37. BLOOD TRANSFUSION.—LOWER (Richard). The Method observed in Transfusing the Bloud out of one Animal into another. 4to. Pp. 353-358 in *Philosophical Transactions,* Number 20, December 17, 1666. $250

Garrison-Morton 2012: "In February 1665 Lower successfully transfused dogs with blood." Solidly bound together, in full cloth, with *Philosophical Transactions,* Number 22, Febr. 11, 1666, pp. 385-408.

PHILOSOPHICAL TRANSACTIONS.

Munday December 17. 1666.

The Contents.

The Method observed in *Transfusing the Bloud out of one Animal into another.*

THis Method was promised in the last of these Papers. It was first practised by Dr. *Lower* in *Oxford,* and by him communicated to the Honourable *Robert Boyl,* who imparted it to the *Royal Society,* as follows;

First, Take up the *Carotidal* Artery of the Dog or other Animal, whose Bloud is to be transfused into another of the

ſame or a different kind, and ſeparate it from the Nerve of the *Eighth pair*, and lay it bare above an inch. Then make a ſtrong Ligature on the *upper* part of the Arterie, not to be untied again: but an inch below, *videl.* towards the Heart, make another Ligature of a *running* knot, which may be looſen'd or faſtned as there ſhall be occaſion. Having made theſe two knots, draw two threds under the Artery between the two Ligatures; and then open the Artery, and put in a Quil, and tie the Artery upon the Quill very faſt by thoſe two threds, and ſtop the Quill with a ſtick. After this, make bare the *Jugular* Vein in the other Dog about an inch and a half long; and at each end make a Ligature with a running knot, and in the ſpace betwixt the two running knots drawn under the Vein two threds, as in the other: then make an Inciſion in the Vein, and put into it two Quills, one into the *deſcendent* part of the Vein, to receive the bloud from the other Dog and carry it to the Heart; and the other Quill put into the other part of the *Jugular* Vein, which comes from the Head (out of which, the ſecond Dogs own bloud muſt run into Diſhes.) Theſe two Quills being put in and tyed faſt, ſtop them with a ſtick, till there be occaſion to open them.

All things being thus prepar'd, the Dogs on their ſides towards one another ſo conveniently, that the Quill may go into each other, (for the Dogs necks cannot be brought ſo near, but that you muſt put two or three ſeveral Quills more into the firſt two, to convey the bloud from one to another.) After that unſtop the Quill that goes down into the firſt Dog's *Jugular* Vein, and the other Quill coming out of the other Dog's Artery; and by the help of two or three other Quills, put into each other, according as there ſhall be occaſion, inſert them into one another. Then ſlip the running knots, and immediatly the bloud runs through the Quills, as through an Artery, very impetuoſly. And immediately, as the bloud runs into the Dog, unſtop the other Quill, coming out of the *upper* part of his *Jugular* Vein (a Ligature being firſt made about his Neck, or elſe his other *Jugular* Vein being compreſs'd by ones Finger;) and let his own bloud run out at the ſame time into Diſhes (yet not conſtantly, but according as you perceive him able to bear it)

till

till the other Dog begin to cry, and faint, and fall into Convulſions, and at laſt dye by his ſide.

Then take out both the Quills out of the Dogs *Jugular* Vein, and tye the running knot faſt, and cut the Vein aſunder, (which you may doe without any harm to the Dog, one *Jugular* Vein being ſufficient to convey all the bloud from the Head and upper parts, by reaſon of a large *Anatomoſis*, whereby both the *Jugular* Veins meet about the *Larinx*.) This done, ſow up the skin and diſmiſs him, and the Dog will leap from the Table and ſhake himſelf and run away, as if nothing ailed him.

And this I have tryed ſeveral times, before ſeveral in the *Univerſities*, but never yet upon more than one Dog at a time, for want of leiſure, and convenient ſupplyes of ſeveral Dogs at once. But when I return, I doubt not but to give you a fuller account, not only by bleeding ſeveral Dogs into one, but ſeveral other creatures into one another, as you did propoſe to me, before you left *Oxford*; which will be very eaſie to perform; and will afford many pleaſant and perhaps not unuſeful Experiments.

But becauſe there are many Circumſtances neceſſary to be obſerv'd in the performing of this Experiment, and that you may better direct any one to doe it, without any danger of killing the other Dog, that is to receive the others bloud, I will mention two or three.

Firſt, that you faſten the Dogs at ſuch a convenient diſtance, that the Vein nor Artery be not ſtretched; for then, being contracted, they will not admit or convey ſo much bloud.

Secondly, that you conſtantly obſerve the Pulſe beyond the Quill in the Dogs *Jugular* Vein (which it acquires from the impulſe of the *Arterious* bloud:) For if that fails, then 'tis a ſign the Quil is ſtopt by ſome congealed bloud, ſo that you muſt draw out the *Arterial* Quill from the other, and with a *Probe* open the paſſage again in both of them, that the bloud may have its free courſe again. For, this muſt be expected, when the Dog, that bleeds into the other, hath loſt much bloud, his heart will beat very faintly, and then the impulſe

of bloud being weaker, it will be apt to congeal the ſooner, ſo that at the latter end of the work you muſt draw out the Quill ofter, and clear the paſſage; if the Dog be faint-hearted, as many are, though ſome ſtout fierce Dogs will bleed freely and uninterruptedly, till they are convuls'd and dye. But to prevent this trouble, and make the experiment certain, you muſt bleed a great Dog into a little one, or a *Maſtive* into a *Curr*, as I once try'd, and the little Dog bled out at leaſt double the quantity of his own bloud, and left the *Maſtive* dead upon the Table, and after he was untyed, he ran away and ſhak'd himſelf, as if he had been only thrown into water. Or elſe you may get three or four ſeveral Dogs prepared in the ſame manner; and when one begins to fail and leave off bleeding, adminiſter another, and I am confident one Dog will receive all their bloud, (and perhaps more) as long as it runs freely, till they are left almoſt dead by turns: provided that you let out the bloud proportionably, as you let it goe into the Dog, that is to live.

Thirdly, I ſuppoſe the Dog that is to bleed out into diſhes will endure it the better, if the Dogs that are to be adminiſtred to ſupply his bloud, be of near an equal age, and fed alike the day before, that both their blouds may be of a neer ſtrength and temper.

There are many things I have obſerved upon bleeding Dogs to death, which I have ſeen ſince your departure from *Oxford*, whereof I ſhall give you a relation hereafter; in the mean time ſince you were pleaſed to mention it to the *Royal Society*, with a promiſe to give them an account of this experiment, I could not but take the firſt opportunity to clear you from that obligation, &c.

So far this Letter: the preſcriptions whereof having been carefully obſerv'd by thoſe who were imployed to make the Experiment, have hitherto been attended with good ſucceſs; and that not only upon Animals of the ſame *Species* (as two Dogs firſt, and then two Sheep) but alſo upon ſome of very differing *Species* (as a Sheep and a Dog; the former *Emitting*, the other *Receiving*)

Note only, that inſtead of a Quill, a ſmall crooked thin Pipe

Pipe of Silver or Braſs, ſo ſlender that the one end may enter into a Quill, and having at the other end, that is to enter into the Vein and Arterie, a ſmall knob, for the better faſtening them to it with a thread, will be much fitter than a ſtrait Pipe or Quill, for this Operation: for ſo they are much more eaſie to be managed.

