

As the Author alledges this Example to fortifie his Opinion concerning the Cause that impells the Chyle to the Breasts, which he takes to be the Mother's or Nurse's strong imagination and passion to give Suck ; so he adds another, for the same purpose, known to himself, and happen'd in his own Family, which is, That a little Boy of his having been suckled for a while by his own Mother, the Author's Wife ; but being fallen very Sick, and for great weakness unable to Suck any more for six or seven Weeks, and consequently given over for Dead ; the Mother, having cast off all hopes of giving it any further Suck, let her Milk dry up. But the Child by great Care recovering so far as to be able to Suck again, and being put to an hired Nurse, after the Mother's Breasts were dryed up, and this Nurse not using the Child well, the Mother out of great Compassion to her Child, did, about the End of the ninth Month from the time of her being brought to Bed, take the Babe to her self again, and whilst another Nurse was looked for, with a thousand embraces she passionately wish'd and desired, she might have a full Breast to give Suck again her self. A Nurse being found the same Day, and the Child put to her Breasts, the Wife of our Author found at Night, from her strong imagination and passion (saith he) that her Breasts, though not stroaked by her, nor suckled by the Child, swell'd again, after they had for eight whole Months been quite dryed up, and they yielded so much good Milk, that, if the new Nurse had not been hired, she could have given plentiful Suck to the Boy her self.

An Account of two Books.

- I. *Traëtatus quinque Physico-Medici, de SALE-NITRO & SPIRITU NITRO-AEREO ; de RESPIRATIONE ; de RESPIRATIONE FÆTUS in UTERO & OVO ; de MOTU MUSCULARI & SPIRITIBUS ANIMALIBUS ; de RACHITIDE : Auth. Joh. Mayow, LL. D. & Medici, &c. Oxonii, è Theat. Sheldoniano 1674, in 8°.*

THE first Treatise of this Book handling of *Niter*, and the *Nitro-aerial Spirit*, premiseth a *History of Niter*, and concerning it teaches ; What are its component Parts ; How

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it is produced in the Earth; What the Air contributes to its Generation, and what the *Earth* it self: Which last he esteems to be made of a fix'd Salt and Sulphur closely combin'd, and to contain the *Seeds* of fix'd Salts, even when elixivated; which *Seeds he saith*, are by an Aerial Influx and Ferment in tract of time Digested and Matur'd into a fix'd Salt.

Having deliver'd the constitutive Principles of Niter in general, the Author treats in particular of the *Acid Spirit* of Niter, affirming it to be produced partly by the Air, and partly by a Terrestrial Matter. Where he refers the Reader to those

\* See Mr. Boyle's excellent *Traicts printed A. 1672. in London; the first of which contains New Experiments touching the Relation between Flame and Air, and about Exploptions; where, among many other Things, is evinced the Efficacy of the Air in the Production of Flame even without any actually flaming or burning Body: and where also the Curious Reader will meet with a full and very instructive Account of those Experiments, which this Author here Glances at.*

it has none,) but by those Fiery Aerial Parts, put into a very quick Motion. Concluding upon the whole Matter, that the *Aerial* Parts of Niter are nothing else but the *igneo-aerial* Particles thereof, requisite

\* Compare *Experimenta & Meditationes circa Naturalium rerum principia Davidis von der Becke, described N. 103. of these Tracts, p. 61.*

to make Flame, and that this Aerial Part of Niter is lodged in the *Acid* \* *Spirit* of the same, and not in the fixed Salt; which Acid Spirit, in his Opinion, is compounded of a *Terren* Matter, that is flexile and humid, and of *Ethereal* Corpuscles, that are Rigid, Dry, Active and Igneous, proceeding from the Air. And these Igneous Particles, conceived by him to be *common* to Niter and Air, he calls *Nitro-aerial*, from whence the *Spirit of Niter* derives its caustique and corrosive Nature, which he calls a *Potential* fire, and from whence he thinks also that the *Form* or *Fire* chiefly, if not only, depends. Now, forasmuch as this *Nitro-aerial* igneous

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Spirit resides in the *Acid* Spirit of Niter, he hence infers, that that *Nitro-aerial* Spirit is of a Nitro-salin Nature, obtaining rather the Nature of an *Acid* than *fix'd Salt*; considering also, that the Effects of Fire answer to a very subtile and corrosive Salt.

These things being thus by our Author presuppos'd, he descends to the Explication of the Nature of *Fire*, and makes its Form and Essence principally to depend from the said Nitro-aerial Spirit put into Motion; rejecting the Opinion of those, that will have Fire producible by the subtile and briskly mov'd Parts of *any* Matter, and declaring on this Occasion his dissent from those Philosophers, that deduce all Effects of Nature from the same Uniform Matter, and the various Modifications thereof; \* which he thinks inconsistent with the *Phænomena* of Fire, not at all, in his Opinion, producible but by a certain determinate Kind of Particles, such as he calls *Nitro-aerial*. This he endeavours to prove by divers Experiments.

\* Compare herewith the Considerations of the Noble R. Boyle about the Excellency and Grounds of the Mechanical Hypothesis, printed at London this present Year 1674.

Having done with the *Aerial* Part of the Spirit of Niter, he proceeds to its *Terrestrial* and *Acid* Part, and labours to shew, How the Spirit of Niter is produced in the *Earth*. For the better understanding whereof he premises something concerning the *Spirit of Sulphur* and other *Acid* Liquors; teaching, that that Spirit does not exist in Sulphur before deflagration or the Operation of the Fire; and affirming, that, as the *Nitro-aerial Spirit* of the Fire, by a very brisk Motion and Effervescence contending with and acting upon the *Salino-sulphureous* Particles, does in a very short time comminute and render Fluid the Salin Parts included in the Sulphureous; so the same Spirit, Boiling up by a more remiss Motion with the same *Salino-sulphureous* Parts, doth in a longer time turn the Salin Parts into an *Acid* Liquor. Where he takes Occasion to Discourse, How Liquors in general become *Acid* by the Operation of the *Nitro-aerial Spirit*; as also, Wherein Fermentation consists, viz. In the Effervescence of the *Nitro-aerial* Particles with the *Salino-sulphureous* ones of the Liquor.

