





PHILOSOPHICAL
TRANSACTIONS:

Giving some

ACCOUNT

OF THE

Present Undertakings, Studies and Labours

OF THE

INGENIOUS,

IN MANY

Considerable Parts of the WORLD.

VOL. XXI. For the Year 1699.

LONDON:

Printed for *S. Smith* and *B. Walford*, Printers to the
Royal Society, at the *Prince's Arms* in *St. Paul's*
Church-Yard. MDCC.

DEDICATION.

is so great a Judge of all sorts of Undertakings of this kind, will favourably accept of the good endeavours of a few Men who spend some of their Time, Thoughts, and Money, only to aim at the forwarding useful Knowledge, and hoping that your Lordship will please to pass by many Faults incident to Human Nature. I need not tell your Lordship, who knows so much, that our Sences are not able to attain to the Knowledge, nor our Reason to Comprehend the Causes of many things which we daily see; but there is great Usefulness and Pleasure in the Pursuit of Natural Inquiries, more than equals the Trouble of the Undertaking, and the Contempt or Pleasantry of the Malicious and Ignorant. Much should be here said in acknowledgment of your Lordships Favours, but I rather choose to desist, where I must come far short of your Lordships deserts, and the Sence of the Society of them, and therefore shall only beg leave to add that I am

Your Lordships most Obedient

and Dutiful Servant,

Hans Sloane, Soc. Reg. Sec.

THE

T H E

P R E F A C E.

THE following Papers are a few of such as have come last Year to the Royal Society, which the Persons Interested in, have given leave should be printed. I am so sensible of my own Weakness, and have so good an Opinion of the Abilities of the several Persons who have favoured the Society with these Communications, that I have not abridged or chang'd any thing in them, but when it was possible, had them Corrected by those who Communicated them. There is no doubt but the more discerning will make a great difference between what is related in them as Matter of Fact, Experiment, or Observation, and what is Hypothesis. The first sort of Relations (of which all these Papers contain, some) are, and must always be useful, and the latter may be pass'd over by such as dislike them. For my own part such Hypotheses as are, or shall be found in any Papers of mine, I have so little regard for them, that considering what has happened to others better qualified than my self, I must conclude, that future Accidents, and Observations, will make them go off, and be hereafter succeeded by others more plausible. The mischiefs these Hypotheses; and their Authors have done, by putting People from further search, out of the way, and making them wrest Matters of Fact to their Fancies, have been very great. There is a very memorable instance

[*R r r 2]