'Tis intended, that theſe tryals ſhall be proſecuted to the utmoſt variety the ſubject will bear: As by exchanging the bloud of Old and Young, Sick and Healthy, Hot and Cold, Fierce and Fearful, Lame and Wild Animals, &c. and, that not only of the ſame, but alſo of differing kinds. For which end, and to improve this noble Experiment, either for knowledge, or uſe, or both, ſome Ingenious men have already propoſed conſiderable tryals and Inquiries; of which perhaps an account will be given hereafter. For the preſent we ſhall only ſubjoyn ſome

Conſiderations about this kind of Experiments.

1. It may be conſider'd in them, that the bloud of the *Emittent* Animal, may after a few minuts of time, by its circulation, mix and run out with that of the *Recipient*. Wherefore to be aſſured in theſe Tryals, that all the bloud of the *Recipient* is run out, and none left in him but the adventitious bloud of the *Emittent*, two or three or more Animals (which was alſo hinted in the *method* above) may be prepared and adminiſtred, to bleed them all out into one.

2. It ſeems not irrational to gueſs afore hand, that the exchange of bloud will not alter the nature or diſpoſition of the Animals, upon which it ſhall be practiſed; though it may be thought worth while for ſatisfaction and certainty, to determine that point by Experiments. The caſe of exchanging the bloud of Animals ſeems not like that of *Graffing*, where the *Cyons* turns the Sap of the *Stock*, graffed upon, into its nature; the *Fibres* of the Cyons ſo ſtraining the juice, which paſſes from the ſtem to it, as thereby to change it into that of the Cyons, whereas in this tranſfuſion there ſeems to be no ſuch

Per-

Percolation of the bloud of Animals, whereby that of the one ſhould be changed into the nature of the other.

3. The moſt probable uſe of this Experiment may be conjectured to be that one Animal may live with the bloud of another; and conſequently, that thoſe Animals, that want bloud, or have corrupt bloud, may be ſupplyed from other with a ſufficient quantity, and of ſuch as is good, provided the Transfuſion be often repeated, by reaſon of the quick expence that is made of the bloud.

Note.

In the laſt Tranſactions *was alſo promiſed an Accompt by the next, of Monſieur* Hevelius *his accurate Calcul. of the late* Solar Eclipſes, *Duration, Quantity, &c. But this being to be accompanyed with a* Scheme, *the* Graving *whereof met with a diſappointment, it muſt be ſtill referred to another Opportunity.*

An Accompt of ſome Sanative-waters in Herefordſhire.

This account was communicated by Dr. *B.* in theſe words.

There are two Springs in *Herefordſhire*, whereof one is within a Bolt, or at leaſt Bow-ſhoot of the top of the near adjoyning loftie Hill of *Malvern*, and at great diſtance from the Foot of the Hill; and hath had a long and old fame for healing of eyes. When I was for ſome years moleſted with Tetters on the back of one and ſometimes of both my hands, notwithſtanding all endeavors of my very friendly and skilful Phyſitians I had ſpeedy healing from a neighbouring Spring of far leſs fame. Yet this Spring healed very old and Ulcerous ſores on the Legs of a poor Fellow, which had been poyſon'd by Irons in the Gaol, after other Chirurgery had been hopeleſs. And by many tryals upon my hands, and the Tetters; I was perſwaded, that in long droughts, and laſting dry Froſts, thoſe waters were more effectually and more ſpeedily healing, than at other times. And not to omit this circumſtance, I did hold this water in my mouth, till it was warm, and perchance ſomewhat intermingled with faſting Spittle, and

and ſo dropping it upon the Tetter, I there could ſee it immediately gather a very thin skin upon the raw fleſh, not unlike that which is ſeen to gather upon Milk over a gentle fire. This skin would have ſmall holes in it, through which a moiſture did iſſue in ſmall drops, which being wip'd away, and the water continued to be dropp'd warm out of the mouth, the holes would diminiſh, and at laſt be all quite healed up.

For the *Eye-waters*, I conceived them more ſtrongly terſive, and clearing the Eyes; and they had a rough ſmartneſs, as if they carryed Sand or Gravel into the Eye.

I have known and try'd three or four healing Fountains of late diſcovery, or of no old fame that I could hear of.

I did once put rich *Marle* for ſome days in a veſſel of water, to try whether the water would acquire a healing vertue; but my Experiments were interrupted. I had in my thoughts many other ways of Tryal; which I may reſume hereafter.

A farther Accompt of the Vitriolate-water, *mention'd* Num. 18 p. 323. *Together with ſome other particulars touching waters.*

This comes from the ſame hand as follows;

I formerly mentioned to you, that, if that Pool of Mr. *Phillip's*, which ſeems to be of Vitriolate-water, were on my ground, I would drain it, and ſearch the head of the Spring, purſuing the ſource, till I could well diſcern, through what lay of Earth or Gravel it does paſs. Now I ſhall tell you, that I have taken order for the further tryal of the ſaid Water, by boiling a greater quantity in a Furnace, *&c.* But juſt as we were in readineſs for the tryal, a ſtream of Rain-water fell into the Pool, and ſo diſcourag'd us for the preſent. I have alſo taken a courſe to turn the falling Waters aſide, and to drain the Pool, that we may ſee, what the Native Springs (whether one or more) may be. Of which more hereafter.

I wiſh (*ſo he goes on*) we had a full Accompt of our *Salt-Springs* at *Droyt-wych* near *Worceſter*, and at *Nant-wych* in *Cheſhire* (what other Salt-Springs we have in *England*, I know not:)

It

It ſhould be inquired, at what diſtance they are from the Seas, or from Salt-fluxes, from Hills, and how deep in the Vales? What the weight? Whether in droughts or long Froſts the proportion of Salt or weight increaſeth? Whether the Earth near the Springs, or in their paſſage hath any peculiar ferment, or produceth a blackiſhneſs, if it reſts, after it is well drained.

Inquiries for Turky.

Though many Relations and Deſcriptions of *Turky* be extant in Print, yet they leave in many a deſire of a fuller information in the following particulars, lately drawn up, for the moſt part by Mr. *H.* and recommended to an Ingenious Gentleman, bound for that Country; and deſired alſo to be taken notice of by others, that may have occaſion to viſit the ſame.

1. In what part of *Turky* the **Ruſma* is to be found; and in what quantity? Whether the *Turks* employ it to any other Uſes, beſides that of the taking away of Hair? Whether here be differing kinds of it? How it is uſed to take of hair, and how to get ſtore of it.

* *Ruſma* is a kind of Earth, uſed in *Turky* to take away hair.

2. Whether the *Turks* do not only take *Opium* themſelves for ſtrength and courage, but alſo give it to their Horſes, Camels and Dromedaries, for the ſame purpoſe, when they find them tired and faint in their travelling? What is the greateſt *Doſe*, any men are known to have taken of *Opium*? and how prepared?