This being explain'd, he thinks it not difficult to understand, How the *Acid* Spirit of the *Niter* is generated in the *Earth*; declaring,

ring, That *as* the Nitro-aerial Spirit, put into a vehement effervescence with the Particles of common Sulphur, doth sooner or later evacuate and make Fluid the Salino-metallic Parts thereof; *so* the same Spirit penetrating into the Bowels of the Earth, falls there upon the Terrestrial Sulphur, and therewith Fermenting, so breaks and attenuates the Salin Parts harbour'd therein, that at length they become Flexil, Liquid, and highly Acid; and these Salin Parts being thus reduced to Fluidity, become a fit receptacle for the Nitro-aerial ones to lodge in; from the strict union of both which he affirms such a Spirit of Niter to be constituted, as is obtain'd by Distillation. And these Particles of the Nitrous Spirit being thus generated in the Earth, meeting with the Seeds of fixed Salt, harbour'd in the Earth, do quickly embrace the same, and being closely combin'd with them, make up that Salt called *Niter*. So that, according to this Author, *Sal-Niter* is made up of a threefold Salt; whereof one the most Active, deduces its origin from the Air, and is of an Ethereal and Igneous Nature; and this by its Architectonical power forms to it self out of a Terrestrial Matter a Salin Vehicle, which, together with the Igneous Salt residing in it, constitutes the Spirit of Niter, which as soon as it is Generated falls a working upon the fixed Salts of the Earth brought to due maturity, and together with them makes up the *Common Niter*. From this *Nitro-aerial Spirit* he derives all *Fermentations* tending both to the Production and Dissolution of Things. From the same he deduces *Rigidity*, and particularly *Congelation*, and the Expansion made therein; where he examines the explication given by *Des-Cartes* of the Rarefaction of congealed Water. And as he makes Rigidity the Effect of that Spirit, so he would have the Restitution of Rigid and Infected Bodies, in which consists *Springiness*, to result from the same. And acknowledging, from the many *Boylean* Experiments, \* that the Air is endow'd with a considerable Spring, he attempts to give an Account, whence that Elasticque power ariseth; taking it for granted, that the Air, contains store of those Nitro-aerial Particles, that to him are

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\* To be met with in Mr. Boyle's *Physico-Mechanical Experiments of the Year 1660. at Oxford; and the Continuation of the Year 1669. at Oxford; where the considering Reader may find a full information of what our Author here declares.*

absolutely necessary to make Fire, of which the Air being exhausted by Deflagration, the Fire needs must be extinguish'd ; and assuming thereupon, that the *Elasticity* of the *Air* proceeds from such Aerial Particles as maintain Flame ; having found, *as he saith*, by Experiments, that Air deprived of those Nitro-aerial Parts looseth its Springy Vertue ; which Vertue he also affirms to be lessened by the *Respiration* of Animals, who, in his Opinion, do exhaust out of the Air certain Vital, and those Elastique, Particles ; in-somuch, that he doubts not but that something Aerial, absolutely necessary to Life, passeth into the Blood of Animals by means of their Respiration ; whose Necessity therefore he cannot acknowledge to arise from thence only, that thereby and by the Motion of the Lungs the Mass of Blood may be communicated, as some have asserted : Concluding at last, that *Fire* and *Life* are maintain'd by the same Aerial Parts ; and giving a Reason, why an *Animal* is able to live in a Receiver a while after a *Candle* is extinguish'd ; which is, that, *in his Opinion*, there is required a greater Quantity of Aerial Particles to the burning of a *Candle*, than the maintaining of *Life*. Whence yet he would by no means have it infer'd, that, though Flame and Life are maintain'd by the same Particles, therefore the Mass of Blood is *kindled*, as some teach : Which Doctrine how solidly our Author disputes against, we leave to those that are concern'd to examine.

Mean time, finding great Difficulties in this Matter of *Springiness*, he considers, by what ways the Elastique Vertue of Things may arise ; where he concludes, that though it may partly proceed from the Agitation of the Aerial Parts by a subtle Matter interspers'd amongst them ; yet it seems to him, that the Spring of the Air doth chiefly proceed from, and consist in this, That the rigid Parts of the Air, being compress'd by the Weight of the incumbent Atmosphere, and thereby inflected, do endeavour to expand themselves.

Next, he attempts to explain, How the Air comes to loose its Spring in *Flame* ; affirming, that forasmuch as the Rigidity of the *Ramous* Parts of the Air proceeds from the *Nitro-aerial* corpuscles therein infix'd, and the Spring from that Rigidity, therefore the *former* Parts of the Air being depriv'd of the *latter*, they not only become unfit to maintain the Fire, but also

from rigid become flexible, and consequently loose their Spring.

Here he takes occasion to deliver his Thoughts again of the Nature of *Fire*, which seems to him to be nothing else, than a *Congeries* of very minute Sparks copiously struck out of the Aerial parts by the allision of the Sulphureous ones ; esteeming the Aerial parts solid and rigid enough, to have Fire struck out of them.

This done, he further declares, that the Nitro-aerial Particles, from which, *in his Opinion*, the Spring of the Air proceeds, are lodged in the very Parts of the Air, and carried away from it by the Burning of a Candle, or the Respiration of Animals ; so that, *to him*, those Nitro-aerial and Elastique parts, that come to fail, are not the Air it self, but the subtilest and the most active Part thereof, which being expell'd by burning or respiration, the Air becomes effete, and destitute of its Spring.