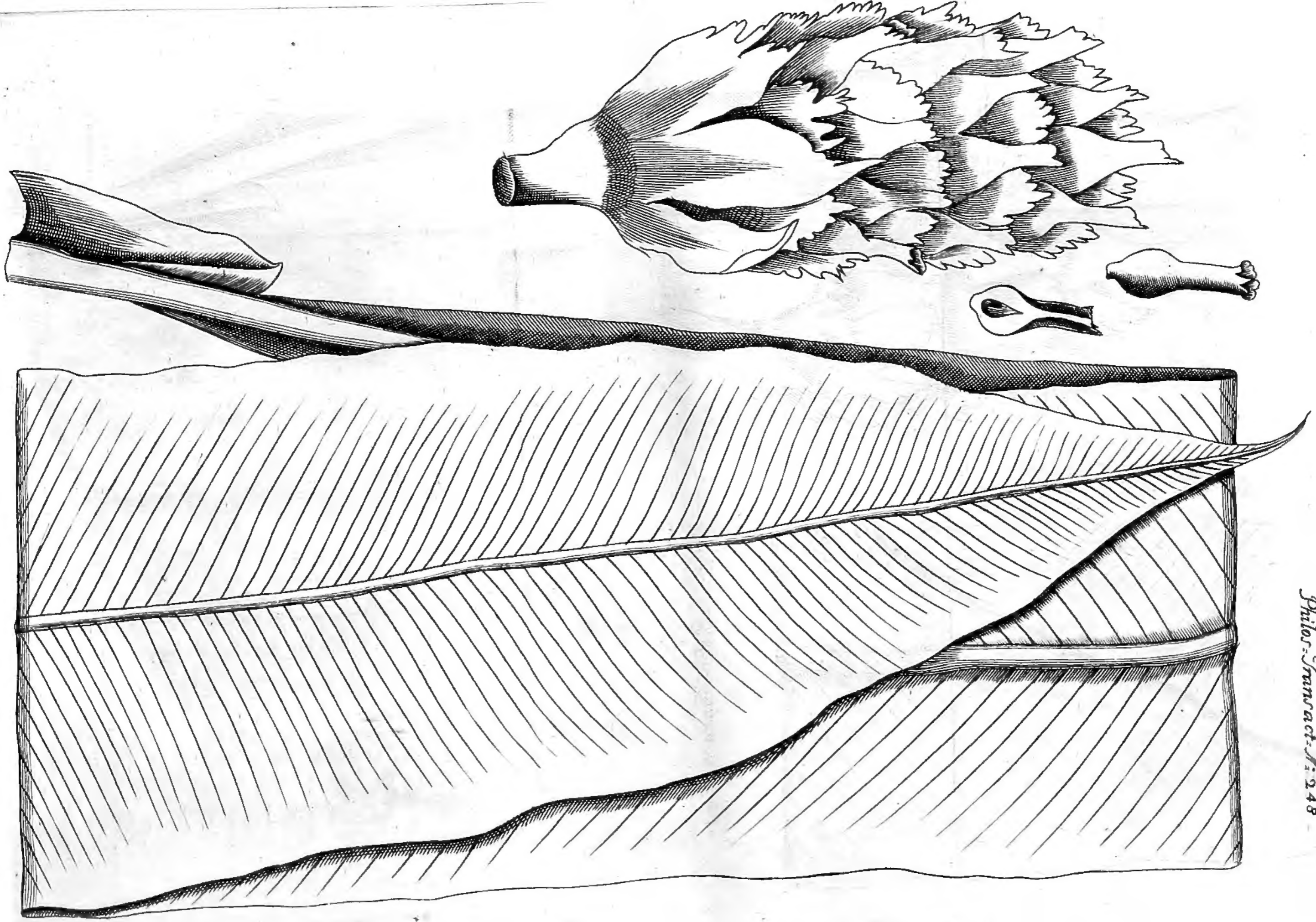
of

The P R E F A C E.

of this in the Jesuits Bark, which was opposed by Physicians from 1640. or thereabouts, till about twenty years since: the Arguments used against it, were drawn from its being no alterer or voider of those Humours, which the most part of Physicians, had then settled by their Hypotheses to be the cause of such Distempers. A poor Indian who first taught the Cure of an Ague, of which the Lady of the Count de Chincon (Governor of Peru, in 1638.) was Sick, overthrew with one simple Medicine, without any preparation, all the Hypotheses, and Theories of Agues, which were supported by some Scores not to say Hundreds of Volumes; and 'tis plain did mischief by hindering the advantage Men might have received sooner from so innocent and beneficial a Remedy. I say this not to repoach Physitians, who do well to be wary in the use of a new Remedy, till Experience confirms it to be Harmless; but because there are some Specific Medicines mentioned in these Transactions for the Cure of other Diseases, and more are designed for the succeeding Year. I have mentioned the names of the Persons from whom, and to whom Letters were sent, and the Circumstances of the several Relations that came to my Hands, that they may be either relied on, convicted of falshood, or further inquired into by those who desire to be better satisfied. More might have been said of Books, but I think that part sufficiently handled by others, and not so material here, the Informations to be had in ordinary Extracts and Epitomes being not so satisfactory to any who would have a full knowledge of the Matters contained in the Books themselves, the best things being sometimes left out according to the understanding, studies, or liking of the Abridger. I am sorry so many mistakes happen in the Press, there will always be some, and these Transactions have been the more incorrect for being done often in such haste as not to admit of a Revise.

PHILO.





Philos. Transact. N. 248

PHILOSOPHICAL TRANSACTIONS.

For the Month of January, 1699.

The CONTENTS.

- I. *A Description and Figure of the true Amomum, or Tugus, sent from the Reverend Father George Camelli, at the Phillipine Isles, to Mr. John Ray, and Mr. James Petiver, Fellows of the Royal Society.* II. *Succincta Succini Prussici Historia & Demonstratio. Autore Philippo Jacobo Hartmann, Phil. & Med. D. Professore Medicinæ Extraordinario, Historiarum Ordinario, S. R. I. Naturæ Curiosorum Collega.*

A

I. A

Orig. mss. in Bot. Dept. (2)

I. A Description and Figure

Of the true

Amomum, or *Tugus*.

SENT

From the Reverend Father *George Camelli*, at the *Phillipine Isles*, to Mr. *John Ray* and Mr. *James Petiver*, Fellows of the Royal Society.

De Tugus, seu Amomo legitimo.

RAcemoso *Tugus*, seu *Birao*, aliis *Caropi* viso florum fasciculo: degustato ejusdem uvæ acinis, seu oblongo semine & facta collatione cum Botanico-rum *Amomi* descriptionibus *Tugus legitimum Dioscoridis* esse *Amomum* decrevi.

Est autem *Tugus* planta quandoque ultra cubitos novem aflurgens, folio simile plantæ *Tagbac*, seu *Bagongbonque* excipe quod

quod parte prona suavi oblitum sit lanugine venosius præterea, longius & suaveolens. Ad plantæ radicem seu caulis truncum, ex foliacei caulis medietate racemiformis, & pistillo seu Amomonti florum fasciculo non adeo similis prorumpit florifera, & granigera foliolorum sesquipalmaris congeries, flosculis exornata rubicundis, quibus uvæ in longiusculum protensæ collum seu floris tubuli reliquias subsequuntur; dulci & pauco cortice unde à Muribus & Avibus unà cum semine plerumque depasta, pauca admodum & exigua colligi potest quantitate. Quare & olim rarum fuisse, nec passim nasci *Virgilius* insinuare videtur: dum spondet quod *Affrium* vulgò nascetur *Amomum*.