3. What effects are obſerved from their uſe, not only of *Opium* (already mention'd) but alſo of Coffee, Bathing, ſhaving their Heads, uſing Rice; and why they prefer that which grows not unleſs water'd, before Wheat, *&c.*

4. How their Damaſco-ſteel is made and temper'd?

5. What is their way of dreſſing and making Leather, which though thin and ſupple, will hold out water?

6. What method they obſerve in breeding thoſe excellent Horſes, they are ſo much famed for?

7. Whether they be ſo skilful in Poyſoning, as is ſaid; and how their Poyſons are curable?

8. How

8. How the *Armenians* keep Meat freſh and ſweet ſo long, as 'tis ſaid they do?

9. What Arts or Trades they have worth Learning?

10. Whether there be ſuch a Tree about *Damaſcus*, call'd *Mouſlac*, which every year about the Month of *December* is cut down cloſe by the root, and within four or five Months time ſhoots up again apace, bringing forth Leaves, Flowers, and Fruit alſo, and bearing but one Apple (an excellent Fruit) at once?

11. Whether about *Reame* in the Southern part of *Arabia Fœlix*, there be Grapes withour any grains? And whether the people in that Country live, many of them, to a hundred and twenty years, in good health?

12. Whether in *Candia* there be be no poyſonous Creatures; and whether thoſe Serpents, that are there, are without poyſon?

13. Whether all Fruits, Herbs, Earth, Fountains, are naturally ſaltiſh in the Iſle of *Cyprus*? And whether thoſe parts of this Iſle, which abound in *Cyprus-trees*, are more or leſs healthful, than others?

14. What ſtore of *Amianthus* there is in *Cyprus*; and how they work it?

15. Whether *Mummies* be found in the ſands of *Arabia*, that are the dryed fleſh of men buried in thoſe ſandy Deſerts in travelling? And how they differ in their vertue from the Embalmed ones?

16. Whether the parts about the City of *Conſtantinople* or *Aſia Minor*, be as ſubject to Earth-quakes now, as they have been formerly? And whether the Eaſtern Winds do not Plague the ſaid City with Miſts, and cauſe that inconſtancy of Weather, it is ſaid to be ſubject to?

17. Whether the Earth-quakes in *Zant* and *Cephalonia* be ſo frequent, as now and then to happen nine or ten times a Month? And whether theſe Iſles be not very Cavernous?

18. What is the height of Mount *Caucaſus*, its poſition, temper in its ſeveral parts, *&c.*

19. With what declivity the Water runs out of the *Euxine-Sea* into the *Propontis*? With what depth? And if the many Tides and Eddies, ſo famous by the name of the *Euripi*, have any certain Period?

20. If in the *Euxine-Sea* there can be found any ſign of the *Caſpian Seas* emptying it ſelf into it by a paſſage under ground? If there be any different Colour, or Temper as to Heat or Cold; or any great Current or Motion in the Water, that may give light to it?

21. By what Inland paſſages they go to *China*; there being now a paſſage for *Caravans* throughout thoſe places, that would formerly admit of no Correſpondence by reaſon of the Barbariſme of the Inhabitants?

22. Whether in the Aquæducts, they make, they line the inſide with as good Plaiſter, as the Ancients did? and how theirs is made?

23. To inquire after theſe excellent Works of Antiquity, of which that Country is full, and which by the ignorant are not thought worth notice or preſervation? And particularly, what is the bigneſs and ſtructure of the Aquæducts, made in ſeveral places about *Conſtantinople* by *Solyman* the Magnificent? *&c.*

An Obſervation of Optick Glaſſes made of Rock-Chryſtal.

This is contained in a Letter, of *Euſtachio Divini*, Printed in *Italian* at *Rome*, as the 39. *Journal des Scavans* extracts it; *vid.*

Though it be commonly believed, that *Rock-Chriſtal* is not fit for Optick-Glaſſes, becauſe there are many Veins in it; yet *Euſtachio Divini* made one of it, which *he ſaith* proved an excellent one, though full of Veins. *

* It may be queried whether thoſe were true Veins, or only Superficial Strictures, and ſlight ſcratches.

An Accompt of the Uſe of the Grain of Kermes *for Coloration.*

This was communicated by the Ingenious Dr. *Croon*, as he received it from one Monſieur *Verny*, a *French* Apothecary at *Montpelier*; who having deſcribed the Grain of *Kermes*, to be an excreſcence growing upon the Wood, and often upon the leaves

leaves of a Shrub, plentifull in *Languedock*, and gather'd in the end of *May*, and the beginning of *June*, full of a red Juyce; ſubjoyns two Uſes, which that Grain hath, the one for *Medicine*, the other for *Dying of Wool*. Waving the *firſt*, notice ſhall only be taken here of the *latter*, vid. That, for *Dying*, they take the Grain of *Kermes*, when ripe, and ſpread it upon Linnen: And at firſt, whilſt it abounds moſt in moiſture, 'tis turn'd twice or thrice a day, to prevent its Heating. And when there appears red powder amongſt it, they ſeparate it, paſſing it through a Searce; and then again ſpread abroad the Grain upon Linnen, untill there be perceived the ſame redneſs of the powder; and at the end, this red powder appears *about* and *on* the ſurface of the Grain, which is ſtill to be paſs'd through a Searce, till it render no more.

And in the beginning, when the ſmall red Grains are ſeen to move (as they will do) they are ſprinkled over with ſtrong Vinegar, and rubb'd between ones hands: afterwards little balls are form'd thereof, which are expos'd to the Sun to dry.

If this red powder ſhould be let alone, without pouring Vinegar or ſome other accid liquor upon it, out of every Grain thereof would be form'd a little Fly, which would skip and fly up and down for a day or two, and at laſt changing its colour, fall down quite dead, deprived of all the bitterneſs, the Grains, whence they are generated, had before.

The Grain being altogether emptyed of its pulp or red powder, 'tis waſh'd in Wine, and then expos'd to the Sun Being well dryed, 'tis rubb'd in a Sack to render it bright; and then 'tis put up in ſmall Sacks, putting in the midſt, according to the quantity, the Grain has afforded, 10. or 12 pounds (for a *Quintal*) of the duſt, which is the red powder, that came out of it. And accordingly, as the Grain affords more or leſs of the ſaid powder, Dyers buy more or leſs of it.

'Tis to be noted, That the firſt red powder, which appears, iſſues out of the Hole of the Grain, that is on the ſide, where the Grain adhered to the Plant. And that, which about the end appears ſticking on the Grain, hath been alive in the husk, having pierced its covers though the hole, whence it commonly iſſues, remains cloſe as to the Eye.

An Account of ſome Books lately publiſhed.

I. PINAX Rerum Naturalium BRITANICARUM continens VEGETABILIA, ANIMALIA & FOSSILIA in hoc Inſula reperta, inchoatus, Auth. Chriſtophoro Merret, *Med. D. & utriuſque* Societatis Regiæ *ſocio.*

The Learned and Inquiſitive Author of this Book, hath by his laudable example of collecting together, what Natural things are to be found here in *England*, of all ſorts (which he has done upon his own expences) given an invitation to the curious in all parts of the world to attempt the like, thereby to eſtabliſh the much deſired and highly uſeful commerce among *Naturaliſts*, and to contribute every where to the compoſing of a genuine and full *Hiſtory of Nature.*

In the *Preface* he intimates, that his ſtock does ſtill encreaſe dayly; and that therefore the Reader may expect an *Appendix* to this collection.

In the Body of the Book, he enumerates all the *Species*, Alphabetically: And, as to *Vegetables*, he reckons up about 410 ſorts; and gives their *Latine* and *Engliſh* Names, and the *Places* and *Times* of their growth: reducing them afterwards to certain *Claſſes*, hitherto uſed by *Botanick* Writers in their *Hiſtories* of *Plants:* Adding the *Etymology* of their Generick Names, and a compendious *Regiſter* of the Time, *when* and *how long* the *Engliſh* Plants do ſhoot and flouriſh.

