By the Council of the ROYAL SOCIETY of *London* for Improving of Natural Knowledge.

Ordered, *That the Book written by* Robert Hooke, *M.A. Fellow of this Society, Entituled*, Micrographia, or some Physiological Descriptions of Minute Bodies, made by Magnifying Glasses, with Observations and Inquiries thereupon, *Be printed by* John Martyn, *and* James Allestry, *Printers to the said Society*.

Novem. 23. 1664.

BROUNCKER. *P.R.S.*

MICROGRAPHIA:

OR SOME

Physiological Descriptions

OF

MINUTE BODIES

MADE BY

MAGNIFYING GLASSES

WITH

OBSERVATIONS and INQUIRIES thereupon.

By *R. HOOKE*, Fellow of the ROYAL SOCIETY.

Non possis oculo quantum contendere Linceus,
Non tamen idcirco contemnas Lippus inungi. Horat. Ep. lib. 1.

LONDON, Printed by *Jo. Martyn*, and *Ja. Allestry*, Printers to the ROYAL SOCIETY, and are to be sold at their Shop at the *Bell* in *S. Paul's* Church-yard. M DC LX V.

TO THE

KING.

SIR,

Do here most humbly lay this *small* Present at *Your Majesties* Royal feet. And though it comes accompany'd with two *disadvantages*, the *meanness* of the *Author*, and of the *Subject*; yet in both I am *incouraged* by the *greatness* of your *Mercy* and your

Knowledge. By the *one* I am taught, that you can *forgive* the most *presumptuous Offendors*: And by the *other*, that you will not *esteem* the least work of *Nature*, or *Art*, unworthy your *Observation*. Amidst the many *felicities* that have accompani'd *your Majesties* happy *Restauration* and *Government*, it is none of the least considerable that *Philosophy* and *Experimental Learning* have *prosper'd* under your *Royal Patronage*. And as the calm prosperity of your Reign has given us the *leisure* to follow these *Studies* of *quiet* and *retirement*, so it is just, that the *Fruits* of them should, by way of *acknowledgement*, be return'd to *your Majesty*. There are, Sir, several other of your Subjects, of your *Royal Society*, now busie about *Nobler* matters: The *Improvement* of *Manufactures* and *Agriculture*, the *Increase* of *Commerce*, the *Advantage* of *Navigation*: In all which they are *assisted* by *your Majesties Incouragement* and *Example*. Amidst all those *greater* Designs, I here presume to bring in that which is more *proportionable* to the *smalness* of my Abilities, and to offer some of the *least* of all *visible things*, to that *Mighty King*, that has *establisht an Empire* over the best of all *Invisible things* of this World, the *Minds* of Men.

Your Majesties most humble and most obedient Subject and Servant,

ROBERT HOOKE.

TO THE

ROYAL SOCIETY.

fter my *Address* to our *Great Founder* and *Patron*, I could not but think my self oblig'd, in consideration of those *many Ingagements*

you have laid upon me, to offer these my *poor Labours* to this MOST ILLUSTRIOUS ASSEMBLY. YOU have been pleas'd formerly to accept of these rude *Draughts*. I have since added to them some *Descriptions*, and some *Conjectures* of my own. And therefore, together with YOUR *Acceptance*, I must also beg YOUR *pardon*. The Rules YOU have prescrib'd YOUR selves in YOUR Philosophical Progress do seem the best that have ever yet been practis'd. And particularly that of avoiding *Dogmatizing*, and the *espousal* of any *Hypothesis* not sufficiently grounded and confirm'd by *Experiments*. This way seems the most excellent, and may preserve both *Philosophy* and *Natural History* from its former *Corruptions*. In saying which, I may seem to condemn my own Course in this Treatise; in which there may perhaps be some *Expressions*, which may seem more *positive* then YOUR Prescriptions will permit: And though I desire to have them understood only as *Conjectures* and *Quæries* (which YOUR Method does not altogether disallow) yet if even in those I have exceeded, 'tis fit that I should declare, that it was not done by YOUR Directions. For it is most unreasonable, that YOU should undergo the *imputation* of the *faults* of my *Conjectures*, seeing YOU can receive so *small advantage* of reputation by the *sleight Observations* of

YOUR most humble and most faithful Servant

ROBERT HOOKE.