Hæ uvæ quina communiter, aut sena continent subrusta, oblonga, inæqualia, aromatica, *Amuyong* minus acria, & cubebis *Officinarum* suaveolentiora grana, seu acinos, ex quibus trajecto filo nunc per se nunc sociatis *Margaritis*, ac *Corallo*, nonnullæ puellæ *Indicæ Caropi* seu monilia ac armillas concinnare solent.

Aliæ ex his, & semine *Belmusci*, iis *Maricom*, *Arundinis Lithospermos*, iis *Tigbi*, *Cannæ Floridæ*, iis *Ticasticas*, *Pisî coccinei* iis *Saga*. *Amomonti* præterea *Badiang*, & *Calanos* seminibus similia necesse assueverunt. Ob gratum vero quem spirant odorem grana *Tugus* collo appensa gerunt ab insecto etiam præservare aere & *ætui* mederi *Scolopendriæ*, masticata si super imponantur experientia docuit. *Radix* similis est radici *Tagbac* seu *Calami odorati*, insipida, alba interne, de foris rubicundis & subodoratis *Cæpaceis* contacta obvolucris. Ex *Borongam* scripto accepi, in caulium apicibus alium & hunc inodorum ferre fructum, quem necdum vidi. Idem *Indi Indanenses* mihi affirmarunt: sed eos hallucinari censeo, & plantam *Tagbac* (*Tagbac*) pro *Tugus* vidisse puto.

Provenit in *Borongam* & *Paramas* caput ex aliis *Insularum Samar*, & *Leyte*, locis. Nec dubito in *Luzone* quoque reperiri, maximè *Silani* in torrentium profunditatibus.

Nota florum *Tugus* recentia & tenella germina, aliquantum *Pseudo amomum* *Garcia* pedem *Columbinum* referens exprimunt. Ne autem quidquam desideretur mihi unà cum his scriptis plantæ delineationem, & similiorem castaneam esse ovo non deerit qui objiciat, quam folia *Tugus* foliis *Mali Punici* quod lubens concesserim, sed quicquid *Dioscorides* & *Plinius* de *Amomo* tradidere solummodo de florifero & semine turgente *Tugus* racemo

racemo intelligenda esse censeo, utpote quibus integra & ipsa planta non innotuit. Hunc enim *Tugus* thyrsus deprehendet. *B. L.* exigue fruticare *Palmi* videlicet, plusve minusve altitudine: ex ligno subruffo, seu lignosa materia, flosculis & folliculis foliis *Mali Punici* similibus sese in racemi modum convolvere, sive ut *Barth. Merula* vertit esse fructum similem botruo inveniet semine uvis parvis simili, si seminis carnosum spectet tegumentum, plenum, valde odorato & acre gustu, vim habente calefaciendi, adstringendi & exsiccandi & cætera legitimi *Amomi* signa, ut pedis *Columbini* effigiem si diligenter investigaverit. *Amomum* in *Turcomania Armena* provincia provenire scribit *Jo. Botero Benes. f. 99. p. 2.*

II. F. N. F.

Succincta SUCCINI PRUSSICI
Historia & Demonstratio.

Sectio Prima.

Regiones in quibus per universum terrarum orbem Succinum generatur.

C. I.

Regiones Africa, Asia, & Europæ, in quibus Antiqui Succinum generari crediderunt.

§ I. **S**uccini antiquissimis temporibus cognita virtus celebre ipsi pluribus ante CHRISTUM natum seculis apud Scriptores Græcos peperit nomen; Inter Philosophos à Platone & Aristotele; inter Historicos ab Herodoto & Ctesia; Inter Poetas ab Æschylo commemorari meruit.

II. Postquam Romanis admirationi esse cœpit, & his Auctoribus gemma reddita est memorabilis: præsertim quum NERONIS mores in luxum succino abuti docerent. Longo hinc intervallo succinea munera à Gothorum in Italia Rege THEODORICO deprædicata legimus, ut nec apud Barbaros Succinorum memoriam gratia interire sineret.

III. Quantacunq; verò *Succinorum* vetusto ævo fuerit æstimatio, terræ tamen in quibus generantur, incognitæ mansere; inde tot sententiarum divortia, his in Africa, istis in Asia; aliis in Europa thesaurum reconditum memorantibus: In Africa Hesperidum horti, Ægyptus, Æthiopia, Numidia; In ASIA India præcipuè, juxta & Arabia, succiniferæ creditæ

B

IV. Inter

IV. Inter Europæas ditiones, Italiæ, & in eadem Eridani, viciniq; maris Adriatici ex succineis divitiis præcipua laus fuit; quam tamen fida magis historia, Romanis latè per Germaniam victricia arma circumferentibus, maris Germanici ac Baltici Insulis vendicat; Hispaniâ & Britanniâ in partem aliquam gloriæ admittit.

