bowels they seem to have been hatch't, as *Flints*, *Pebles*, *Agats*, &c. especially in *Free-*

Freestone, the best of them being said to be obnoxious to these inmates, which when they chance to ly, where the intended superficies of the Stone, when hewn, is to cut the body of them, they being knockt out, the Stone will need to be patch't, or, if that be not faisible, the Stone will not serve for the purpose intended.

15. To inquire how Stones grow, whether by a kind of Vegetation? It being affirm'd by some, that a Peble being put in a vial with water, so as the stone can easily enter into it, though almost touching the neck every where as it enters, it will, within 12 Months or so, increase in bulk so much that it cannot come out where it went in : As also, that Pebles and Flints have been observed to grow so fast in some grounds, that all being taken away that can be seen now, within a year or two there will be new ones found there, like the former.

16. Whether Beds of Sandy and Loamy matter, and the like, do not in time harden into Stones? The Quarries about *Paris* seem to favour the affirmative : And near *Mansfield* in *Sherwood-forest*, where some high wayes through sandy grounds are worn some 8 or 10 foot deep, the faces on the backs on either side are said to be hardned into a strong crust, which being broken off to the thickness of perhaps 8 or 10 inches, all within is still sand. Now it being exposed to the Sun, Wind and Rain, it seems not irrational to presume, the Surface thereof may be easily hardned into Stone. Nay 'tis notorious, that in divers places in England, Scotland, France, &c. water dropping through the Cranies of the Roofs of Caves in rocks, does in a short space of time produce heaps of Stone, where it falls; the particles of sandy and loamy Stuff, that are conveyed a long in the body of the dropping water, being left to cling together, when the water is drained away from them. Such was there found in great store in a Cave near *Enston* in *Oxfordshire*, where was built a famous *Grotta*.

To endeavour to retrieve the Art of hardning and tempering Steel for cutting of Porphyre, &c; which the Egyptians were masters of, of old, and after them the Greeks and Romans : Infomuch that the neat and curious hewing and carving of Obelisks, Colosses, Statues, Pots, Urns, as also Porphyre and other hard Marbles, is now the Object of admiration to the
most

most skillful workmen; who know not which way to rough-hew Stones of that untractable hardness. The retrieving of which skill would be of good use, now that Curiosities of workmanship begin to recover, and many eminent persons do countenance and encourage the endeavors of such, as apply themselves to the retrieving of such commendable practises, as were familiar to the Antients, and improve what they know of them and of others with new additions and inventions, which in this knowing and inquisitive age is like to be driven on as far as humane industry can go. Some curious and intelligent persons have of late already taken laudable pains in this very Art. And some Masters in Italy pretend even to have hit upon the old Art, or inventions as good; but they, it seems, envy the world the knowledg of it.

An Account of the Advantage of Virginia for building Ships; communicated by an Observing Gentleman.

1. **T**HE Country of Virginia all over abounds with large and tall *Oakes* of at least 50 or 60 feet in height of clear timber, without boughs or branchings, being very fit to make plank of any feize, very tough, and excellently well enduring the water; as we know by good experience.

2. With abundance of *Pines* for Masts, no country, that we know, in the world is better stored than *Virginia*. Besides there is another sort of wood, called *Cypress*, which is far better than any *Pine* for Masts, it being of as tough and springy a nature as *Yew-tree*; bending beyond credit; when dry, much lighter than *Fire*, and so well lasting in wet and dry, that it seems rather to polish than perish in the weather: And this is known by much use, and several Experiments.

3. The same Country affords great abundance of *Old Pine* for the making of *Rosin*, *Pitch* and *Tar*; of which they have there made several quantities for their own use, and if occasion were, could fully supply the Kingdom of England

4. The conveniency of planting *Hemp* for Cardage and ail-cloths in that Country is so great, that England might in