THE

PREFACE.

t is the great prerogative of Mankind above other Creatures, that we are not only able to behold *the works of Nature, or barely to* sustein *our lives by them, but we have also the power of* considering, comparing, altering, assisting, *and* improving *them to various uses. And as this is the peculiar priviledge of humane Nature in general, so is it capable of being so far advanced by the helps of Art, and Experience, as to make some Men excel others in their Observations, and Deductions, almost as much as they do Beasts. By the addition of such* artificial Instruments *and* methods, *there may be, in some manner, a reparation made for the mischiefs, and imperfection, mankind has drawn upon it self, by negligence, and intemperance, and a wilful and superstitious deserting the Prescripts and Rules of Nature, whereby every man, both from a deriv'd corruption, innate and born with him, and from his breeding and converse with men, is very subject to slip into all sorts of errors.*

The only way which now remains for us to recover some degree of those former perfections, seems to be, by rectifying the operations of the Sense, *the* Memory, *and* Reason, *since upon the evidence, the* strength, *the* integrity, *and the* right correspondence *of all these, all the light, by which our actions are to be guided is to be renewed, and all our command over things it to be establisht.*

It is therefore most worthy of our consideration, to recollect their several defects, that so we may the better understand how to supply them, and by what assistances we may inlarge *their power, and* secure *them in performing their particular duties.*

As for the actions of our Senses, *we cannot but observe them to be in many particulars much outdone by those of other Creatures, and when at best, to be far short of the perfection they seem capable of: And these infirmities of the Senses arise from a double cause, either from the* disproportion of the Object to the Organ, *whereby an infinite number of things can never enter into them, or else from* error in the Perception, *that many things, which come within their*

reach, are not received in a right manner.

The like frailties are to be found in the Memory; *we often let many things* slip away *from us, which deserve to be retain'd, and of those which we treasure up, a great part is either* frivolous *or* false*; and if good, and substantial, either in tract of time* obliterated*, or at best so* overwhelmed *and buried under more frothy notions, that when there is need of them, they are in vain sought for.*

The two main foundations being so deceivable, it is no wonder, that all the succeeding works which we build upon them, of arguing, concluding, defining, judging, and all the other degrees of Reason, are lyable to the same imperfection, being, at best, either vain, or uncertain: So that the errors of the understanding *are answerable to the two other, being defective both in the quantity and goodness of its knowledge; for the limits, to which our thoughts are confin'd, are small in respect of the vast extent of Nature it self; some parts of it are* too large *to be comprehended, and some* too little *to be perceived. And from thence it must follow, that not having a full sensation of the Object, we must be very lame and imperfect in our conceptions about it, and in all the proportions which we build upon it; hence, we often take the* shadow *of things for the* substance*, small* appearances *for good* similitudes*,* similitudes *for* definitions*; and even many of those, which we think, to be the most solid definitions, are rather expressions of our own misguided apprehensions then of the true nature of the things themselves.*

The effects of these imperfections are manifested in different ways, according to the temper and disposition of the several minds of men, some they incline to gross ignorance *and stupidity, and others to a* presumptuous imposing *on other mens Opinions, and a* confident dogmatizing *on matters, whereof there it no assurance to be given.*

Thus all the uncertainty, and mistakes of humane actions, proceed

either from the narrowness and wandring of our Senses, *from the slipperiness or delusion of our* Memory, *from the confinement or rashness of our* Understanding, *so that 'tis no wonder, that our power over natural causes and effects is so slowly improv'd, seeing we are not only to contend with the obscurity and* difficulty of the things *whereon we work and think, but even the* forces of our own minds *conspire to betray us.*