C. II.

Recentiores qui in Africa, Asia & America Succinum generari asseverarunt.

§ I. **V**erum ut veteribus tot regiones succiniferas allegantibus ignosci posset, nescio an proximo aut huic nostro ævo venia sit danda, etiamnum ex Africa & Asia, quin ex novè detecto orbe, nativum succinum afferenti, vulgato insuper Orientalium Succinorum nomine.

II. Quod enim cum pace tantorum virorum dixerò, pleriq; Auctorum sunt intestabiles, rumoribus plus justo tribuentes: oculatos testes fallere & falli nescios, vix produxeris. Quin nomen Ambari sive Ambræ, quod Succino cum pretiosissimo & fragrantissimo Orientali bitumine jam diu ap. plurimas nationes commune esse cœpit, non paucos in errorem induxit: Succinum enim crediderunt, quum Ambram in memoratis Africæ, Asiæ, Americæve locis nasci acceperant. Si non alius error Succinum Orientale progenuit, Resinâ Copal, Succinum mentiri aptissimâ, hoc nomine ab Officinis Pharmaceuticis adoptatâ.

III. Nec Naturæ impotentiam accuso, ac si Polydædalæ omnium genitrici his in locis Succinorum fœtura denegata foret; certiora saltem monumenta desidero, quibus de genitis in Africa, Asia, America Succinis fides firmari queat. Et quâ sagacissimus Chinesium populus tantos in Prussicum faceret sumtus, si domi haberet undesumeret Succinum? Per multos qui in Orientalibus partibus commorati diutius, rerumq; Physicarum fuerunt gnari, ipsemet atq; Amici, coram & literis, percontati sumus, neq; incidimus in quempiam, qui certi quidpiam cum fiducia edisserere nosset; majorq; pars, quicquid de Orientali Succino fama sparsit aut scriptis prodidit, incertitudinis aut falsitatis condemnavit.

C. III.

Europæ Regiones esse Succiniferas, sed nec omnes, nec æquæ; prærogativâ ad mare Germanicum & Balticum fixarum.

§ I. **N**EC in Europæ memoratis omnibus Provinciis Succinum generatur: inanibus Auctorum de Eridano, mari Adriatico, aliisque; Italiæ locis succiniferis, commentis; Nec de Hispano, Britannico, Pannonico Succino graviora aut certiora prostant documenta: Gagates Succini nigri appellatione scriptoribus imposuisse videtur.

II. Reliquis Europæ ditionibus succiniferis fide digniora & illustriora adsunt monumenta; & de Polonicis, Silesiacis, Bohemicis succinis effossis, quamvis raros in Patriis Annalibus præcones nacta sint, indubitata experientiâ constat.

III. Germanici Succini crebrior & evidentior est memoria: In litoribus maris ad insulas Belgicas, ad Holsatiam, Jutiam, in ripis etiam fluviorum, lectum; quin ex interioribus terræ visceribus erutum gravissimi Auctores consignarunt. SAXONIA, MISNIA, ISLEBIA. SUEVIA, ex gremio matris telluris se hunc sætum suscepisse, aliquoties attestantur: Hallensesque Carbonariæ fodinæ SERENISSIMI FRIDERICI III. auspiciis non ita pridem detectæ, succineas viliores glebas plus via simplici ostenderunt; fidem faciente D. Krug. S. Electoris Brandenb. Archiatrorum Comite & Consiliario, rerumque Metallicarum Directore gnarissimo atque meritissimo. Nec ignobiliora testimonia incluta MARCHIA perhibet: Superiori seculo Jodocus Willichius, propè Neomandram, novam cellam dictam Francofurto ad Oderam tria milliaria circiter distantem, in lacûs ingentis ripa Succinum Falernum reperiit; Nostrâ ætate in ripa Viadri propè Cûstrinum juxta pagum Schaumberg inventum CL. D. BECMANNUS; èque fossa Insulæ Pottamensis regnante MAGNO FRIDERICO WILHELMO eductum CL. D. ELSHOLTIUS memorarunt.

IV. Major Succinorum est proventus in locis mari Baltico vicinis. Suecia, vel ex lacûs dulcis Meleri ripa ejectum sæpius legit, aut effossum sustulit. DANIA ex fossa Hafniensi insignia Succina vidit & admirata est; atque ex collibus Se-

elandiæ suæ mediterraneis non contemnendâ magnitudine ac multitudine prodiisse, uniusq; colliculi fossionem quinquaginta libras erogasse, vomereq; ex agris extracta meminit; testesq; CL. BORRICHII adsunt literæ, Insulas Cimbriam Holsatiamq; allambentes [formœ, Mandœ, Rôm.] ad litora sua in Oceano pariter copiosum Succinum expiscari.

