

V. *An Account, or History, of the Procuring the SMALL POX by Incision, or Inoculation; as it has for some time been practis'd at Constantinople.*

Being the Extract of a Letter from Emanuel Timonius, Oxon. & Patav. M. D. S. R. S. dated at Constantinople, December, 1713.

Communicated to the Royal Society by John Woodward, M. D. Profes. Med. Gresh. and S. R. S.

THE Writer of this ingenious Discourse observes, in the first place, that the *Circassians, Georgians,* and other *Asiatics,* have introduc'd this Practice of procuring the *Small-Pox* by a sort of Inoculation, for about the space of forty Years, among the *Turks* and others at *Constantinople.*

That altho' at first the more prudent were very cautious in the use of this Practice; yet the happy Success it has been found to have in thousands of Subjects for these eight Years past, has now put it out of all suspicion and doubt; since the Operation having been perform'd on Persons of all Ages, Sexes, and different Temperaments, and even in the worst Constitution of the Air, yet none have been found to die of the *Small-Pox*; when at the same time it was very mortal when it seiz'd the Patient the common way, of which half the affected dy'd. This he attests upon his own Observation.

Next he observes, they that have this Inoculation practis'd upon them, are subject to very slight Symptoms, some being scarce sensible they are ill or sick; and what
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is valued by the Fair, it never leaves any Scars or Pits in the Face.

The Method of the Operation is thus. Choice being made of a proper Contagion, the Matter of the Pustules is to be communicated to the Person propos'd to take the Infection; whence it has, metaphorically, the name of Infection or Inoculation. For this purpose they make choice of some Boy, or young Lad, of a sound healthy Temperament, that is seized with the common *Small-Pox* (of the distinct, not Flux sort) on the twelfth or thirteenth day from the beginning of his Sickness; they with a Needle prick the Tubercles (chiefly those on the Shins and Hams) and press out the Matter coming from them into some convenient Vessel of Glass, or the like, to receive it; it is convenient to wash and clean the Vessel first with warm Water: A convenient quantity of this Matter being thus collected, is to be stop'd close, and kept warm in the Bosom of the Person that carries it, and, as soon as may be, brought to the place of the expecting future Patient.

The Patient therefore being in a warm Chamber, the Operator is to make several little Wounds with a Needle, in one, two or more places of the Skin, till some drops of Blood follow, and immediately drop out some drops of the Matter in the Glass, and mix it well with the Blood issuing out; one drop of the Matter is sufficient for each place prick'd. These Punctures are made indifferently in any of the fleshy Parts, but succeed best in the Muscles of the Arm or *Radius*. The Needle is to be a three-edg'd Surgeon's Needle; it may likewise be perform'd with a Lancet: The custom is to run the Needle transverse, and rip up the Skin a little, that there may be a convenient dividing of the Part, and the mixing of the Matter with the Blood more easily perform'd; which is done, either with a blunt Stile, or an Ear-picker: The Wound is cover'd with half a Walnut-shell, or the like Concave Vessel, and bound over, that the Matter be not rub'd off by the Garments; which is all

removed in a few Hours. The Patient is to take care of his Diet. In this place the Custom is to abstain wholly from Flesh and Broath or 20 or 25 days.

This Operation is perform'd, either in the beginning of the Winter. or in the Spring.

Some, for caution, order the Matter to be brought from the Sick by a third Person, lest any infection should be convey'd by the Cloaths of the Operator; but this is not material.

As to the Process of this Matter, in respect of the *Idiosyncrasie*; the *Small-Pox* begins to appear sooner in some than in others. in some with greater, in others with lesser Symptoms; but with happy Success in all. In this Place the Efflorescence commonly begins at the end of the seventh day. which seems to favour the Doctrin of *Crisis*.

It was observ'd, in a Year when the common *Small-Pox* was very mortal, that those by Incision were also attended with greater Symptoms. Of 50 Persons, who had the Incision made upon them almost in the same day, four were found in whom the Eruption was too sudden, the Tubercles more, and Symptoms worse. There was some suspicion, that these four had caught the common *Small Pox* before the Incision was made. It is enough for our present purpose, that there was not one but recovered after the Incision: In those four the *Small-Pox* came near the confluent sort. At other times the inoculated are distinct, few and scatter'd; commonly 10 or 20 break out; here and there one has but 2 or 3, few have 100: There are some in whom no Pustule rises, but in the Places where the Incision was made, which swell up into purulent Tubercles; yet these have never had the *Small-Pox* afterwards in their whole Lives; tho' they have cohabited with Persons having it.