These being the dangers in the process of humane Reason, the remedies of them all can only proceed from the real, *the* mechanical, *the* experimental *Philosophy, which has this advantage over the Philosophy of* discourse *and* disputation, *that whereas that chiefly aims at the subtilty of its Deductions and Conclusions, without much regard to the first ground-work, which ought to be well laid on the Sense and Memory; so this intends the right ordering of them all, and the making them serviceable to each other.*

The first thing to be undertaken in this weighty work, is a watchfulness over the failings *and an* inlargement of the dominion, *of the Senses.*

To which end it is requisite, first, That there should be a scrupulous *choice, and a* strict examination, *of the reality, constancy, and certainty of the Particulars that we admit: This is the first rise whereon truth is to begin, and here the most severe, and most impartial diligence, must be imployed; the storing up of all, without any regard to evidence or use, will only tend to darkness and confusion. We must not therefore esteem the riches of our Philosophical treasure by the* number *only, but chiefly by the* weight*; the most* vulgar *Instances are not to be neglected, but above all, the most* instructive *are to be entertain'd; the footsteps of Nature are to be trac'd, not only in her* ordinary course, *but when she seems to be put to her shifts, to make many* doublings *and* turnings, *and to use some kind of art in indeavouring to avoid our discovery.*

The next care to be taken, in respect of the Senses, is a supplying of their infirmities with Instruments, *and, as it were, the adding of* artificial Organs *to the* natural*; this in one of them has been of late years accomplisht with prodigious benefit to all sorts of useful knowledge, by the invention of Optical Glasses. By the means of* Telescopes, *there is nothing so* far distant *but may be represented to our view; and by the help of* Microscopes, *there is nothing so* small, *as to escape our inquiry; hence there is a new visible World discovered to the understanding. By this means the Heavens are open'd, and a vast number of new Stars, and new Motions, and new Productions appear in them, to which all the ancient Astronomers were utterly Strangers. By this the Earth it self, which lyes so neer us, under our feet, shews quite a new thing to us, and in every* little particle *of its matter; we now behold almost as great a variety of Creatures, as we were able before to reckon up in the whole* Universe *it self.*

It seems not improbable, but that by these helps the subtilty of the composition of Bodies, the structure of their parts, the various texture of their matter, the instruments and manner of their inward motions, and all the other possible appearances of things, may come to be more fully discovered; all which the ancient Peripateticks *were content to comprehend in two general and (unless further explain'd) useless words of* Matter *and* Form. *From whence there may arise many admirable advantages, towards the increase of the* Operative, *and the* Mechanick *Knowledge, to which this Age seems so much inclined, because we may perhaps be inabled to discern all the secret workings of Nature, almost in the same manner as we do those that are the productions of Art, and are manag'd by Wheels, and Engines, and Springs, that were devised by humane Wit.*

In this kind I here present to the World my imperfect Indeavours; which though they shall prove no other way considerable, yet, I hope, they may be in some measure useful to the main Design of a

reformation *in Philosophy, if it be only by shewing, that there it not so much requir'd towards it, any strength of* Imagination*, or exactness of* Method*, or depth of* Contemplation *(though the addition of these, where they can be had, must needs produce a much more perfect composure) as a sincere* Hand*, and a* faithful *Eye, to examine, and to record, the things themselves as they appear.*

And I beg my Reader, to let me take the boldness to assure him, that in this present condition of knowledge, a man so qualified, as I have indeavoured to be, only with resolution, and integrity, and plain intentions of imploying his Senses *aright, may venture to compare the reality and the usefulness of his services, towards the true Philosophy, with those of other men, that are of much stronger, and more acute* speculations*, that shall not make use of the same method by the Senses.*