Moreover, he considers, How the Air, when deprived of its Nitro-aerial parts, is afresh supplied with them ? Likewise, he takes occasion to declare his Opinion, first, of the Nature of the *Sun*, viz. That it seems to be nothing else than a vast *Chaos* of Nitro-aerial corpuscles, wheeled about by a perpetual and very soft rotation ; secondly, of the Nature of *Cold*, that it is something *Positive*, consisting in this, That the Nitro-aerial parts, which being vehemently mov'd constitute the Body of the Sun, when remov'd from the Sun into the Middle-Region of the Air, cease from that Motion of Circumgiration, and either totally cease, or move on *punctim* like so many Bristles or Darts.

Further, he observes, That since the Parts of the Air being deprived of the Nitro-aerial Spirit are raised upward, and being there impregnated afresh, return thence downward again ; therefore the Air being the Blood as it were of the *Macrocosm*, is in a continual Circulation, and doth it self, forasmuch as in Circulating it takes in the Nitro-aerial Spirit, exercise a Kind of Respiration.

Hereupon he proceeds to explain, In what manner the Nitro-aerial Spirit is breathed in by Animals ; and how it comes to loose in them its Elastique Power ; and of what use it is being inspired : where he teacheth, That those Nitro-aerial Parts are in Animals as well as in Vegetables the principal Instrument of  
Life

Life and Motion ; and that the Fermentation both of the Blood and the Vegetable Juice depends on the same.

Then he passes on to deliver his Opinion about the *Flamma vitalis*, esteeming, that the Fermentation of the Blood, and consequently the Incalcescence of it, ariseth from its Nitro-aerial Parts boyling up with the Salino-sulphureous ones, without a necessity of having any recourse to such a Flame ; which he doth somewhat sarcastically Exagitate, thereby provoking the Maintainers thereof to a Vindication, if the Matter will bear it.

This done, he enquires, Whether Air may be generated *de novo*, and, on this Occasion, recites an Experiment, which he saith, is like to one formerly made by Mr. Boyle, tending to prove the *Affirmative* of the Question. Concerning which, this Author is of Opinion, that though the *Aura*, produced by that Experiment, and by others here recited, be endow'd with a no less Spring than the Air we breath in ; yet it is no *true* Air, such as contains vital and igneous Parts ; for as much as that *aura*, wherein he found an Animal and a lighted Candle to expire ; was, *as he saith*, endow'd with a Spring as well as an unviolated Ait, but destitute of Nitro-aerial and vital Parts. Mean time, he suggests an Experiment to discover, Whether the pretended new generated Air be true Air indeed and fit for to maintain any Life ; and by that Experiment determines this Matter in the *Negative*, though he denies not that there is a great Affinity betwixt them.

After this, he spends a *Chapter* in discoursing, How *Fire* is kindled and propagated, and in what manner all *Fermentations* are made, namely, by the pulsation of the Cartesian *materia subtilis*, whereby as by a Substance that constantly moves, *he saith*, the Ignited Parts are put into a vehement Motion. And here he declares, That *Fire* seems to him to be nothing else than a very great Fermentation of Nitro-aerial and Sulphureous Parts ; and concludes, That, as the most vehement Motion of the igneous Particles proceeds from thence, that the Sulphureous ones pass into the Particles of the Niter or Air, and there hitting upon the briskly agitated *materia subtilis*, are by the impulse of the same, together with the Nitro-aerial Parts, found in the said Substances, by an *Elastique impetus* struck out ; so all the more remiss

Fermentations of natural Things are caused hence, that the said Nitro-aerial Particles, penetrating the Salino-sulphureous Mass, do enter into the Body of the *Subtile matter*, by which, being put in a great Agitation, the said Nitro-aerial Parts are protruded together with the Sulphureous ones ; so that the Effervescence of Fire seems to him to differ from the more remiss Intestine Motions, by which Vegetables are generated or dissolved, only in this ; That in Fire the Nitro-aerial Particles being closely joyn'd with the fixed Salts or Parts of the Air, are by the impulse of the sulphureous Parts and the subtil Matter carried away with Violence, and put in a very swift Agitation ; whereas in other Fermentations, the sulphureous Parts not being lodged so fast in the embraces of the fixed Salt, are by the pulsation of the Nitro-aerial Parts and of the *materia subtilis* moved with more remissness.

Having dispatch'd this Argument, he maketh an excursion into the Ocean, and labours to give an Account of that Ascent of the Waters in the Sea, which is commonly call'd a *Spout* ; deducing it from a vehement *Vertigo* or Whirling of the Air : of the Particulars thereof himself may be consulted.

Next, he Discourses of *Light* and *Colours*, embracing the Doctrin of *Des-Cartes*, making *Light* to consist in a pulse, which by reason of the continuity of the luminous *Medium* is suddenly transmitted to the greater Distance ; but this Impulse our Author would have made by his Nitro-aerial Particles ; as he is of Opinion, That *Colours* are produc'd not from a light Reflected, but from a peculiar Impulse of the *Medium*, altogether different from that of *Light* ; concerning which and the manner of which, the Discourse it self may likewise be perused.

To this he subjoyns a *Chapter* about *Lightning*, which he denies to proceed from kindled Exhalations ; and having espoused the *Cartesian* Opinion of the Production of *Thunder* from the impetuous fall of the upper condensed and conglaciated Clouds upon the lower ; he hence infers, That *Lightning* is made by his Nitro-aerial Particles struck out of the Air, and by their vehement igneous Motion, causing a slight and momentaneous Flash spreading it self over the whole Hemisphere. Where he adds his Thoughts about the Force of *Lightning*, and its wonderful



derful Effects, in melting Swords without hurting their Scabbards, in killing Animals, in occasioning very tempestuous Winds, &c.