It is to be noted, that a no small quantity of Matter runs for several days, from the place of the Incision.

The Pocks arising from this Operation are dry'd up in a short time, and fall off, partly in thin Skins, and partly
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contrary to the common sort, vanish by an insensible wasting.

The Matter is hardly a thick *Pus*, as in the common, but a thinner kind of *Sanies*; whence they rarely pit, except at the place of the Incision, where the Cicatrices left are not to be worn out by time, and whose Matter comes near the nature of *Pus*.

If an Aposteme breaks out in any (which Infants are most subject to) yet there is nothing to be fear'd, for it is safely heal'd by Suppuration. If any other Symptom happens, 'tis easily cur'd by the common Remedies.

Observe, they scarce ever make use of the Matter of the Incisious Pox. for a new Incision. If this Inoculation be made on Persons who have before had the *Small-Pox*, they find no alteration, and the places prick'd presently dry up; except in an ill Habit of Body, where possibly a slight Inflammation and Exulceration may happen for a few days.

To this time, he says, I have known but one Boy, on whom the Operation was perform'd, and yet he had not the *Small-Pox*, but without any mischief; and some Months after catching the common sort, he did very well. It is to be observ'd, that the places of the Incision did not swell. I suspect this Child prevented the insertion of the Matter, for he struggled very much under the Operation, and there wanted help to hold him still. The Matter to be inserted will keep in the Glass very well for 12 Hours. He goes on.

I have never observ'd any mischievous Accident from this Incision hitherto; and altho' such Reports have been sometimes spread among the Vulgar, yet having gone on purpose to the Houses whence such Rumors have arisen, I have found the whole to be absolutely false.

It is now eight Years since I have been an Eye-witness of these Operations; and to give a greater Proof of the Sedulity I have used in this Disquisition, I shall relate two Histories.

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There was, in a certain Family, a Boy of 3 Years old, afflicted with the *Falling-Sickness*, the *King's-Evil*, an *Hereditary Pox*, and a long *Marasmus*. The Parents were desirous to have the Incision made upon him; the *Small-Pox* were thrown off with ease; about the 40th day he dy'd of his *Marasme*. In another Family, a Girl of 3 Years old, troubled with the like Fits, strumous, attended with an *Hereditary Lues*, and labouring under a colliquative Loosness for three Months. The Operation was perform'd on this Child; she came off very well of the *Small-Pox*, which was all over the 15th day; on the 32d she dy'd of her Loosness, which had never left her the whole time.

But it is true, I never maintain'd the Inoculation as a *Panacea*, or Cure for all Diseases; nor do I think it proper to be attempted on Persons like to die. Some more quick-sighted, imagin'd these two Children were, as useles Shades, sent to *Charon* by any means that could be made use of. If I could have collected any more concerning this Matter, I should have imparted it candidly.

The rest of Dr. *Timone's* Letter contains his Reasons for this Method of Practice; which being the *Ætiological* Part, is publish'd in his own Words, as follows.

Æ T I O L O G I A.

Contagium Variolarum per puris infusionem propagari haud equidem mirabitur qui *Æsculapii templum* vel à primo limine salutavit, & fermentationis doctrinam subodoratus est: Nec obscurier est insitionis modus, quàm panificium, aut ars cerevisiaria, in quibus ex admixto fermento massæ fermentandæ turgescunt; conciliato nimirum motu intestino minimarum particularum principiis active polientium. Si quis querit interim cur variolæ periculosæ alioquin & persæpe lethales, ex insitione sine ullo periculo excludantur. Dico: Variolæ communes vel concurrente pravâ aliquâ speciali aeris diathesi suscitantur, vel ab effluviis à varioloso