As to *Animals*, he finds of them about 340. kinds in *England*, whereof the *fourfooted* are about 50. *Birds* 170. and *Fiſhes* 120. *Inſects* are innumerable, which yet he endeavours to enumerate, and to reduce to certain *Claſſes*; into which he alſo brings the three former kinds.

Concerning *Foſſils*, he *firſt* takes notice of the *Metals* found in *Engliſh* Mines; as *Silver*, *Tin*, *Copper*, *Iron*, *Lead*, *Antimony*, and ſome *Gold* extracted out of *Tin.* Next of the *Stones*, of which he finds about 70 ſorts; & amongſt them, *Briſtol-Diamonds*, *Agates*, *Hyacinths*, *Emerods*, *Loadſtones*, *Toad-ſtones*, (which laſt yet he affirms to be nothing but the grinding-teeth of the

Fiſh

Fiſh *Lupus*) *Pearls*, *Corals*, *Marble*, *Alabaſter*, *Emery*: To which he adds the various kinds of *Coals*; as alſo *Bitumens*, *Turfs*, and *Jets*. And *thirdly* of the various kinds of *Allam*, *Vitriol*, *Niter*, *Sea-ſalt*, *Pit-ſalt*. But *fourthly* of the various *Earths*, of which he reckons up 15. peculiar ſorts (beſides thoſe that ſerve for *Husbandry*, which are not eaſily numbred;) and amongſt them, *Read-lead*, *Black-lead* and *Fullers-earth*.

He concludes all with mentioning the ſeveral *Meteors* appearing in *England*; and the *Hot Springs*, and *Medical Waters*; as alſo, the *Salin*, *Petrifying*, and ſome more unuſual Springs: *Item*, *Subterraneous Trees*, *Subterraneous Rivers*, *Ebbings and Flowings of Wells*, *&c.*

II. PLACITA PHILOSOPHICA Guarini. The chief ſubject of this Treatiſe is Natural *Philoſophy*; upon many important queſtions whereof it enlargeth, as thoſe of the Motion of the Cœleſtial Bodies, of Light, of Meteors, and of the vital and animal functions; leaving ſometimes the common opinions, and delighting in the defence of *Paradoxes*.

E. G. That the material ſubſtantial Form, is nothing but *mera potentia*, and ſubſiſts not by it ſelf: by which means the Author judges, he can free himſelf from many great difficulties touching *Generation* and *Corruption*, which do perplex the other Philoſophers.

He holds *Epicycles* to be impoſſible, and *Excentricks*, not ſufficient to explicate the motion of the Stars; but that all the irregularities of this motion may be ſalved by the means of certain *Spiral* Lines; largely proving this *Hypotheſis*, and particularly explicating the motion of each Planet.

He denies the middle Region of the Air to be cold; and believes that cold is not neceſſary to condenſe the vapours into Water.

He admits not that received Axiome, *That the generation of one Body is the corruption of another*; maintaining that there are *Generations*, to which no corruption ever preceded; and that it may happen, that one Animal without dying may be changed into another Animal.

He alledges ſeveral reaſons to evince, that the Air breathed in, enters not only into the whole capacity of the Cheſt, but alſo into the lower belly. He

He is of opinion that the Air, which is commonly believed to corrupt eaſily, is incorruptible; alledging among other reaſons, this for one, that experience ſhews, that if a Bottle be exactly ſtop'd, there is never any mixt Body form'd in it; wherefore, *ſaith he*, the Air is not corrupted there.

He maintains, that 'tis not the *Magnet* that draws the Iron, but rather the Iron that attracts the *Magnet*. To explain which he affirms, that the Load-ſtone ſpreads abroad out of it ſelf many corpuſcles, which the ſubſtance of the Iron imbibes, and that, as dry things attract thoſe that are moiſt, by the ſame reaſon Iron draws the Loadſtone.

He rejects the *ſpecies intentionales*, *Vital* and *Animal* Spirits, and holds many other uncommon opinions, touching *Light*, the *Iris*, the *Flux and Reflux of the Sea*, *&c.*

III. GUSTUS ORGANUM per Laurentium Bellini *noviſſimè deprehenſum.*

This Author propoſing to himſelf to diſcover both the principal *Organ* of the *Taſte*, and the nature of its *object*, begins with the latter, and examins firſt, what is *Taſte?* He judges that it is cauſed by nothing but Salts, which being variouſly figured, affects the tongue variouſly: alledging this for his chief reaſon, that the Salt which is extracted by *Chymiſts* out of any mixt body whatever it be, carries away with it all its taſte, and that the reſt remains taſteleſs. He adds that the Teeth in grinding the Food, ſerve much to extract this Salt: And he notes by the by, that the Teeth are ſo neceſſary for preparing the aliment, that certain Animals which ſeem to have none, have them in their ſtomach; and that nature has put at the entry of the palat of thoſe that are altogether deſtitute of them, certain moveable inequalities, which are to them inſtead of Teeth.

But then *ſecondly*, concerning the *Organ* of Taſte, he eſteems, that 'tis neither the Fleſh, nor the Tongue, nor the Membrans, nor the Nerves found there, nor the Glanduls, called *Amygdalinæ*; but thoſe *little eminences* that are found upon the tongue of all Animals. To obtain which, he obſerves,

1. That from the middle of the Tongue to the root, as alſo towards the tip, there are found innumerable *little Riſings* called

led *Papillares*; but that from the tip of the Tongue unto the ſtring there is obſerved none at all.

2. He hath experimented, that if you put *Sal Armoniack* upon the places of the Tongue, where thoſe *Eminencies* are not, you ſhall find no Taſte; but that you will find it preſently aſſoon as you put any ſuch Salt, where they are to be met with. Ergo, *ſaith he*, thoſe *Eminencies* are the principal Organ of Taſte.

3. He aſſures, that with a *Microſcope*, may be ſeen in thoſe *Riſings* many little holes, at the bottom whereof there are ſmall nerves, terminating there: But *he directs*, to obſerve this in live and healthy, not in dead or ſick Animals.

Having laid down theſe Obſervations, he concludes, that the manner, after which Taſte is perform'd, is this, That the particles of Salt paſsing through thoſe pores, which pierce the *Papillary Eminences*, and penetrating as far as to the nerves, that meet them there, do by the means of their ſmall points prick them; which pricking is called the *Taſte*.

In the mean time he acknowledges, that before him Signior *Malphigi*, Profeſſor at *Meſsina*, had made ſome of theſe diſcoveries.

The notice of theſe two laſt Books we owe to the *French Journal*.

Correct in Number. 19.

Page, 342. line, 33. read *mixt Ores*, in ſtead of, *mixt with Ores*.

London, Printed for *John Martin*, Printer to the *Royal Society*, and are to be ſold at the *Bell* a little without *Temple-Bar*.

PHILOSOPHICAL TRANSACTIONS.

Monday, February 11. *1666.*

The Contents.

Tryals propoſed by Mr. Boyle *to Dr.* Lower, *to be made by him, for the Improvement of Transfuſing Blood out of one live Animal into another; promiſed* Numb. 20. p. 357.