This is follow'd by an Explication of the Manner, How Heat is rais'd in *Quick-lime* by pouring Water upon it ; which he deduces from two contrary Salts, the Acid and Alkali, working upon one another : So that flaked Lime seems to him to be nothing else but a Magistery constituted by two contrary Salts, and a stony Earth united together. Where he adds the reason, Why Quicklime is not Heated by the affusion of well-rectified Spirit of Wine, or of Spirit of Turpentine, or any other sulphureous Liquor ; *viz.* because such Liquors are unfit to dissolve the Salts contain'd in the Lime. To which he subjoyns, a Discourse about the *Convening of contrary Salts* both with themselves, and with other Things ; as also concerning *Precipitation* ; giving withal a caution, not rashly to prescribe contrary Salts in the same Medicine, lest the one destroy the efficacy of the other, or change it into a third, quite different from what it was before.

After this, he makes a Digression to examine the *Bath-Waters* ; judging them to be impregnated with a Kind of Vitriolat Tartar, or an aluminous Salt ; which Salts yet, *he saith*, do not destroy one another, but either of them falls into an effervescence with its contrary, for as much as those Salts are so imperfect, that joyned together they are not able to destroy one another. So that he denyeth there is any Solution either of *Niter* or *Sulphur* in those Waters, as hath been hitherto believed ; declaring it to be a Cheat, that *Silver Coins* immersed in those Waters are tinged *Yellow* ; for as much as they are rather tinged *Black*, if immediately they be put into them without any previous dawbing them with a salino-sulphureous Dung. Nor will he admit these Waters to be Heated by any subterranean Fire, but with the learned *Jordan* asserts, that Heat to be produced by a Fermentation made in the Bowels of the Earth : To explain which, he descends to consider the *Origin of Fountains*, most of which he conceives, with many others, to have their rise from Rain-waters, and not from the Sea ; which being supposed, he asserts, that the Air and the Rain-waters passing deep into the porous  
Earth

Earth, and there meeting with Salino-fulphureous Mines, do excite therein a very intense Heat, and that the Springs flowing forth from Mines thus Heated, constitutes these Hot-Baths.

So much, if not too much, of the *first* Treatise. Of the other *four*, there are *two*, viz. that of *Respiration*, and the *Rickets*, the former of which having been Publish'd once already, we have given an Account thereof in *Num.* 70. of the *Traacts*; so that, for fear of being too Prolix, we must say no more of it here; as we also shall forbear to discourse of that other of the *Rickets*; but to hasten to make some mention of the two remaining Parts, treating of the *Respiration* of a *Fætus in the Womb* and the *Egg*, and of the *Muscular Motion* and the *Animal Spirits*.

Touching the *former* of these, our Author considering with himself, How a *fætus* can live in the Womb without the access of Air, and finding the Offices hitherto Assigned to the *Umbilical Arteries* to be ill grounded, scruples not to affirm with the learned *Everard*, that the said Arteries are formed chiefly, if not only, for the Use of *Respiration*, declaring, That the Blood of the *Embryo*, being convey'd through the Umbilical Arteries to the *placenta uteri*, carries to the *fætus*, not only the nutritious Juice, but also with it a quantity of the Nitro-aerial Particles, whereby the Blood of the *fætus*, by its Circulation through the Umbilical Vessels, is impregnated just as it is in the Vessels of the Lungs: Whence he would not have that *Placenta* call'd any more the *Liver* but the *Lungs* of the Womb. And this Supplement for Respiration he extends to the Chicken in an *Egg*, asserting, that the same doth no otherwise than a Child in the Womb breath by the said Arteries; esteeming, that the primogenial Liquors of the Egg, furnish'd with a pure aerial Substance, being incessantly convey'd through the umbilical Vessels to the Chick, perform to the same the Office not only of Nutrition, but of Respiration also. To this he adds, that even that gentle Warmth, excited in the Egg by Incubation, may also contribute something, there to supply the defect of Respiration: forasmuch as he supposes to have proved in his Treatise of *Respiration in general*, that the Nitro-aerial Particles, by the Bloods fermentation struck out of the Parts of the Air, serve Animals for Respiration; and that, as all Heat proceeds, *in his*  
Opinion

*Opinion*, from such Nitro-aerial Particles put into Motion, so in this case, the Heat given by the incubating Bird, and received and detained in the *Albumen*, is thence collected by the many small Suckers of the Umbilical Vessels, and so conveyed to the Chicken. Upon which ground he undertakes to solve that difficult *Quære*, viz. *Why a Fætus after it is born and yet closed up in its Membrans, may yet live for some Hours; whereas, if being devested of those Skins, it have once taken Air into its Lungs, it cannot live a Moment after without it?* Which he answers thus; That a *Fætus* born, and yet wrapped close within the Membrans, is in a like State, and Breathes much after the same manner as a Chick included in an Egg. But, if those Membrans being pull'd away from the *Fætus*, it do, for Breathing, with labour contract the Muscles of the Chest and the Midriff, it spends in that muscular Labour much more of those Nitro-aerial Parts than before; whence there is a greater Necessity for the *Fætus* to breath in the open Air, there being now nothing to compensate the defect of that Respiration.