The truth is, the Science of Nature has been already too long made only a work of the Brain *and the* Fancy*: It is now high time that it should return to the plainness and soundness of* Observations *on* material *and* obvious *things. It is said of great Empires, That* the best way to preserve them from decay, is to bring them back to the first Principles, and Arts, on which they did begin. *The same is undoubtedly true in Philosophy, that by wandring far away into* invisible Notions*, has almost quite destroy'd it self, and it can never be recovered, or continued, but by returning into the same* sensible paths*, in which it did at first proceed.*

If therefore the Reader expects from me any infallible Deductions, or certainty of Axioms*, I am to say for my self, that those stronger Works of Wit and Imagination are above my weak Abilities; or if they had not been so, I would not have made use of them in this present Subject before me: Whenever he finds that I have ventur'd at any small Conjectures, at the causes of the things that I have observed, I beseech him to look, upon them only as* doubtful Problems*, and* uncertain ghesses*, and not as unquestionable*

Conclusions, or matters of unconfutable Science; I have produced nothing here, with intent to bind his understanding to an implicit *consent; I am so far from that, that I desire him, not absolutely to rely upon these Observations of my eyes, if he finds them contradicted by the future Ocular Experiments of other and impartial Discoverers.*

As for my part, I have obtained my end, if these my small Labours shall be thought fit to take up some place in the large stock, of natural Observations*, which so many hands are busie in providing. If I have contributed the* meanest foundations *whereon others may raise nobler* Superstructures*, I am abundantly satisfied; and all my ambition is, that I may serve to the great Philosophers of this Age, as the makers and the grinders of my Glasses did to me; that I may prepare and furnish them with some* Materials*, which they may afterwards* order *and* manage *with better skill, and to far greater advantage.*

The next remedies in this universal cure of the Mind are to be applyed to the Memory*, and they are to consist of such Directions as may inform us, what things are best to be* stor'd up *for our purpose, and which is the best way of so* disposing *them, that they may not only be* kept in safety*, but ready and convenient, to be at any time* produc'd *for use, as occasion shall require. But I will not here prevent my self in what I may say in another Discourse, wherein I shall make an attempt to propose some Considerations of the manner of compiling a Natural and Artificial History, and of so ranging and registring its Particulars into Philosophical Tables, as may make them most useful for the raising of* Axioms *and* Theories.

The last indeed is the most hazardous *Enterprize, and yet the most* necessary*; and that is, to take such care that the* Judgment *and the* Reason *of Man (which is the third Faculty to be repair'd and improv'd) should receive such assistance, as to avoid the dangers to which it it by nature most subject. The Imperfections, which I*

have already mention'd, to which it is lyable, do either belong to the extent, *or the* goodness *of its knowledge; and here the difficulty is the greater, least that which may be thought a* remedy *for the one should prove* destructive *to the other, least by seeking to inlarge our Knowledge, we should render it weak, and uncertain; and least by being too scrupulous and exact about every Circumstance of it, we should confine and streighten it too much.*

In both these the middle wayes are to be taken, nothing it to be omitted, *and yet every thing to pass a* mature deliberation*: No* Intelligence *from Men of all Professions, and quarters of the World, to be* slighted, *and yet all to be so* severely examin'd, *that there remain no room for doubt or instability; much* rigour *in admitting, much* strictness *in comparing, and above all, much* slowness *in debating, and* shyness *in determining, is to be practised. The* Understanding *is to* order *all the inferiour services of the lower Faculties; but yet it is to do this only as a* lawful Master, *and not at a* Tyrant. *It must not* incroach *upon their Offices, nor take upon it self the employments which belong to either of them. It must* watch *the irregularities of the Senses, but it must not go before them, or* prevent *their information. It must* examine, range, *and* dispose *of the bank which it laid up in the Memory: but it must be sure to make* distinction *between the* sober *and* well collected heap, *and the* extravagant Ideas, *and* mistaken Images, *which there it may sometimes light upon. So many are the* links, *upon which the true Philosophy depends, of which, if any one be* loose, *or* weak, *the whole* chain *is in danger of being dissolv'd; it is to* begin *with the Hands and Eyes, and to* proceed *on through the Memory, to be* continued *by the Reason; nor is it to stop there, but to* come about *to the Hands and Eyes again, and so, by a* continual passage round *from one Faculty to another, it is to be maintained in life and strength, as much as the body of man it by the* circulation *of the blood through the several parts of the body, the Arms, the Feet, the Lungs, the Heart, and the Head.*