THe following *Queries* and *Tryals* were written long ſince, and read about a Moneth ago in the *R Society*, and do now come forth againſt the Authors intention, at the earneſt deſire of ſome Learned Perſons, and particularly of the worthy *Doctor*, to whom they were addreſſed; who thinks, they may excite and aſſiſt others in a matter, which, to be well proſecuted, will require many hands. At the reading of them, the *Author* declared, that of divers of them he thought he could fore-ſee the Events, but

yet judged it fit, not to omit them, becauſe the Importance of the *Theories*, they may give light to, may make the Tryals recompence the pains, whether the ſucceſs favour the *Affirmative* or the *Negative* of the Queſtion, by enabling us to determine the one or the other upon ſurer grounds, than we could otherwiſe do. And this Advertiſement he deſires may be applied to thoſe other Papers of his, that conſiſt of *Quæries* or propoſed *Tryals*.

The Quæries *themſelves follow.*

1. Whether by this way of Transfuſing Blood, the diſpoſition of Individual Animals of the ſame kind, may not be much altered? (As whether a *fierce* Dog, by being often quite new ſtocked with the blood of a *cowardly* Dog, may not become more tame; *& vice verſa, &c?*)

2. Whether immediately upon the unbinding of a Dog, repleniſht with adventitious blood, he will know and fawn upon his Maſter; and do the like cuſtomary things as before? And whether he will do ſuch things better or worſe at ſome time after the Operation?

3. Whether thoſe Dogs, that have *Peculiarities*, will have them either aboliſht, or at leaſt much impaired by transfuſion of blood? (As whether the blood of a *Maſtiff*, being frequently transfuſed into a *Blood-hound*, or a *Spaniel*, will not prejudice them in point of ſcent?)

4. Whether acquired Habits will be deſtroy'd or impair'd by this Experiment? (As whether a Dog, taught to fetch and carry, or to dive after Ducks, or to ſett, will after frequent and full recruits of the blood of Dogs unfit for thoſe Exerciſes, be as good at them, as before?)

5. Whether any conſiderable change is to be obſerv'd in the Pulſe, Urin, and other Excrements of the *Recipient* Animal, by this Operation, or the quantity of his inſenſible Tranſpiration?

6. Whether the *Emittent* Dog, being full fed at ſuch a diſtance of time before the Operation, that the maſs of blood may be ſuppos'd to abound with *Chyle*, the *Recipient* Dog, being before hungry, will loſe his appetite, more than if the *Emittent* Dogs blood had not been ſo chylous? And how long, upon a

Vein

Vein opened of a Dog, the admitted blood will be found to retain *Chyle?*

7. Whether a Dog may be kept alive without eating by the frequent Injection of the Chyle of another, taken freſhly from the Receptacle, into the Veins of the *Recipient* Dog?

8. Whether a Dog, that is *ſick* of ſome diſeaſe chiefly imputable to the maſs of blood, may be cured by exchanging it for that of a *ſound* Dog? And whether a *ſound* Dog may receive ſuch diſeaſes from the blood of a *ſick* one, as are not otherwiſe of an infectious nature?

9. What will be the Operation of frequently ſtocking (which is feaſible enough) an *old* and feeble Dog with the blood of *young* ones, as to livelineſs, dulneſs, drowſineſs, ſqueamiſhneſs, &c. *et vice verſa?*

10. Whether a *ſmall* young Dog, by being often freſh ſtockt with the blood of a young Dog of a *larger* kind, will grow bigger, than the ordinary ſize of his own kind?

11. Whether any Medicated Liquors may be injected together with the blood into the *Recipient* Dog? And in caſe they may, whether there will be any conſiderable difference found between the ſeparations made on this occaſion, and thoſe, which would be made, in caſe ſuch Medicated Liquors had been injected with ſome other Vehicle, or alone, or taken in at the mouth?

12. Whether a Purging Medicine, being given to the *Emittent* Dog a while before the Operation, the *Recipient* Dog will be thereby purged, and how? (which Experiment may be hugely varied.)

13. Whether the Operation may be ſucceſsfully practis'd, in caſe the injected blood be that of an Animal of another *Species*, as of a *Calf* into a *Dog*, &c. and of a *Cold* Animal, as of a *Fiſh*, or *Frog*, or *Tortoiſe*, into the Veſſels of a *Hot* Animal, and *vice verſa?*

14. Whether the *Colour* of the Hair or Feathers of the *Recipient* Animal, by the frequent repeating of this Operation, will be changed into that of the *Emittent?*

15. Whether by frequently tranſfuſing into the ſame Dog, the blood of ſome Animal of another *Species*, ſomething further, and more tending to ſome degrees of a change of *Species*, may

be effected, at leaſt in Animals near of Kin; (As Spaniels and Setting Dogs, Iriſh Grey-hounds and ordinary Grey-hounds, &c.)

16. Whether the Transfuſion may be practis'd upon pregnant Bitches, at leaſt at certain times of their gravidation? And what effect it will have upon the Whelps?

There were ſome other *Quæries* propoſed by the ſame *Author*; as, the weighing of the *Emittent* Animal before the Operation, that (making an abatement for the Effluviums, and for the Excrements, if it voids any) it may appear, how much blood it really loſes. To which were annext divers others not ſo fit to be peruſed but by *Phyſitians*, and therefore here omitted.

A Method
For Obſerving the Eclipſes of the Moon, *free from the Common Inconveniencies, as it was left by the Learned Mr.* Rook, *late* Greſham-*Profeſſor of Geometry.*

ECliplſes of the Moon are obſerved for two principal ends; One *Aſtronomical*, that by comparing Obſervations with Calculations, the *Theory* of the *Moons Motion* may be perfected, and the *Tables* thereof reformed: the other, *Geographical*, that by comparing among themſelves the Obſervations of the ſame *Ecliptick Phaſes*, made in *divers* places, the *Difference* of *Meridians* or *Longitudes* of thoſe places may be diſcerned.

The Knowledge of the Eclipſe's Quantity and Duration, the Shadows, Curvity, and Inclination, &c. conduce only to the former of theſe ends. The exact time of the Beginning, Middle, and End of Eclipſes, as alſo in *Total* ones, the Beginning and End of *Total* darkneſs, is uſeful for both of them.

But becauſe in Obſervations made by the *bare* Eye, theſe times conſiderably differ from thoſe with a *Teleſcope*; and becauſe the *Beginning* of Eclipſes, and the *End* of *Total* darkneſs, are ſcarce to be obſerved exactly, even with Glaſſes (none being able clearly to diſtinguiſh between the *True* Shadow and *Penumbra*, unleſs he hath ſeen, for ſome time before, the Line, ſeparating them, paſs along upon the Surface of the Moon;) and laſtly, becauſe in ſmall

Partial

Partial Eclipſes, the Beginning and End, and in *Total* ones of ſhort continuance in the Shadow, the Beginning and End of *Total* darkneſs, are unfit for nice Obſervations, by reaſon of the ſlow change of *Apparences*, which the *Oblique* Motion of the Shadow then cauſeth. For theſe reaſons I ſhall propound a *Method* peculiarly deſign'd for the Accompliſhment of the *Geographical* end in Obſerving Lunar Eclipſes, free (as far as is poſſible) from all the mentioned Inconveniences.