But enough also of this Exercitation; let us pass to the last, which is of *Muscular Motion*, and *Animal Spirits*. It is undoubted, that the Motion of Animals is made by the Contraction of the Muscles; but it is controverted, in what manner that Contraction is made? The most received Opinion is, That the Fibres of the Muscles are inflated by some Elastique Matter, swelling them as to their breadth, but contracting them as to their length; though the learned *Steno* in his *Myology*, thinks it needless to take in a springy Matter for the Contraction of the Muscles; forasmuch as he judges it may be effected by the sole Change of their Figure. Concerning which our Author considers, that it appears not; 1. How that Motion, requisite to make a Change in the Figure, can be produc'd without the Accession of some new Matter. 2. How it comes to pass, if no new Matter enters the Muscle, that in its Contraction it is so sensibly hard and tense? And whereas Anatomists have hitherto taught, that the Carneous Fibres chiefly make the Contraction in Muscles, our Author thinks it more probable, that the *Fibrilla*, transversely inserted into the greater *Fibres*, perform the chief Part in that Contraction, by reason as well of their position, as their size and number. And

as to the Cause of this Contraction in these *Fibrille*, he thinks, that, besides the *Animal Spirits*, there are also required to this Motion some of the salino-sulphureous Parts of the Blood ; and that those *Animal Spirits*, that contribute to the animal Motion, consist of those Nitro-aerial Parts, which he asserts to be transmitted into the Blood by Inspiration. And both these Parts he judges necessary to this Muscular Motion, because he understands not, how that Animal Motion can be perform'd without different Particles mixed together and briskly moved ; in regard that, *in his Opinion*, it cannot be effected by Springiness and Weight, which do the work in *Automatums*, since their *impetus* will soon cease : Whence he concludes, that the Muscular contraction is perform'd by the Effervescence of the Salino-sulphureous and Nitro-aerial Particles ; of which two he endeavours to shew the *later* to constitute the very *Animal Spirits*, proceeding from the Brain in such Animals as commonly are call'd *perfect*, and (according to *Malpighius*) from the *Medulla spinalis* in *Insects*. But, though our Author ascribes so much to the *Nitro-aerial Particles* as to make them the same with the *Animal Spirits* ; yet would he not have us think, that he believes the *Sensitive Soul* to consist in a *Congeries* of *Animal Spirits*, since he conceives that Soul to be a thing different from them, and to consist of a Matter yet more subtil and æthereal ; of which those Nitro-aerial Particles, that is, the *Animal Spirits*, are the instrument of operation. And concerning that *Sensitive Soul* he thus declares his Mind, *viz.* That it is a more divine *aura*, endow'd with sense from its first Creation, and co-extended to the whole World ; a small Portion of which being contain'd in a duly disposed Subject, exerts such Functions, as we see and admire in the Bodies of Animals.

Having dispatch'd this *Hypothesis* about the Nature of *Animal Spirits*, he endeavours to explain from thence the manner of all Fermentations and Concoctions perform'd in the *viscera* of Animals, and particularly in the *Stomach*, *Pancreas*, and *Spleen* ; in the last of which he takes Occasion to shew, *both* how the Fixed Salts in Animals are volatiliz'd, *and* that from Plants, (which he saith are furnish'd with no Volatil Salt) if they be laid to putrify, a considerable Quantity of Volatil Salt

Salt may be extracted by Distillation.

He concludeth this Part by shewing,

1. In what manner the *Fibrillæ* of the Muscles are contracted; namely, not by Inflation, but Contorsion, as very instantaneous to the constriction and hardness of contracted Muscles, as well as to that strong Traction of the Muscles, sometimes perform'd with a wonderful Vigour; to which he adds, the fitness of the Motion of the Nitro-aerial Particles (by which the Muscular contraction is, *in his sentiment*, perform'd) for such a Contorsion; enforced by Experiment. 2. How the Muscles themselves are mov'd; *viz.* not by bringing the Extremities of the shortned Fibres to the Middle, but by drawing the looser End and the middle Part of the contracted Fibres to the fastned End, or to the Head of the Muscle, which is a fixed and immoveable Tendon. 3. How the Diaphragme, and the Heart are contracted; and how *Saltation* is perform'd. But apprehending we have already been too tedious in giving this Account, we must here break off, and in these and some other Particulars refer to the Author himself.

II. *ANATOMIE CORPORIS HUMANI*, *conscripta* ab Isbrando de Diemberbroeck, *Med. & Anatomes Professore*, *Ultrajecti*, 1671 in 4<sup>o</sup>.

**T**HIS Comprehensive Body of *Anatomy*, but lately come to my Hands, consists of 12 Parts or Books: The *first*, *second*, and *third*, treat of *Three Venters* of the Human Body, as they are wont to be call'd by Anatomists; the Author having premised thereunto some general Considerations touching the great diversity to be met with therein, as to its outward Form, Size and Colour; where he takes particular Notice of the Observations, made *both* by *Schouten* in his Voyages, of having found about the *Straights of Magellan*, Men of ten and eleven Cubits High; and by *Fazellus* in his 1. *decad. lib. 1. c. 6.* of Men found, some 17, some 18, some 20, and even 22 Cubits Tall.

Treating of the Concoction made in the Stomach, he considers the Cause of *Chylification*, why the Aliments there are turned into Chyle rather than into Bile, Blood, &c. examining al-

\* Compare this with what the ingenious Dr. Daniel Cox, a Fellow of the R. Society, publish'd four Months since, in Numb. 101. of the Philosophical Transactions; where it will appear, that that learned Gentleman hath set down the whole Process of the manner of this Extraction, known to him many Years ago, for which he deserves due Acknowledgement.

so the Opinions of Physicians concerning the Cause of *Hunger*, and subjoyning his own, illustrated by Histories, shewing, That such as have fasted for a Couple of Days are then not sensible of Hunger, and find no other Trouble but that of Feebleness of Body. He also he discusses three Problems. 1. What is the Cause of unnatural Appetite, call'd *Pica*? Which Cause he placeth rather in the Brain than the Stomach. 2. Whether in a depraved Constitution and Concoction of the Stomach, the Bile may be made in the same, such as in the *Cholera morbus* is voided both upward and downward? Which he denyeth against *Regius*, and others. 3. Whether *all* the Chyle flows out of the Stomach into the Gut? Which he answers in the *Affirmative*, refuting those that assert, part thereof to pass by the *vas breve*, and other neighbouring *gastric* Veins, into the Spleen; and assigning the manner of the sudden Refection of the Body after Eating and Drinking.