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corpore emanantibus per contagium propagantur. Primus casus in paucis individuis accidit, & concurrente quidem vel insigni cacochymia, vel saltem variolosi seminii in talibus individuis latitantis acerrimâ exaltatione: Secundus casus communissimus est. In primo casu miasma malignum acreum, in secundo virulenta contagii corpuscula indolis (probabiliter) salino-sulphureæ sed specificam fracedinem seu ranciditatem nacta statim ac per respirationem hauriuntur spiritus ipsos, & labe quidem teterrima inficiunt; subsequenter autem massam sanguineam & lympham vitari manifestum est. Spiritus statim infici rationi consentaneum est, tum quia in fontes spirituum, cor scilicet & cerebrum, statim ingressum habent virulentem aporrhæ, tum ratione analogismi inter miasmata & effluvia ista ipsosque spiritus, cum utraque spirituosæ aeræ textura sint. Deducitur etiam cita & prava spirituum infectio à tot tantisque nervosi systematis symptomatibusque, quæ malas plerumque comitantur variolas, & præcipuè à convulsionibus epilepticis quæ infantibus accidunt ipso momento, quo varioloso inficiuntur contagio multo antequam febris illos corripiat. Massam autem sanguineam inquinari præter febrem purulenta tuberculorum exclusio testatur. Lymphæ verò vitiatæ fidem faciunt glandularum in faucibus tumor, screatus, & enormis multoties pyralismus. Inter hæc circularis etiam sequitur noxa. Sed præcipuè sanguinis particule ab indebita spirituum irradiatione in plures ataxias & anomalias perducuntur. Duobus tamen potissimum modis in variolis communibus mortem contingere observavi.

Primus est quando paucis erumpentibus variolis, & tardè ad maturitatem procedentibus, mala alia oboriuntur symptomata; secundus quando nimia tuberculorum copia cadaverosam putredinem inaucit. In primo casu maligne vulgo dicuntur variola: causa autem est vel nimia fustio & dissolutio massæ sanguineæ, vel ejusdem coagulatio & grumescencia. Si enim impetus spirituum explosivus justo plus augeatur, particule massæ sanguineæ nimium ad invicem atteruntur, comminuantur, & tenuissimas nanciscuntur acrotitas: sanguis in hoc statu sollertis naturæ mechanismum eludit, cumque nil sæculentioris in glandulis secretoriis cribrisque deponat, economiæ animalis functionibus requisitas filtrationes & transcolati-

ones celebrari haud patitur: improporcionata etenim est figura particularum liquidi ad configurationem pororum in tubulis & colatoriiis ratione subtilitatis nimia: filtratione enim defaecarentur particulae sanguinis si naturalera servarent schematismum & molem: hinc dicitur pessim fieri per incrassationem. Præter hoc celeritas ipsa transiūs sanguinis in causa est ut nihil deponatur in colatoriiis. Torrens ubi nimio impetu & præcipiti cursu fertur aquas turbidas defaecari haud patitur; quia vis centripeta gravitatem admixti terrei sequens superatur à fortiorum pulsoria virtute aqueorum globulorum rapide ruentium: virtus enim fortis, verbi gratia, ut unum non poterit lineam perpendicularem describere ubi virtus fortis ut duo ad lineam horizontalem protrudit: sic etiam haud pluit vento flante intensissimo; eadem geometrica proportione (probabiliter loquendo) sanguinis particulae aucto ab effrenibus spiritibus motu, tubulos colatorios prætersuunt nullâ factâ facum depositione. Hæc probabilia fiunt à summa pulsūs celeritate, febre intensissima, sudore nullo, & urina cruda. E contra quandoque contingit ut ab acutis, & scindentibus deleterii fermenti particulis frangatur, corrodatur, vel saltem relaxetur elater spirituum: elanguescente igitur spirituum motu torpidiores etiam hebetioresque fiunt sanguinis lymphæque particulae: igitur dum in labyrinthis tubulorum anfractibus moram indebitam contrahunt alias turmatim invicem complicari, alias autem, congestione factâ, super alias incidere, & diverso ad invicem superficierum suarum contactu à naturali configuratione desciscere, & novas induere angulorum dimensiones necesse est. Sic igitur diversa ab illa, quam superius narravimus, figurarum ad tubulorum meatus improporcionem, pari tamen calamitatis eventu dedatæ naturæ machinationes irritas fieri contingit. Hæc probabilia fiunt à pulsu tardo & raro, ac febris carentia quandoque in summa malignitate observatis, paucis & tardè erumpentibus voriolarum pustulis. Ulterius à trepidatoria, seu subsultoria ac tumultuosa furentium spirituum irradiatione inæqualis eodem tempore in diversis partibus massæ sanguineæ, & arteriarum etiam venarumque contingere potest impulsus. Sive igitur fibrilla aliquæ (ut quidem volunt) reperiantur in sanguine, seu ubi nondum bene assimilati sint portiones usibus peculiaribus dica-