For, *Firſt*, It ſhall not be practicable without a Teleſcope. *Secondly*, The Obſerver ſhall alwayes have opportunity before his principal Obſervation, to note the Diſtinction between the *True Shadow* and the *Penumbra*. And, *Thirdly*, It ſhall be applicable to thoſe Seaſons of the Eclipſe, when there is the ſuddeneſt Alteration in the *Apparences*.

To ſatisfie all which intents,

Let there be of the Eminenteſt *Spots*, diſperſed over all Quarters of the Moons Surface, a ſelect number generally agreed on, to be conſtantly made uſe of, to this purpoſe, in all parts of the World. As, for Example, thoſe, which *M. Hevelius* calleth,

Mons: *Sinai.* *Ætna.* *Porphyrites.* *Serorum.*

Inſula: *Besbicus.* *Creta.*

Palus: *Mæotis.* *Maræotis.*

Lacus Niger Major.

Let in each *Eclipſe*, not all, but (for inſtance) three of theſe *Spots*, which then lie neareſt to the *Ecliptick*, be exactly obſerved, when they are firſt touch'd by the *True* Shadow, and again, when they are juſt compleatly entred into it, and (if you pleaſe) alſo in the *Decreaſe* of the Eclipſe, when they are firſt fully clear from the *True* Shadow: For the accurate determinations of which moments of time (that being in this buſineſs of main importance) let there be taken *Altitudes* of remarkable *Fixed Stars*, on this

ſide

ſide of the *Line*, of ſuch, as lie between the *Æquator* and *Tropick* of *Cancer*; but *beyond* the *Line*, of ſuch, as are ſituate towards the other *Tropick*; and in all places, of ſuch, as at the time of Obſervation, are about 4. hours diſtant from the *Meridian*.

An Account
of ſome Obſervations, lately made in Spain, *by His Excellency the* Earl of Sandwich.

THe Right Honourable the *Earl of Sandwich*, as he appears eminent in diſcharging the Truſt, his Majeſty hath repoſed in him, of Ambaſſador Extraordinary to the King of *Spain*; ſo he forgets not in the midſt of that Employment, that he is a Member of the *Royal Society*; but does from time to time, when his weighty State-Negotiations do permit, imploy himſelf in making conſiderable Obſervations of divers kinds, both *Aſtronomical* and *Phyſiological*; and communicateth the ſame to the ſaid *Society*; as for inſtance, lately, what he has obſerv'd concerning the *Solar Eclipſe* in *June* laſt, the Suns height in the Solſtice, and alſo the Latitude of *Madrid*, eſteeming by the Suns Altitude in the *Solſtice*, and by other Meridian Altitudes, the *Latitude* of *Madrid* to be 40 deg. 10 min; which differs conſiderably from that aſſigned by others; the General Chart of *Europe* giving to it 41 deg. 30 min. the General Map of *Spain*, 40 deg. 27 min. A large Provincial Map of *Caſtile*, 40 deg. 38 min.

To theſe particulars, and others formerly imparted, his Excellency is making more of the ſame nature; and particularly thoſe of the Immerſion of the *Satellites* of *Jupiter*.

We muſt not omit mentioning here, what he hath obſerved of *Halo*'s about the *Moon*; which he relates in theſe words;

Decemb. 25. *Old Style*, 1666. In the Evening, here (vid. at *Madrid*) was a great *Halo* about the Moon, the *Semidiameter* whereof was about 23 deg. 30 min. *Aldebaran* was juſt in the *North-eaſt* part of the *Circle*, and the two Horns of *Aries* juſt encloſed by the *South-weſt* of the *Circle*, the Moon being in the *Center*. I note this the rather (*ſaith he*) becauſe five or ſix years ago, vid. *Novemb.* 21. *Old Style*, 1661. an hour after Sun-ſet, I ſaw a great *Halo* about the Moon of the ſame *Semidiameter*,

at

at *Tangier*, the Moon being very near the ſame place, where ſhe was now.

Extract

Of a Letter, lately written by Mr. Nathaniel Fairfax *to the* Publiſher, *containing Obſervations about ſome* Inſects, *and their Inoxiouſneſs, &c.*

The Ingenious Author of this Letter, as he expreſſes an extraordinary deſire to ſee the *Store-houſe* of *Natural Philoſophy*, more richly fraughted (a Work begun by the ſingle care and conduct of the Excellent Lord *Verulam*, and proſecuted by the Joynt-undertakings of the *R. Society*) ſo he very frankly offers his Service in contributing ſome of his Obſervations, and begins in this very Letter to perform his Offer. For, Having taken notice of what was publiſht in *Numb. 9. p. 161.* out of the *Italian* Philoſopher *Redi*, vid. That Creatures, reputed Venomous, are indeed no Poyſons, when ſwallow'd, though they may prove ſo, when put into Wounds: He, for confirmation thereof, alledges Examples of ſeveral Perſons well known to him (himſelf alſo having been an Eye-witneſs to ſome ſuch Experiments) who have frequently ſwallow'd *Spiders*, even of the rankeſt kind, without any more harm than happens to Hens, Robin-red-breaſts, and other Birds, who make Spiders their daily Commons. And having made mention of ſome men, that eat even *Toads*, he adds, that though a Toad be not a Poyſon to us in the whole; yet it may invenome outwardly, according to ſome parts ſo and ſo ſtirr'd; an inſtance whereof he alledges in a Boy, who ſtumbling on a Toad, and hurling ſtones at it, ſome Juyce from the bruiſed Toad chanced to light upon his Lips, whereupon they ſwell'd, each to the thickneſs of about two Thumbs: And he neglecting to uſe, what might be proper to reſtore them, they have continued in that miſhapen ſize ever ſince; the uglineſs whereof, when the Relator ſaw, gave him occaſion to inquire after the cauſe of it, which thereupon he underſtood to be, as has been recited.

On this occaſion, the ſame Gentleman relates, that once ſeeing a Spider bruiſed into a ſmall Glaſs of Water, and that it tinged

it

it ſomewhat of a Sky-colour, he was, upon owning his ſurpriſe thereat, informed, that a dozen of them being put in, they would dye it to almoſt a full *Azure*. Which is touch't here, that, the Experiment being ſo eaſie to make, it may be tried, when the ſeaſon furniſhes thoſe Inſects; mean time, it ſeems not more incredible, that this Creature ſhould yield a Sky-colour, when put in water, than that *Cochineel*, which alſo is but an Inſect, ſhould afford a fine *red*, when ſteep'd in the ſame Liquor.

An Account Of Some Books.

I. Le Tome troiſieme et dernier des Lettres de *M. DES-CARTES.*

As the two firſt *Tomes* of M. *Des-Cartes* his Letters, contain Queſtions, for the moſt part of a *Moral* and *Phyſiological* Nature, propoſed to, and anſwer'd by him; ſo *this* conſiſts of the Conteſts, he had upon ſeveral Subjects with divers Men eminent in his time.

To paſs by that ſharp Conteſt, he was engaged in by ſome Profeſſors of Divinity at *Utrecht*, who endeavoured to diſcredit his Philoſophy, as leading to Libertiniſme and Atheiſme, notwithſtanding he made it ſo much his buſineſs, as to aſſert the Exiſtence of a Deity, and the Immortality of a Soul: We ſhall take notice of what is more to our purpoſe, *vid.* the Differences, he had touching his *Dioptricks* and *Geometry*.