This done, he Discourses of the Use of the Chyle, and inquires, Whether any Parts of the Body are immediately nourish'd by the Chyle before its Conversion into Blood? Which he resolves in the *Negative*; though he affirms withal, that whilst the Blood is the ultimate Aliment of all the Parts, the Chyle doth humect the Stomach and the milky Vessels.

Treating of the *Mesentery*, and the many and considerable Glanduls thereof, he observeth, that from the Obstruction of those Glanduls, Fluxes and Atrophies are frequently occasioned; refuting withal the Opinion of *Riolan*, who makes the Glanduls of the Mesentery the root of all Strumosity.

Examining the *Pancreas*, he reproveth those that would deduce almost all the Origins and Causes of Diseases, from the vitiated Humour of the *Pancreas*: Where he also rejects Dr. *Wharton's* Opinion concerning the Use of this Part, *viz.* that into it are voided the excrementious Juices of the Nerves.

Searching into the *ductus thoracicus* (the Conveyer of the Chyle,) he declares, that that winding Circle of *De Bills*, into which he affirmed the said *ductus* to be propagated at the place of the division of the Jugular Veins, is not a Protraction of that *ductus*, nor receives from it any Chyle, nor carries any; but a Channel, in which is collected the *Lympha*, conveyed out of the circum-

circumjacent Glanduls and other Parts, and to be conveyed into the neighbouring Veins, &c. Here he also treats of that Question, Whether through his *ductus* all the Chyle passeth to the subclavial Vessel? which he answers affirmatively, except that sometimes, yet very seldom, and in an extraordinary Case it flows to the Bladder, and ordinarily in Women with Child to the Womb, and those that give Suck, to the Breasts. Refuting withal *Regius Deusingius*, and others, that labour to maintain the contrary.

Inquiring into the *Lymphatic* Vessels, he explodes the Assertion of the same *De Bills*; teaching, that the *Lympha* is the self same Liquor with the Chylous Juice contain'd in the Lacteals, and that it passeth out of the Chyliferous Vessels into the Liver and Glanduls, and from thence into the Spermatic Vessels for the Humectation and Nourishment, and not from the Glanduls and Liver to the Chyliferous Vessels. Having dispatch'd this Controversy, he examines, What Kind of Liquor this *Lympha* is? Where having endeavour'd to disprove the Opinion of *Dr. Glisson*, esteeming it to be made of the Steams of the Blood, collected like Dew, and impelled into these Vessels, and re-passing with the Vehicle of the Aliment carried through the Nerves; he asserts the *Lympha* to be a peculiar subtile Liquor, separated in the conglobate Glanduls from the *Serum* of the Blood, and embued with store of volatile Salt, and with some Sulphureous Particles, getting into those small Vessels, and by them convey'd partly into the Chyliferous Vessels, partly into many Veins; into the *former*, the more to attenuate the Chyle and thereby to facilitate its Dilatation in the Heart; into the *latter*, to prepare also the Venal Blood to a more expedit Rarefaction in the same Part. Before he leaves these Vessels, he notes, That the Rupture of them often causeth the *Ascites*, and that their being obstructed occasions other dangerous Diseases.

In the Anatomie of the *Liver*, he chiefly commends the accuracy and diligence of *Dr. Glisson* and Signor *Malpighi*, especially as to the Position of the Branches of the *vena cava* and *porta*, and the Vessels of the Bladder of Gall, and how the Blood of the *Porta* enters into the Roots of the *Cava* and those of the said Bladder, not by opening themselves into one another, nor by

having their Branches inserted into the Sides of one another, but only by sending the sanguineous Liquors through the Ends of the Ramifications of the *Porta* in the Substance of the Liver, and from thence conveying the said Liquors into the extremities of the *carva* and the Vessels of the Bladder of Gall : Where he also expresses his Agreement to the Assertion and solid Proof of the learned Dr. *Glisson*, importing, That in a Liver there is not any *Anastomosis* of any Vessels : Whence he concludes it to be evident, How that in other Parts also the Circulation of the Blood is perform'd not by the sole *Anastomosis* of the *Arteries* with the *Veins*, but by the very Pores of the Substance of the Parts themselves. Further, having with most of the modern Anatomists deny'd *Sanguification* to be perform'd in the Liver, and ascribed to it, and the Spleen together, the province of making the Ferment of the Blood, to render it spirituous ; he subjoyns two or three Observations of Persons cured of considerable Wounds inflicted in the Liver ; and another of a Youth whose Liver was immediately joyned to his Lungs, without any other *diaphragme* or *mediastinum* at all ; as also of one *Ortelius*, that had neither Liver or Spleen, and whose *vena carva* proceeded out of the Guts themselves ; concerning which latter Case the sagacious *Malpighi* conjectures, that the glandulous Substance of the Liver in the said *Ortelius*, exended it self all along his Guts.