V. Liberalius longè in SAMOGITIÆ, CURONIÆ & LIVONIÆ contermina maris Baltici litora Succinæ opes redundant; ut inter algas arenasq; absconditæ à rusticis confertim deprehendantur: Reticulis haurire SERENISSIMUS DUX CURONIÆ instituit: Inter arandum quoq; & inter fodiendum in maritimis jugeribus sese ultrò, sine gravioris laboris impendio offerunt, vili pretio ab Electrotoreutis ibi locorum quondam cœmta.

C. IV.

Inter Regiones succiniferas ad mare Balticum, principem esse Prussiam & ab hac secundam Pomeraniam.

§ I. **V**ERùm nulla maritimarum Provinciarum æque opima spolia ex mari Baltico legit, nulla ex sinu telluris æque numerosam prolem succineam suscipit ac Prussia, ut Electrides Antiquorum nullibi rectius collocaveris: idq; meritò Æstiorum, qui Theodorici Regis Italiæ tempore etiamnum has terras incolebant, Legati ante omnes homines suam Patriam Succina offerre gloriabantur: tulitq; deinceps PRUSSIA à non paucis Scriptorum istud elogium, quod Italiæ olim perperam erat tributum, ut sola Succinorum genitrix salutaretur.

II. Antiquissima quidem monumenta, quibus ordinis Crucigerorum post Christianismi professionem, res gestæ sunt conditæ, indicium patrii thesauri posteritati relinquere neglexerunt; tandem Civitatibus ab Ordine secessionem facientibus etiam Succini mentio adjecta est: Sub DIVO verò ALBERTO, Florentibus Provinciæ rebus, non defuere decora ingenia, quæ regiam hæc Naturæ gazam Erudito orbi graphice exponerent.

III. Sed quod unica Succinorum Promiconda celebratur, non solum divitiis quas mare in Prussiam effundit acceptum ferendum, verùm & illis, quas litorei montes ferro patefacti libera-

liberaliter elargiuntur, quasq; loca à mari longè distita, interanea nec opinantibus nec cogitantibus colonis, dum aratro sulcos ducunt, aut colles decacuminant, aut scrobes fossasq; varios in usus excavant, haud parcè offerunt.

IV. Allata sunt mihi ex Sambia, ex Natangia, ex Hockerlandia, ex Pomesania fortuitò inventa Succina; & propè oppida Hollandiam, Liebftadium, detecta; quæq; ex Electoralis Lithuaniae agris effossa, Varmiensa quoq; & Elbingensia possideo. Olim vir Consularis mihi amicissimus annotarat, in silva quadam Kerbswald Elbingensis ditionis Anno 1641. intra modicum temporis spatium, septingentas libras fodiendo ex terra erutas; frustumq; insigne Amicus nuperrimè dono dedit, cujus idem natale fuerat solum. Et in ripis Lacûs Recentis ac Curoniensis, fluviorumq; Pregelæ, Vistulæ, Elme, lecta adeptus sum. Adeoq; nullus dubito, totum PRUSSIAE fundum succineum affirmare, præsertim quum scaturigo, de repente Anno 1666. circa oppidum Bartenstein exundans, tantam vim succinorum egresserit, ut filci reditus augetet; quæ à terræ visceribus avulsa, nec mare vidisse unquam, certa est fides.

V. Post Prussiam Pomerania succinifera nominari meretur, illo potissimum oræ maritimæ tractu, qui per litora Electoralium hinc & Olivensium ac Gedanensium ditionum ad Neriam recentem excurrit. Multum Succini cum Decumanis fluctibus ad hanc oram advolvitur, iisdem signis proventum manifestantibus, Electrotoreutarum Gedanensium quæstu non spernendo, qui à senatu justo pretio, quæcunq; ad Neriam appellunt, redemerunt. Ad Insulam Rugiam usq; maris Baltici effusa est liberalitas, siquidem & hæc succineis glebis potitur; juxta Hiddensee & lectas & haustas percepti.

VI. Nec mediterranea Pomeraniæ Succinorum sunt vacua, quippe quod pariter bonâ fortunâ in eadem ruricolæ aliud agentes incidant sæpius, quamvis Scriptoribus ejusmodi prosperos eventus Annalibus inserere minus curæ fuit; Curoniæq; & Samogitiæ inter succiniferas palmam Pomerania dubiam reddit.

C. V.

In Prussia ora maritima litus Sudavicum Succinis abundare ; cujus facies exterior & interior describitur.

§ I. **P**RUSSIAM quaqua versum succiniferam prædicavi, ut tamen præcipuè litoris Sudavici amore Succina detineantur : Situm est Litus in ista parte, quæ Sambia vocatur, à novo transitu (*Neve Tiff*) ad tabernam (*Vrantz Vrug.*) decem miliarium spatio.