As for his *Dioptricks*, though a great part of the Learned World have much eſteem'd that Treatiſe, as leaving little to be ſaid after him upon that Subject; yet there have not been wanting Mathematicians, who have declared their diſagreement from his Principles in that Doctrine. The firſt of them was the Jeſuit *Bourdin*, Mathematick Profeſſor in the Colledg of *Clermont* at *Paris*; but this difference was ſoon at an end. A ſecond was Mr. *Hobbs*, upon whoſe account he wrote ſeveral Letters to *Merſennus*, containing many remarks conducing to the Knowledge of the Nature of *Reflection* and *Refraction*. But the Perſon, that did moſt learnedly and reſolutely attack the ſaid *Dioptricks*, was Monſieur *Fermat*, writing

writing firſt about it to *Merſennus*, who ſoon communicated his Objections to M. *Des-Cartes*, who failed not to return his Anſwer to them. But *Fermat* replied, and *Des-Cartes* likewiſe; and after many reciprocations, in which each party pretended to have the advantage, the matter reſted; until M. *Fermat* taking occaſion to write afreſh of it to M. *De la Chambre*, ſeveral years after *Des-Cartes*'s death, upon occaſion of a Book, written by M. *De la Chambre*, *Of Light*; diſcourſed with this new *Author* after the ſame rate, as he had done before with *Des-Cartes* himſelf, and ſeemed to invite ſome-body of his friends, to re-aſſume the former conteſt. Whereupon M. *Clerſelier* and M. *Rohault* took up the Gantlet, to aſſert the Doctrine of the deceaſed Philoſopher, exchanging ſeveral Letters with M. *Fermat*, all inſerted in this *Tome*, and ſerving fully to inſtruct the Reader of this Difference, and withal to elucidate many difficult points of the Subject of *Refractions*; eſpecially of this particular, *Whether the Motion of Light is more eaſily, and with more expedition, perform'd through* denſe *Mediums, than* rare.

Beſides this, though one would think, Diſputes had no place in *Geometry*, ſince all proofs there, are as many Demonſtrations; yet M. *Des-Cartes* hath had ſeveral ſcufles touching that Science. As M. *Fermat* had aſſaulted his *Dioptricks*, ſo He reciprocally examined his Treatiſe *De Maximis & Minimis*, pretending to have met with *Paralogiſmes* in it. But the Cauſe of M. *Fermat* was learnedly pleaded for, by ſome of his Friends, who took their turn to examine the Treatiſe of *Des-Cartes*'s Geometry; whereupon many *Letters* were exchanged, to be found in this Book, and deſerving to be conſidered; which doubtleſs the Curious would eaſily be induced to do, if Copies of this Book were to be obtain'd here in *Engländ*, beſides that one, which the *Publiſher* received from his *Pariſian* Correſpondent, and which affords him the opportunity of giving this, though but Curſory, Account of it.

As to *Phyſicks*, there occur chiefly two Queſtions, learnedly treated of in this *Volume*, though not without ſome heat between M. *Des-Cartes* and M. *Roberval*. The *one* is, touching the Vibrations of Bodies ſuſpended in the Air, and their Center of Agitation: about which, there is alſo a Letter inſerted of

M. *Des-Cartes* to that late Noble and Learned Engliſh Knight, Sir *Charles Cavendiſh*. The *other* is, whether Motion can be made without ſuppoſing a *Vacuum*: where 'tis repreſented, That, if one comprehend well the Nature, aſcribed to the *Materia ſubtilis*, and how Motions, called *Circular*, are made, which need not be juſt *Ovals* or *true* Circles, but are only called Circular, in regard that their Motion ends, where it had begun, whatever irregularity there be in the Middle; and alſo, that all the Inequalities, that may be in the Magnitude or Figure of the parts, may be compenſated by other inequalities, met with in their Swiftneſs, and by the facility, with which the parts of the *Subtle Matter*, or of the firſt *Carteſian* Element, which are found every where, happen to be divided, or to accommodate their Figure to the Space, they are to fill up: If theſe things be well underſtood and conſidered, that then no difficulty can remain touching the Motion of the parts of Matter *in pleno*.

Beſides all theſe particulars, treated of in this *Tome*, there occur many pretty Queſtions concerning *Numbers*, the *Cycloid*, the manner of *Working Glaſſes for Teleſcopes*, the way of *Weighing Air*, and many other Curioſities, Mathematical and Phyſical.

II. ASTRONOMIA REFORMATA, *Auctore* JOHANNE BAPT. RICCIOLI, *Soc. Jeſu.*

For the Notice of this Book, and the Account of the Chief Heads contained therein, we are obliged to the *Journal des Scavans*; which informs us,

Firſt, That the Deſign of this Work is, that, becauſe ſeveral *Aſtronomers*, having had their ſeveral *Hypotheſes*, there is found ſo great a diverſity of opinions, that it is difficult thence to conclude any thing certain; this Author judged it alſo neceſſary, to compare together all the beſt Obſervations, and upon examination of what they have moſt certain in them, to reform upon that meaſure the Principles of *Aſtronomy*.

Secondly, That this *Volume* is divided into two Parts; whereof the *Firſt* is compoſed of *Ten* Books; in which the Author conſi-

conſiders the principal Obſervations, hitherto made of the Motion of the Planets and the Fixed Stars, of their Magnitude, Figure, and other Accidents; drawing thence ſeveral Concluſions, in which he eſtabliſhes his *Hypotheſis*. The *Second* contains his *Aſtronomical Tables*, made according to the *Hypotheſes* of the Firſt Part, together with Inſtructions teaching the manner of uſing them.

Thirdly, That Aſtronomers will find in this Book many very remarkable things, concerning the *Apparent Diameter of the Sun* and the other Stars, the Motion of the *Libration of the Moon*, the *Eclipſes*, *Parallaxes*, and *Refractions*: And that this Author ſhews, that there is a great difference between *Optical* and *Aſtronomical* Refraction, which *Tycho* and many others have confounded; undertaking to prove, that, whereas theſe *Aſtronomers* have believed, that the remoter any Star is, the leſs is its Refraction, on the contrary the Refraction is the greater, the more a Star is diſtant. And among many other things, he ingeniouſly explicates the two contary Motions of the Sun, from Eaſt to Weſt, and *vice verſa*, by one onely Motion upon a *Spiral*, turning about a *Cone*.