If once this method were followed with diligence and attention, there is nothing that lyes within the power of human Wit (or which is far more effectual) of human Industry, which we might not compass; we might not only hope for Inventions to equalize those of Copernicus, Galileo, Gilbert, Harvy, *and of others, whose Names are almost lost, that were the Inventors of* Gun-powder, *the* Seamans Compass, Printing, Etching, Graving, Microscopes, &c. *but multitudes that may far exceed them: for even those discoveries seem to have been the products of some such method, though but imperfect; What may not be therefore expected from it if thoroughly prosecuted?* Talking *and* contention of Arguments *would soon be turn'd into* labours*; all the fine* dreams *of Opinions, and* universal metaphysical natures, *which the luxury of subtil Brains has devis'd, would quickly vanish, and give place to* solid Histories, Experiments *and* Works. *And as at first, mankind* fell *by* tasting *of the forbidden Tree of Knowledge, so we, their Posterity, may be in part* restor'd *by the same way, not only by* beholding *and* contemplating, *but by* tasting *too those fruits of Natural knowledge, that were never yet forbidden.*

From hence the World may be assisted with variety *of Inventions,* new *matter for Sciences may be* collected, *the* old improv'd, *and their* rust *rubb'd away; and as it is by the benefit of Senses that we receive all our Skill in the works of Nature, so they also may be wonderfully benefited by it, and may be guided to an easier and more exact performance of their Offices; 'tis not unlikely, but that we may find out wherein our Senses are deficient, and as easily find wayes of repairing them.*

The Indeavours of Skilful men have been most conversant about the assistance of the Eye, and many noble Productions have followed upon it; and from hence we may conclude, that there it a way open'd for advancing the operations, not only of all the other Senses, but even of the Eye it self; that which has been already done ought not to content us, but rather to incourage us to proceed

further, and to attempt greater things in the same, and different wayes.

'Tis not unlikely, but that there may be yet invented several other helps for the eye, at much exceeding those already found, as those do the bare eye, such as by which we may perhaps be able to discover living Creatures *in the Moon, or other Planets, the* figures *of the compounding Particles of matter, and the particular* Schematisms *and* Textures *of Bodies.*

And as Glasses *have highly promoted our* seeing, *so 'tis not improbable, but that there may be found many* Mechanical Inventions *to improve our other Senses, of* hearing, smelling, tasting, touching. *'Tis not impossible to hear a* whisper *a* furlongs *distance, it having been already done; and perhaps the nature of the thing would not make it more impossible, though that furlong should be ten times multiply'd. And though some famous Authors have affirm'd it impossible to hear through the* thinnest plate *of* Muscovy-glass*; yet I know a way, by which 'tis easie enough to hear one speak through a* wall a yard thick. *It has not been yet thoroughly examin'd, how far* Otocousticons *may be improv'd, nor what other wayes there may be of* quickning *our hearing, or* conveying *sound through* other bodies *then the* Air*: for that that it not the only* medium, *I can assure the Reader, that I have, by the help of a* distended wire, *propagated the sound to a very considerable distance in an* instant, *or with as seemingly quick a motion as that of light, at least, incomparably swifter then that, which at the same time was propagated through the Air; and this not only in a straight line, or direct, but in one bended in many angles.*