II. Regia hæc Succinorum sedes, septem recessibus, vulgato angulorum vocabulo, antiquitus distinguitur : *Krecke, Nodums, vel Nodem, Lassnicken, Kuckse, sive Kuyck, Palmenick, nempe, Thierskeim* ; nostrâ ætate non *Nempe, sed Kraydepellen, sive Krappellen* inter *Palmenig & Subenig*, tum *Bruster* magis quàm *Dirschkeim*, & præter hos alii accensentur.

III. Litus omne altis montibus præcingitur, mari vadoso ; à primo ingressu trium quatuorve, mox triginta aut quadraginta orgyarum, postquam progressus fueris profunditate minori, pergendo longius rursus altissima ; ut brevia sive Syrtes intelligas, quæ litus Sudavicum, hujusq; recessum *Brusteram* adprimè naufragiis infamant.

IV. Prærupta & ardua recessuum juga, quædam lenius atolluntur, versus *Pillaviam* in planitiem desinunt. Solum minus firmum ; alicubi latentium aquarum comœatu fallax, in tantum ut quasi voragine equi & homines absorpti memorentur ; maximam partem sabulo tegitur, aliquot areolæ herbis investiuntur, *Petasite, eryngio, lappâ* ; raris arbutis aut senticetis, quæ tamen ad *Brusteram* silvescunt ; eademq; cum parte montis aliquando subsidunt ; *Rupes nullæ, nec saxa, præterquam ad radices montium* : aquæ ex summis jugis passim dimanant, quæ inferius alveis collectæ rivulos imitantur.

V. Istâ exteriori facie litoris Sudavici, interanea mineralibus abundant : *Vitrioli non una comparet species* : alibi niveis striis, terrâ nigrâ interjectâ, stratum super stratum ; alicubi fufum vitrum, ligneis fibris hinc inde interlucentibus, præsentat ; alibi terræ micantium pulvisculorum instar est admixtum.

VI. Præter vitriolum corticosa terra, quâ integri colles exsurgunt, & lignum quod litoreos montes longo tractu medios dividit,

dividit, sunt conspicua ; tum terra flavescens, quæ Ochram æmulatur, & lutum cæruleum, certis intervallis per litus expansum.

VII. Ex lapidibus memorabiles Da&yli Idæi (*Alpenschoß*) inter saxa & arenas dispersi, sed & ex montibus effodiuntur : Saxa mari vicina aliâ parte durissima, alia friabilia visuntur : Petrefacta quoque ligna, lapidesq; algâ marinâ, tenui foliâ & vesiculari luxuriantes inveni : mitto varios lusus Naturæ, in quos incidi. Præter vulgares lapides, & adamantes, & Jaspides hoc litus quandoq; profert.

VIII. Camporum vicinorum sterilitas summa ; Silvæ raræ, pineæ nullæ. Illud adjiciendum, quod Phocarum greges apri-cantes, in scopulis & collibus vadosi maris colludentes, sæpius se conspiciendos præbeant.

Sectio Secunda.

Matrix Succini, vena ex ligno fossili ; Succini in eadem generatio.

C. I.

Quod matrix non sit quærenda in omnibus, in quibus Succinum invenitur, e. g. non in alga, arena, Vitriolo, terra flavâ, sabulo, aut luto cæruleo.

§ 1. **D**omicilium Succini in litore Sudavico diversis mineralium concamerationibus compositum perlustravimus, indagandum porrò, in quibus penetralibus succinea fœtura formetur, ut in lucem edatur.

II. Litus quidem inter arenarum lapidumve acervos Succina monstrat, sed in his non generari manifestum est : multò minus ex alga marina natales accersendi, licet huic involuta ad litus propellantur.

III. Et quum intra viscera montium litoreorum ubiq; reperiuntur, in Vitrioli interstratis Crystallis ; in terræ flavæ, in sabuli, in luti cærulei intertexto opere, non tamen in his omnibus prima eorum statuenda incunabula.

IV. In Vitriolorum, terræ flavæ & Sabuli partibus raro eventum Succina, eaq; minuta & ignobilia, deprehenduntur.

V. Cœrulei luti ductus nondum ita experientiæ patuere, quod inacceffi, quamvis egregia & numerosa succina fovere à Colonis tradantur; mihiq; diffractâ luti glebâ, natus sætus succineus animadverfus, quem tenui cortice obductum, colore fulvo dilucidum, inter cara naturæ succinea munuscula Musæum affervat.

C II.

Quod Lignum matrix Succini, non vegetabile fit, sed fessile.

§ I. QUUM corticosa terra, & præter hanc lignum Litus Sudavicum discriminant, Lignum quod montes intersecat succiniferum esse, ut quod maximè, multorum annorum experientia firmat. Hujusque ductum fossores indagant & observant, nunquam irritò successu, quousq; instabile solum ipsorum operas progredi permittit.

II. Terra corticosa Succina exigua complectitur; minusq; solida, & ingrati coloris.

III. Lignum autem minimè ab arboribus est arcessendum; siquidem tam vastos truncos arboreos, qui prostrati plurimarum orgyarum longitudine & latitudine fibras suas extendent, nusquam orbis vidit; integri recessus, sive anguli litoris Sudavici continuo ligni tractu per orbitam notabiliter distincti cognoscuntur.