In the examination of the Juice of *Gall* he observes, That that Liquor doth not only promote the excretion of the *Fæces*, but is also highly necessary to the Fermentation of the Chyle and Blood ; and teacheth, that it is a fermentative Juice prepared in the Liver out of the Sulphureous Parts of the Venal Blood, and the Saltish and Sub-acid Liquor of the Spleen ; refuting not only the new Opinion of *Sylvius* and *Regius* concerning the Generation of this Liquor ; but also that of *Malpighius*, importing, That the Bile is not generated out of any Blood, or by a Concoction of divers Juices made in the Liver, but only separated from the Blood by means of the Kernels of the Liver. After this he discusses and disproves the Doctrine of *Backius* and *Sylvius* about the Motion of the *Bile*, asserting it to be produced in the *folliculus*, and to pass partly through the common *ductus colidochus* into the Guts, and partly through the *porus bilarius* into the Liver,



ver, there to mix with and to attenuate the Blood ; but that nothing of the Bile flows out of the Liver through the said *porus* into the Guts.

In the disquisition of the *Spleen*, he highly applaudeth the discovery of the excellent *Malpighius*, who found it to be wholly made up of little membranous Cells like Hony-combs, accurately explained in his Dissertation *de Liene* v. 5. and formerly described in these Tracts, *Numb.* 44. p. 890. As to its *Use*, he thinks that to be no other, than to make out of the arterial Blood a sub-acid Matter, from which, being anew concocted with sulphureous Particles in the Liver, is made a bilious Ferment of the Blood and Chyle. Entering here upon the Consideration of the *Necessity* of the Spleen in the Body, and relating amongst other Particulars, that it having been written out of *England*, that those Bitches, of whom the Spleen had been cut out, had proved steril afterwards, Dr. *de Graef* had thereupon made himself an Experiment upon a Bitch, which having been deprived of her Spleen, had afterwards conceived and brought forth Puppies : Which Story is certainly grounded upon a Mistake, forasmuch as it is most notorious over all *London*, that, divers Years since, a Bitch, yet alive, of a considerable Nobleman, after she had lost her Spleen, hath been several times with Puppies, of which some, out of Curiosity, were opened, and found to have a very fair Spleen.

Our Author having explain'd the structure and use of the *Pancreas*, the Liver, Bile, and Spleen ; spends a whole Chapter upon the Ferment of the Blood and Chyle, to which he judgeth, that the Operations of the Liver, Spleen and Pancreas do joyntly concur ; where he takes Occasion to Discourse largely of the Matter, Nature, Preparation, and Manner of working of Ferments ; and observes Particularly, from whence those sharp and fermentative Particles in our Bodies are derived ; ascribing their origine to Sulphur and Salt, to be found in all Aliments ; the *former* causing the Commotion, and the *latter* the principal Acrimony. To all which he adds, the Inconveniencies and Diseases arising in the Body, for want of the due Manner and competent Degree of Fermentation in the Juices thereof.

Next, our Author proceeds to the consideration of the *Kid-*  
*neys*

neys, where, having rejected the Opinion of Hieronymus Barbatas, teaching, That the Serum is as alimentary to the Spermatique Parts, as the Blood is to the Carneous; he highly commends what Signor Malpighi hath detected in the Kidneys, *lib. de Renibus*, (of which see also *Numb. 44.* of these Tracts *p. 890.*) and Discourses at large of the Manner of Separation of the Serum from the Blood, which, in his Opinion, is done by a peculiar Fermentation made in that Part; yet leaving it in the dark, How by that effervescence the serious Part of the Blood, together with many Impurities, is separated, and what Configuration it requires, fit to pass alone through the Pores of the Kidneys, with exclusion to the Blood? And, which is much more strange, How divers solid and hard Bodies, as Needles, small Nails, Fenil and Anni-seeds, &c. (of which here are alledged Examples well attested,) can be excreted with Urine, but without Blood: To render some tolerable Account of which *Phanomena*, as also, to conceive the better, How Spaw-waters can be in so great plenty Voided, without passing through the Heart, Lungs and Kidneys, and without molesting the Heart; our Author suspects, there are some Lacteous Vessels, going some yet unknown Way to the Bladder and Womb; which Suspition he confirms by this, That sometimes a chylous milky Matter hath been seen voided with the Urine: By which Way he imagines also that those Liquors do pass, whose colour and scent do remain unchanged in the Wine: Of which Cases he names several, not only of Oyl of Turpentine, and Asparagus (which are commonly known to do so,) but also of a black Medicine, rendering black the Urine, soon made after; of Saffron given to a Women in Travel, and having tinged the Child born within a quarter of an Hour after; of some, that had eaten the roasted Fat of *Lambs-Kidneys*, which by the Author himself was seen soon after to come almost always with the Urine, &c.

Treating of the *Parts of Generation*; he animadvertes upon *Veslingius* and others, that teach the spermatique Veins and Arteries to terminate in the *Parastata*, and there to be changed into the *vasa deferentia*, as Bodies continued to them; whereas he thinks it evident, That those Vessels do not enter into the *Parastata*, but the *Testicles* themselves; which latter being