dicatæ; probabiliter istarum motum turbari contingit: has enim in circulatorio motu secundum longitudinem suam naturaliter moveri necesse est: ab inæquali autem pressione dicta rectilineam figuram perdere, & in spiras ac semicirculos crispari coguntur: has igitur sic contortas transversaliter postmodum in circulatione raptari, ad invicem implicatas convolvi, & ramosis schematibus abortis, racematim adeo conglobari necesse est, ut in majusculos tandem grumos coalescant, sive demum fibrillæ illæ non dentur, cerè cujuscumque figuræ sint massæ sanguinæ particule, illas à naturali desciscere situatione ex hac motûs inæqualitate contingit: Confusæ igitur particule istæ & ad invicem implicatæ statim vehiculi sui, seri scilicet globulis per expressionem à suo contubernio explosis, majorem, ratione molis auctæ gravitatem nanciscuntur, ideoque impulsivæ circulatoriæ facultatis vim superant: Has igitur hîc illic restitare ac stagnare necesse est, prout in hoc vel illo loco prima mutua cohesio forte contigerit: Hinc livida stigmata, & simul (quod sæpe observavi in variolis cum petechiis erumpentibus) frequens sequitur mictus, quo limpidissimum serum in magna copia excluditur. En fusio, & coagulatio. Hinc mirum non est cur moriantur aliqui in variolis cum petechiis, convulsionibus syncope, vigiliis nimis, emorrhægiis, delirio, vomitibus, enormibus dysenteriis, &c. quamvis haud multa pustularum putrilagine perfundantur: In stygium enim veluti characterisimum variolarum fermentum multoties evehitur, ita ut quamvis haud magnam crassi puris copiam progignere aptum sit, spiritibus tamen, liquidis & solidis suprarecensita mala modis vel explicatis vel aliis consimilibus communicare possit, sicque mortem inferre; & hoc ante undecimum plerumque. Veniamus nunc ad secundum modum. Diversa enim aliquando contingit perniciës & longè alterius generis tragædia: quamvis enim absint illa symptomata, nimia tamen puris, materiæ scilicet cadaverisatæ, copia corpus obruitur. Pus autem generari probabile est quando sulphureis oleosisque massæ sanguinæ particulis in fracedine & fusione constitutis acido-salinarum particularum coassusio contingit. Huic asserto facem accendunt innumera chymica experimenta quibus manifestè edocemur solutionibus pinguium sulphureorum per alkalia factis acido quoli-

bet coaffuso statim massam albicantis coloris emergere. Multoties igitur miasma seu fermentum variolarum per respirationem haustum ratione indolis propria acerrimæ & fortassis septica tales in massam sanguineam particularum acido-salinarum & oleoso-sulphurearum producere potest combinationes, ut non seminia solum variolarum, quæ omnibus individuis (mole tamen minima) à natiuitate indita sunt, agitentur, actuentur, & in purulentam abeant putrilaginem, sed massa ipsa sanguinea tota acorem contrahat, & motu quodam corruptorio putrescat & cadaverifetur. Sic igitur, incendio veluti cohorto, ulterius furere fermentescentes particulas contingit, quam variolosis seminiis per despumationem eliminandis opus sit: hic motus non est depuratorius heterogeneis secernendis inserviens, sed destructivus & corruptorius, fermento nempe massam totam superante & invertente; fracidis scilicet rebellibusque particulis victoria potitis, & omnes alias in sua castra migrare cogentibus. Hoc manifestè observamus in variis potulentis, in quibus fermentatione aliquando excitata, motus succedit corruptivus liquores totaliter vitians: hinc videmus aliquos quamvis supprecessitis symptomatibus immunes, immenso tamen, ut ita dicam, putredinis oceano suffocatos: Et hoc periculum usque ad vigesimum secundum protrahitur. Ultimo loco considerandum solida etiam & nobiliores partes in hisce casibus pessimè affici, & in spasmos inordinatos fieri: variis horum distortionibus tubulorum meatus vitari, at functionum munera depravari necesse est. Ecce igitur continentia, contenta, & impetum facientia, quorum triumviratu humani corporis respublica regitur, una eademque ruina ut plurimum involuta: mirabiturne quispiam malorum inde Iliadem in hominis perniciem pullulare? Observandum ulterius multis, qui peste laboraverint, eorum variolis etiam post annum correptis bubones eosdem intumuisse, qui antea in peste eruperant: nonne hoc etiam summam malignitatem testatur. Infectionem modo ad rationis trutinam revocemus. At hercule longe aliter in hoc contagionis modo rem procedere quis est qui non fateatur? Primum enim Spiritus nullatenus infici manifestum est: deinde non lymphæ, non sanguini labe illa teterrima inuritnr, non solidis vitium aliquod communicatur. Hinc symptomata omnia levia