IV. Neq; arboreis lignis simile est: quippe, quod nec medullæ intimæ, nec corticis extimi ullum prebet indicium; ramorum quoq; divaricationibus ac nodis, foliorumq; germinibus, prorsus destituitur; neq; fibras mutat, sed easdem quavis sui parte retinet: mitto quod compagem ligneam referens non tamen orbiculatim concrevisse cernitur, sed planiori specie.

V. Atq; Curiosi jam diu ligna subterranea mirari desierunt, postquam plures Europæ ditiones istiusmodi, è terra eruta, ipsorum censuræ submiserunt. Ducatus Spoletani sive Umbriæ fodinarum lignum elegantissimum undulatum, in quo & artificum ingenia se exercere poterunt, Franciscus Stellutus Lynceus descripsit, inventore Duce & Principe S. Angeli Fridrico Cesio; ejusdem & P. Kircherus meminit. Aliud Ger-

maniz

manix fossile lignum, Solertia D. Pillingen in Misnia detexit, qui & erudito commentario generationem illustravit. Transmissus mihi Lunenburgensis ditionis subterraneus foetus ligneus, Prussico solidior & ponderosior.

VI. Lignum verò quale litus Suadavicum profert, & alibi locorum, in Prussia interiori, una cum Succinis erutum, ex complurium Amicorum literis fide dignissimis rescivi: Gravesq; mihi Auctores Bartholinus & Borrichius, qui Cortices & ligna ex fossis Hafniensibus iisdem, ex quibus Succina, non exigua quantitate educta attestantur; felixq; capturae indicium in litore Neringæ ex adnatantibus fragmentis capitur.

C. III.

Generatio Ligni fossilis; quod sit bituminosum & variis salibus prægnans.

§ I. **M**atricis autem hujus, experientia Duce, ista indagavi initia ac rudimenta. Colliculi in litore Sudavico hinc inde, imprimis ad Kraxteppelin, procul terra congesta, ubi propius accesseris cumuli coacervatorum corticum videntur: Superior pars, sicubi à Sole exsiccata fuit griseis, his autem remotis, piceæ nigredinis, magnis & levibus nitidisque crustis concretam offert terram, quam si cultro secueris, multorum mollissimorum corticum compagem conspicias: ad radicem istorum colliculorum uda terra, glutinosa ac tenaci liquore cohærens, manuum digitorumq; impressorum vestigia exacte refert, sed ut & tangentes denigret.

II. Talem corticosam pinguem colliculorum terram Ligni fossilis Prussici judico primordium: Neq; lignum nisi siccitate, & qualicumq; soliditate, quâ magis compactum longiori fibrarum protensione, continuâ cohæret, à Corticibus istis differt.

III. Corticosi enim colliculi ab uda tenaci terra nascendi originem fortiuntur: Hanc postquam maris salugo aliis subterraneis Salibus admixta maceravit ac subegit, secedente humore superfluo, aer aut calor Solis exsiccat; Siccitate verò à se invicem secedunt partes, quarum pinguedo exhalavit, aut intus concessit; aliæ, quæ glutine hoc abundant, mutuo, licet in crustas compactæ cohærent, speciemque ligni referunt; ubi iusta siccitas, qualicumq; multarum crustarum cohæssioni, lignosam formam conciliavit.

C

IV. Bitu-

IV. Bituminosam verò Corticum & ligni esse naturam non solum terrestris pinguedo, sed & examen ignis monstrat; accensa enim fomitis instar serpentem ignem propagant, sulphurq; naribus afflant; & destillationi exposita, uti inferius tradituri fumus, aliquot oleosas particulas, olei petrae simili odore, dimittunt, præterquam quod liquor destillans succineum pingue quid exhalet.

V. Post bitumen Corticum & ligni generationem salia subterranea promovent; ab his enim siccitas, & crustarum Species deducenda, intimè enim lignis & Corticibus adhærent. Vitriolum superius differuimus, quomodo cortices undiq; ambiat, atq; cum illis concresecat.

VI. Aliorum salium non ita manifesta est demonstratio: deprehendi tamen in siccissimorum lignorum, corticosaë compagis, interstitiis scintillantes salinas stellulas & fila splendentia, quæ vitriolum minimè referobant, insipida enim prorsus, aut subdulces, lenissimè adstringentes: aquâ affusâ eduxi illas stellulas, lixiviumq; aluminis aut magis Martis subdulcem saporem prætulit, ut tamen Vitriolica virtus extremum perciperetur, quæ inspissato lixivio evidentior, aliquo tamen subdulcis aluminosi aut martialis saporis sensu.