Nor are the other three so perfect, but that diligence, attention, *and many* mechanical contrivances, *may also highly improve them. For since the sense of* smelling *seems to be made by the* swift passage *of the* Air *(*impregnated *with the steams and* effluvia *of several odorous Bodies) through the grisly* meanders *of the Nose whose*

surfaces are cover'd *with a very sensible* nerve, *and* moistned *by a* transudation *from the* processus mamillares *of the Brain, and some adjoyning* glandules, *and by the moist* steam *of the* Lungs, *with a Liquor convenient for the reception of those* effluvia *and by the adhesion and mixing of those steams with that liquor, and thereby affecting the nerve, or perhaps by insinuating themselves into the juices of the brain, after the same manner, as I have in the following Observations intimated, the parts of Salt to pass through the skins of Effs, and Frogs. Since, I say, smelling seems to be made by some such way, 'tis not improbable, but that some contrivance, for making a great quantity of Air pass quick through the Nose, might at much promote the sense of smelling, as the any wayes hindring that passage does dull and destroy it. Several tryals I have made, both of hindring and promoting this sense, and have succeeded in some according to expectation; and indeed to me it seems capable of being improv'd, for the judging of the constitutions of many Bodies. Perhaps we may thereby also judge (as other Creatures seem to do) what is wholsome, what poyson; and in a word, what are the specifick properties of Bodies.*

There may be also some other mechanical wayes found out, of sensibly perceiving the effluvia *of Bodies; several Instances of which, were it here proper, I could give of Mineral steams and exhalations; and it seems not impossible, but that by some such wayes improved, may be discovered, what Minerals lye buried under the Earth, without the trouble to dig for them; some things to confirm this Conjecture may be found in* Agricola, *and other Writers of Minerals, speaking of the Vegetables that are apt to thrive, or pine, in those steams.*

Whether also those steams, which seem to issue out of the Earth, and mix with the Air (and so to precipitate some aqueous *Exhalations, wherewith 'tis impregnated) may not be by some way detected before they produce the effect, seems hard to determine; yet something of this kind I am able to discover, by an Instrument I*

contriv'd to shew all the minute variations in the pressure of the Air; by which I constantly find, that before, and during the time of rainy weather, the pressure of the Air is less, and in dry weather, *but especially when an* Eastern Wind *(which having past over vast tracts of Land is heavy with Earthy Particles) blows, it is much more, though these changes are varied according to very odd Laws*.

The Instrument is this. I prepare a pretty capaceous Bolt-head AB, with a small stem about two foot and a half long DC; upon the end of this D I put on a small bended Glass, or brazen *syphon* DEF (open at D, E and F, but to be closed with cement at F and E, as occasion serves) whose stem F should be about six or eight inches long, but the bore of it not above half an inch diameter, and very even; these I fix very strongly together by the help of very hard Cement, and then fit the whole Glass ABCDEF into a long Board, or Frame, in such manner, that almost half the head AB may lye buried in a concave Hemisphere cut into the Board RS;

Schem. 1.
Fig. 1.
then I place it so on the Board RS, as is exprest in the first figure of the first Scheme; and fix it very firm and steady in that posture, so as that the weight of the *Mercury* that is afterwards to be put into it, may not in the least shake or stir it; then drawing a line XY on the Frame RT, so that it may divide the ball into two equal parts, or that it may pass, as 'twere, through the center of the ball. I begin from that, and divide all the rest of the Board towards UT into inches, and the inches between the 25 and the end E (which need not be above two or three and thirty inches distant from the line XY) I subdivide into Decimals; then stopping the end F with soft Cement, or soft Wax, I invert the Frame, placing the head downwards, and the Orifice E upwards; and by it, with a small Funnel, I fill the whole Glass with Quicksilver; then by stopping the small Orifice E with my finger, I oftentimes erect and invert the whole Glass and Frame, and thereby free the Quicksilver and