Fourthly, That he repreſents, How uneaſie it is to eſtabliſh ſure Principles of this Science, by reaſon of the difficulties of making exact Obſervations. So, for example, in the Obſervation of the *Equinox*, every one is miſtaken by ſo many *Hours*, as he is of *Minutes*, in the Elevation of the *Pole*, or the Diameter of the Sun, or the Refraction, or in any other circumſtance. In the Obſervation of the *Solſtice*, the error of one only *Second* cauſeth a miſtake of an *Hour* and an *half*: mean time 'tis almoſt impoſſible to avoid the error of a *Second*; and even the ſharpeſt ſight will not be able to perceive it, except it be aſſiſted with an Inſtrument of a prodigious bigneſs. For to mark *Seconds*, though Lines were drawn as ſubtil as the ſingle threds of a Silk-worms Clew, (which are the ſmalleſt ſpaces to be diſcerned by the ſharpeſt Eye) by the Calculation made by this Author there would need an Inſtrument of 48. feet *Radius*, ſince Experience ſhews, that there needs no more at moſt, than 3600. threds of Silk to cover the ſpace of an *inch*. But, ſuppoſe one could have a *Quadrant* of this bigneſs, who can aſſure himſelf, that dividing it into

324000. parts (for ſo many *Seconds* there are in 90. *Degrees*) either in placing it, or in obſerving, he ſhall not miſtake the thickneſs of a ſingle thred of Silk? He adds, that Great Inſtruments have their defects, as the ſmall ones: For in thoſe, that are *Movable*, if the thred, on which the Lead hangs, is any thing big, it cannot exactly mark *Seconds*; if it be very fine, it breaks, becauſe of its great length, and the weight of the Lead: And in the *Fixed* ones, the greater the *Diameter* is, the leſs the Shadow or the Light is terminated; ſo that it is painful enough, exactly to diſcern the extremities thereof. Yet 'tis certain, that the greater the Inſtruments are, the ſurer *Aſtronomers* may be: Whence it is, that ſome *Aſtronomers* have made uſe of *Obelisks* of a vaſt bigneſs, to take the *Altitudes*; and Signior *Caſſini*, after the example of *Egnatio Dante*, cauſed a hole to be made on the higheſt part of a Wall of 95. feet in a Church at *Bononia*, through which the beams of the Sun falling on the Floor, mark as exactly as is poſſible, the height of that Luminary.

Fifthly, That the Author reaſons for the *Immobility of the Earth* after this manner. He ſuppoſes for certain, that the ſwiftneſs of the Motion of heavy bodies doth ſtill *increaſe* in their deſcent; to confirm which principle, he affirms to have experimented, That, if you let fall a Ball into one of the Scales of a Ballance, according to the proportion of the height, it falls from, it raiſeth different weights in the other Scale. For example, A Wooden Ball, of $1\frac{1}{2}$ ounce, falling from a height of 35 inches, raiſeth a weight of 5. ounces; from the height of 140 inches, a weight of 20 ounces; from that of 315 inches, one of 45 ounces; and from another of 560 inches, one of 80 ounces, *&c.* From this principle he concludes the Earth to be at Reſt; for, *ſaith he*, if it ſhould have a Diurnal Motion upon its Center, Heavy Bodies being carried along with it by its motion; would in deſcending deſcribe a *Curve Line*, and, as he ſhews by a *Calculus*, made by him, run equal ſpaces in equal times; whence it follows, that the Celerity of their Motion would not increaſe in deſcending, and that conſequently their ſtroke would not be ſtronger, after they had fallen thorow a longer ſpace.

III. ANATOME MEDULLAE SPINALIS, ET NERVORUM *inde provenientium*, GERARDI BLASII, *M. D.*

The Author ſhews in this little *Tract* a way of taking the entire *Medulla Spinalis*, or Marrow of the Back, out of its *Theca* or Bony Receptacle, *without Laceration*; which elſe happens frequently, both of the Nerves proceeding from it, and of the Coats inveſting it; not to name other parts of the ſame. This he affirms to have been put into practice by himſelf, by a fine Saw and Wedge; which are to be dexterouſly uſed: and he produceth accordingly in excellent Cuts, the Repreſentations of the Structure of the ſaid *Medulla* thus taken out, and the *Nerves*, thence proceeding; and that of ſeveral Animals, Dogs, Swine, Sheep.

He intermixes ſeveral Obſervations, touching the *Singleneſs* of this *Medulla*, againſt *Lindanus* and others; its *Original*, vid. Whether it be the Root of the Brain, or the Brain the Root of it: its difference of *Softneſs* and *Hardneſs* in ſeveral Animals; where he notes, that in *Swine* it is much ſofter than in Dogs, *&c.*

He exhibits alſo the Arteries, Nerves, and Veins, diſperſed through this *Medulla*, and inquires, Whether the *Nerves* proceed from the *Medulla* it ſelf, or its *Meninx*; and diſcourſes alſo of the *Principle* and *Diſtribution* of the Nerves; referring for ampler information in this and the other particulars, to that Excellent Book of the Learned Dr. *Willis*, *De Anatome Cerebri.*

*Adverti*ſ*ement.*

Advertiſement.

It was thought fit to publiſh here the following *Advertiſement* of *John Evelyn* Eſquire, and that as himſelf propoſed it. *Viz.*

BEing much ſolicited by many worthy Perſons, to publiſh a *Second Edition* of my Diſcourſe and Directions concerning *Timber*, *&c.* which was printed at the Command and by the Encouragement of the *R. Society*, I do humbly requeſt, that if any Perſon have any Material Additions or Reformations, which he thinks neceſſary either to the Part, which concerns the Improvement of *Forreſt-Trees*, or that of *Cider*, he would be pleaſed to communicate his Notes and Directions to Mr. *H. Oldenburgh*, one of the Secretaries of the ſaid Society, at his Houſe in the *Palmal* of *St. James*'s *Fields Weſtminſter*, with what ſpeed they conveniently can, before our *Lady-day* next, to be inſerted into this intended *Edition.*

Note,

What was obſerved, Numb. 20. *p.* 364. *l.* 18. *of the Number of* Vegetables, (*vid.* That they are about 410.) *found in* England; *and catalogued by Dr.* Merret *in his* Pinax, *&c. is to be underſtood only of the* different Kinds *of Plants, not of the ſeveral ſorts of ſeveral Plants; for, theſe being compriſed, the Number will amount to about* 1400.

THE

THE *PHILOSOPHICAL TRANSACTIONS* OF Two Years, 1665 and 1666, beginning *March* 6. 1665. and ending with *February* 1666; abbreviated in an ALPHABETICAL TABLE: And alſo afterwards Digeſted into a more *NATURAL METHOD.*

In the TABLE, the firſt *Figure* ſignifies the *Number* of the *Tracts*: the ſecond, the *Page*, as it is remarked in the ſame.

Aſtro-

Stenonis

THE

The more
NATURAL METHOD.

Note,

That though in this laſt Head there is repeated the *Transfuſion* of Blood, becauſe the Operation is an Art requiring diligence, and a practiſed hand to perform it for all advantagious Diſcoveries, and ſo to be diſtinguiſh'd from the *Anatomical* Account; yet that there is not affected noiſe and number, may well appear by reviewing and comparing the particulars of *Artificial Inſtruments* in the

Table,

Table, where ſometimes one Engin or Inſtrument may miniſter Aid to diſcover a large branch of Philoſophy, as the *Baroſcope*, an *Optick Glaſs*, &c.

And very particularly M. *Rook*'s directions for Seamen, which ſpecifies Inſtruments, may hereunto belong.

And ſometimes in one of the Diſcourſes herein mention'd, and abbreviated, there are almoſt as many Artificial Inventions, as Experiments; as in Mr. *Boyle*'s Hydtoſtatical Experiments: Beſides all the Chymical Operations, recited in the *Treatiſe* of the *Origine of Forms*, &c.

Οὐκ ἐν τῷ μεγάλῳ τὸ εὖ, ἀλλ' ἐν τῷ εὖ τὸ μέγα.

ERRATA.

Pag. 392. lin. 23. blot out, *as*. ibid. lin. 24. read *of the Soul*.

FINIS.

In the *SAVOY*,
Printed by *T. N.* for *John Martyn*, and *James Allestry*, Printers to the *Royal Society*: And are to be sold at their Shop without *Temple-Bar*, and in *Duck-lane*, 1667.