via, nulla pessima, nulli infantibus epileptici insultus. Contagionis enim hujusce fermentum non spiritale, non acreum & acutum est, sed humorale, iners, ac pigrum: venena autem quo subtiliora eo pejora: Ratione igitur improportionis nulla inter fermentum hoc & spiritus esse poterit lucta. Pus equidem variolarum in ipsa substantia sanguini immediatè infusum statim in largum veluti pelagus exceptum diluitur, involvitur, absorbetur, obtunditur: sic illud mitescit, sic in mansuetiorem indolem cicuratur. Contagiosæ ista particula sanguinem ingressæ statim sibi congere res variolosi seminii particulas sanguini à nativitate inditas inveniunt; iis igitur confermentescunt, sed invicem combinatæ ac complexæ haud amplius sui juris sunt ut posteriores excitent turbas, regiam vitæ petant, spirituum thesauros diripiant; nam mutuis compedibus constrictæ fixantur, precipitantur, crassioresque & hebetiores fiunt, quam antea fuerint. Statim igitur volubilioribus aquearum particularum globulis tamquam aptis vehiculis superincumbentes, sanguinis motu à centro ad peripheriam tendente, secundo veluti amne, ad ambitum corporis protruduntur, eliminantur. Nonne manifestè videmus haud pus generari in insititiis variolis, sed saniosam, dilutiorem videlicet aqueamque magis materiam? Nonne ex hoc phenomeno palam est acido-salinas fermenti contagiosi particulas haud oleosas passim sanguinis particulas in cadaverosam purulentiam pervertere, sed blandioribus potius levioribusque aqueis particulis easdem dilutas & saturatas foras asportari? Ex negatione fovearum & cicatricum nonne manifestum est acres, aculeatas, pungentes & corrosivas salini fermenti particulas à balsamicis statim sanguinis globulis obtundi, spiculis suis orbati, & hebetiori figura modificatas, vi veluti mochlica, extra propelli? Integra interim servatur massæ sanguineæ textura, inviolata consistentia. Nullam hîc vides fusionem, nullam grumescentiam, nullum corruptorium aut destructivum motum. In insitione enim tantum solummodo sanguis fermentescit, quantum impuro à puri consortio separando, ac per despumationem extrudendo satis est. In hoc fermentationis motu solum per undulationem quandam leviter aliquando afficiuntur spiritus, lympa, & solidæ partes, & siquæ ad ista

contagii particulæ perveniunt, certè (quod insitionis adumbrat metaphora) non nisi sylvestri acrimonia privata, ac veluti dulcificata pervenire possunt. Hæc tenuitatis meæ satis conscius hunc præfricta fronte obrudo: non me latet longè meliora emanata ab illis, quæ meliore luto finxit præcordia Titan: In historica tamen insitionis hujusce narratione aliquatenus me bene meritum spero.

Constantinopoli, Anno 1713.
Mense Decembre.

Emanuel Timonius, Constantinopolitanus. In Universitatibus Oxoniensi & Patavina Philosophiæ & Medicinæ Doctor.

VI. *Theoremata quadam infinitam Materiæ Divisibilitatem spectantia, quæ ejusdem raritatem & tenuem compositionem demonstrant, quorum ope plurima in Physica tolluntur difficultates.*

A Johanne Keill, M. D. Profes. Astron. Savil. Oxon. & S. R. S.

Jamdudum sequentia *Theoremata* in lucem emisi, omissis quidem *Demonstrationibus*, eo quod arbitrabar eas, utpote non admodum involutas, à quovis in *Geometriâ*, vel etiam in *Arithmeticâ* mediocriter versato, facile elici potuisse; Sed quoniam video, D. Christianum Wolfium in *Academiâ Fredericianâ* Mathematicum Professore, reliquosque Actorum *Lipsensium* Authores, hæc *Theoremata* non rectè intellexisse, cumque eorum in *Philosophiâ* explicandâ usus non sit exiguus; libet ea nunc denuo, adjectis *Demonstrationibus*, *Reipublicæ Philosophicæ* impertiri.

Suppono *Materiam omnem divisibilem esse in infinitum, eamque posse formam quamcunque seu figuram induere, & ad quamcunque tenuitatem, seu crassitiem quamcunque exiguam reduci.*

Lemma