Discour-

Discourſed of by him, he not only alledges Examples of ſome, that had 3 *Teſtes* but alſo an Inſtance of one that was born without any at all, and yet acted the Part of Virility *in coitu*. Then he rejects the Opinion of thoſe, that held a three-fold *Semen*, elaborated in three different Parts, and neceſſary to Generation: He ſhews alſo, how caſtrated Animals may Engender; and yet how inconſequent it is, that becauſe ſome Animals deſtitute of *Teſticlès* do Generate, therefore the *Teſtes* do not *conficere ſemen*. Proceeding to the Female Sex, he inquires into the Nature of the *fermentum uterinum quod inducit menſtrua*; and examines, Whether a *Fœtus* may be formed *extra uterum*? Whether the *uterus* do remove from its place in hyſterical Women? How *fœtid* Things do help in byſterical Fits? Whether a *Fœtus* can be born, the Mother being dead? *An mulierum genitalia ſolo ſitu a virorum genitalibus differant?* *An mulier mutari poſſit in virum?* What is the conſtituent Matter of the *Seed*? Whether any Thing beſides Arterial Blood, and Animal Spirits? How imagined *Ideas* are imprinted in the *Seed*? Whence comes the external likenefs in the *Fœtus*? Whether the *ſemen muliebri* be the formative Cauſe of the *Fœtus*, and the *virile* be only a Ferment to open and put into act the forming Power of the Female *Seed*? What may be ſaid to the *Harvean* Obſervations concerning the Non-Appearance of the *Seed* ſoon after the *Coit*? Further, he conſiders the whole Work of the Formation of the *Fœtus*; and investigates, what is its Power? Whether the *Seed* be actually animate? Whether a Vegetative Soul be to be admitted in Man; and wherein that conſiſts? Moreover he inquires, Whether the Nutrition of the *Fœtus* is perform'd by the Navil, or the Mouth, or by both? and reſolveth for the laſt; alledging for the Nutrition by the Mouth, among other Arguments, an Obſervation he made of a Child of his own, which about an Hour after it was Born, did void at the Mouth a copious Milk, before it had ſucked or taken in any Thing. Next, he diſcuſſes that great Queſtion, Whether the *Fœtus* reſpireth in the Womb? And reſolves it in the Negative; aſſerting on this Occaſion, That a *Fœtus* never cries in the Womb, &c.

Paſſing on to the *Middle Venter*, or *Cheſt*; he there examines the *Breaſts*, and particularly, Whether there be a Communication of their *Lacteous Veſſels* with any *Chyliferous Channel*? Whether the *Chyle* do paſs through the Arteries themſelves to the *Breaſts*? What *Milk* is? How it is produced of the *Chyle*? What impells the *Chyle* to the *Breaſts*? Concerning which laſt Queſtion, he declares his Opinion to be, that it is a ſtrong Imagination, and an earneſt and frequent Thought and Deſire of *Milk* and giving *Suck*, which works that impaſſe; forasmuch as the vehement Paſſions of the *Mind* are able to cauſe various Motions of the *Spirits* and *Humours*; where the Author taketh Pains to ſhew, how this Cauſe hath place in *Brutes*.

Treating of the *Heart*, he will not admit it to be a *Muſcle*, and endeavours to ſolve the Arguments alledged to prove it to be one. He recites divers memorable Examples of Men wounded in the *Heart*, yet not dying preſently, &c.

In the *Lungs*, he conſiders its Structure out of *Malpighius*; obſerves the many odd Things, often found in them, and, among the reſt, *Stone* of *Stone-duſt* in the *Lungs* of a *Stone cutter*; aſſigneth them the Office of *Respiration*, to refrigerate and condense the *Blood*, and ſo to make it paſs to the left *Venticle* of the *Heart*. Where he contends againſt thoſe, that would have ſome Air mix it ſelf with the *Blood*, and thoſe alſo that would reject *Cooling* as the chief Uſe of *Respiration*; and particularly againſt *Dr. Thoſton*, for diſcharg-

ing the Heart from the Office of Sanguification, and charging the same upon the Lungs. To which he subjoyns a *Quære*, viz. Whether a Man born can live any Time without Respiration? Alledging, divers noble Examples of Men, that have done so.

Proceeding to the *Third Venter*, the *Head*, he endeavours to refute the *Cartesian* Opinion about the Origin of the *Brain*; and then, among many other Particulars, animadverts, on those that alledge Instances of humane Bodies, that were destitute of all Brain, which he is unwilling to believe, suspecting, that it is grounded only upon superficial Inspection. Which done, he disputes against both the *Cartesian* Use of the *Conarion*, and that assigned by Dr. *Whar-ton*; as also against the Office, ascribed by Dr. *Willis* to the *Cerebellum*, viz. to serve for the performing of the Involuntary functions and actions of Animals. After which he Discourses largely of the *Animal Spirits*, attempting to disprove Dr. *Glisson's* Doctrine about the Matter, whence those Spirits are Generated, and that also of *Des-Cartes*, esteeming them not to differ *Specie* from the *Vital*: Himself in the mean time affirming them to be prepared in the Brain, thieftly out of the saline and a few sulphureous Particles of the Blood, and design'd not only for the *animal*, but also for some of the *natural* Actions of the Body, especially the Nutrition of the *spermatic* Parts, &c.

Passing to the *Eye*, he gives the anatome of the structure of this Organ, and the consideration of the Uses of every Part thereof. The like he does as to the *Ear*, and the rest of the Organs of our Senses. Discourfing of the *Tongue*, he will not acknowledge that Part to be a Muscle, as *Spigelius*, *Bellinus*, and others, take it to be. Speaking of the *Salival Channels*, he takes Notice of the contention risen between *Blasius* and *Steno* concerning the priority of their Discovery, &c.

Having dispatch'd these three Books, and in them the *Three Venters*, he goes on to the remaining seven Books, which he dispatches with more Brevity; treating therein of the *Artus*, the *Muscles*, with an *Appendix* about the *Membrans* and *Fibres*, the *Arteries*, the *Veins*, the *Nerves* (not allowing of Dr. *Glisson's* Doctrine, that the Nerves convey the nutritious Juice,) the *Bones*, the *Cartilages* and *Ligaments*, concerning which we cannot here enlarge.

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ERRATA, In Numb. 104. p. 70. l. 29. r. decay. In this Numb. 105. p. 90. l. 18. r. for the annual. p. 95. l. 14. r. The button V. *ib.* l. 18. r, upon it; b, the Hammer, p. 96. l. 15. r. the hollow place, v, in fig. 1. *ib.* l. 17. r. hole, 1. 2. 3. 4. in fig. 2.

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