Glass from all the bubbles or parcels of lurking Air; then inverting it as before, I fill it top full with clear and well strain'd Quicksilver, and having made ready a small ball of pretty hard Cement, by heat made very soft, I press it into the hole E, and thereby stop it very fast; and to secure this Cement from flying out afterward, I bind over it a piece of Leather, that is spread over in the inside with Cement, and wound about it while the Cement is hot: Having thus softned it, I gently erect again the Glass after this manner: I first let the Frame down edge-wayes, till the edge RV touch the Floor, or ly horizontal; and then in that edging posture raise the end RS; this I do, that if there chance to be any Air hidden in the small Pipe E, it may ascend into the Pipe F, and not into the Pipe DC: Having thus erected it, and hung it by the hole Q, or fixt it perpendicularly by any other means, I open the end F, and by a small *Syphon* I draw out the *Mercury* so long, till I find the surface of it AB in the head to touch exactly the line XY; at which time I immediately take away the *Syphon*, and if by chance it be run somewhat below the line XY, by pouring in gently a little *Mercury* at F, I raise it again to its desired height, by this contrivance I make all the sensible rising and falling of the *Mercury* to be visible in the surface of the *Mercury* in the Pipe F, and scarce any in the head AB. But because there really is some small change of the upper surface also, I find by several Observations how much it rises in the Ball, and falls in the Pipe F, to make the distance between the two surfaces an inch greater then it was before; and the measure that it falls in the Pipe is the length of the inch by which I am to mark the parts of the Tube F, or the Board on which it lyes, into inches and Decimals: Having thus justned and divided it, I have a large Wheel MNOP, whose outmost limb is divided into two hundred equal parts; this by certain small Pillars is fixt on the Frame RT, in the manner exprest in the Figure. In the middle of this, on the back side, in a convenient frame, is placed a small Cylinder, whose circumference is equal to twice the length of one of those divisions, which I find answer to an inch of ascent, or descent, of *Mercury*: This Cylinder I, is movable on a very small

Needle, on the end of which is fixt a very light Index KL, all which are so pois'd on the Axis, or Needle, that no part is heavier then another: Then about this Cylinder is wound a small Clew of Silk, with two small steel Bullets at each end of it GH; one of these, which is somewhat the heavier, ought to be so big, as freely to move to and fro in the Pipe F; by means of which contrivance, every the least variation of the height of the *Mercury* will be made exceeding visible by the motion to and fro of the small Index KL.

But this is but one way of discovering the effluvia *of the Earth mixt with the Air; there may be, perhaps many others, witness the* Hygroscope, *an Instrument whereby the watery steams volatile in the Air are discerned, which the Nose it self is not able to find. This I have describ'd in the following Tract in the Description of the Beard of a wild Oat. Others there, are, may be discovered both by the Nose, and by other wayes also. Thus the* smoak *of burning* Wood *is* smelt, seen, *and sufficiently* felt *by the eyes: The* fumes *of burning* Brimstone *are* smelt *and discovered also by the destroying the Colours of Bodies, as by the* whitening of a red Rose*: And who knows, but that the Industry of man, following this method, may find out wayes of improving this sense to as great a degree of perfection at it is in any Animal, and perhaps yet higher.*

'Tis not improbable also, but that our taste *may be very much improv'd either by* preparing *our taste for the Body, as, after eating* bitter *things,* Wine, *or other* Vinous liquors, *are more sensibly tasted; or else by* preparing *Bodies for our tast; as the dissolving of Metals with acid Liquors, make them tastable, which were before altogether insipid; thus* Lead *becomes* sweeter *then Sugar, and* Silver *more* bitter *then Gall,* Copper *and* Iron *of most* loathsome *tasts. And indeed the business of this sense being to discover the presence of dissolved Bodies in Liquors put on the Tongue, or in general to discover that a fluid body has some solid body dissolv'd in it, and what they are; whatever contrivance makes this discovery improves this sense. In this kind the mixtures of*