VII. Nitrum quoq; sub hoc ligno latens olim detexi, forti lixivio vitriolicis particulis segregatis; quamvis ipsi vitriolo Prussico nitrum videatur admixtum: fortè & stellulae ac fila salina per intimas ligni fibras diducta, nitrosæ sunt naturæ.

VIII. Alumen quoq; in Crystallis Vitrioli latet, si non prorsus alumini vindicandi, quos SSS componere asseruimus, quiq; amiantho aut alumini plumoso, similes conspiciuntur; Acidulus enim horum sapor, ad illum salis succini volatilis proximè accedens.

C. IV.

PRUSSIA bituminosa; vera Succini generatio primum à nobis demonstrata.

§ I. **M**Atrice cognitâ quibus bituminis & salis virtutibus sit imprægnata, facilè est coniecere quomodo succineus foetus Prussicus intra illam concipiatur.

II. **PRUSSIAE** solum undiquaq; bituminosum cogita: insignes enim glebæ bituminis condensati in abditiis terræ aut luti aliquo-

aliquoties à colonis casu deprehensæ; ipsemet aliquot librarum frustum non procul à Regiomonto ex limo eductum conspexi; quàm olei rivos ex terra dimanasse, non vanâ famâ accepi. Cerpites verò bituminosi ex pluribus locis effodiuntur.

III. Bituminoso itaq; litoris Sudavici solo, calor subterraneus, quicumq; iste fuerit, bituminis exhalationes per interanea dispersas, undiq; confociat, & in guttas cogit, præprimis ex corticosa aut lignosa matrice easdem congregat; quod dum agit, simul vicina salia pervadit ipsorumq; effluvia secum abducens bituminosis guttis immiscet; salina spicula intra matricem adacta fluorem bituminosum sistunt, & si nullæ suppetiæ bituminosarum guttarum à calore submituntur, gleba pro modulo incunabuli, quod intra lignum ipsi concessum, formam subit, omniq; exhalationum motu sopito, caloreq; evanescente, salinæ particulæ rigorem recuperant, bituminosis superfluum humorem exhalantibus; sociatq; succineam gemmam producunt; nitidiorem, splendidiorem, fragrantio rem, firmiorem, ex puritate & proportione exhalationum bituminosarum ac salinarum.

IV. Hæc vera Succini est generatio, quam ante nos nemo Erudito Orbi perspicuam reddidit: siquidem præconceptis opinionibus laborantes, in animalibus, in vegetabilibus, in fundo maris prima Succinorum incunabula quærendo, à veritate aberrarunt omnes. Neq; istos Succinorum natales in lucem produxissim, nisi crebra litoris Sudavici peragratio, & attentata fodinarum perlustratio Propitii Numinis ductu me recto tramite fecissent verum cernere.

C. V.

Eadem hæc Succinorum generatio: Succinum in animalium ventriculis repertum.

§ I. **A** Ssensum meruit nostra demonstratio, maximis Europæ Eruditæ nominibus ipsam probantibus. Aliquibus tamen is superest scrupulus, an eadem Succinorum, quæ mare ejicit, generatio statuenda? Verum quum in vulgus hic locorum jam notum sit, ex collibus marinis tempestatum vi disjectis aut convulsis Succina prodire, quæ à fluctibus ad litus advolvuntur; capturæ fructuosæ, aut inanis, ex collium istorum divulsione, leviori aut profundiori, sumto indicio; Qui,

inquam, quum haustilia Succina intra colles generari certum sit, alius modus intra hos generandi reddetur vero similis?

II. Sanè in collibus submarinis non minus quàm in litoreis Naturæ Officina erit instructa : addo, quod inter ejectamenta maris & lignorum fossilium copia in litore Sudavico, æque ac in Neringiensi, reperiatur : quid si colles alluvionibus obtecti, qui quondam terræ pars fuerunt ? Si quoq; in collibus submarinis reliquorum mineralium eadem generatio, cur non & Succinorum ?

III. Cæterum sicubi extra Matricem lignosam, in luto cœruleo, in terra corticosa, flava, sabulosa, Vitriolica Succinum nasci contingit, ne tunc quidem alia ratio generationis suberit : pariter enim ex bituminosis exhalationibus in guttas condensatis salium justâ miscelâ, istæ glebæ pronatæ fuerint.

IV. Neq; tamen ubicunq; reperitur ibidem & nativa Succini sedes illicò asserenda, per maris enim vehementiam à matrice avulsam in aliena loca sæpè rejicitur.

V. Quin & animalium ventriculis recondita Succina novi ; visceribus patefactis exempta Amici dono miserunt : nec tamen in animalibus Succina generata dicemus.

VI. Ex accolis litoris Sudavici addidici, omnis generis animalia, terrestria, aquatilia, volatilia, avidè succineas glebas deglutire, adeòq; intra mactatorum viscera non rarò observari. Corvi & Cornices tantâ copia ingerunt, ut egerere rursus vesperi cogantur & minutia complures sub arboribus, in quibus confident, inter excrementa reperiuntur.

Ab asellis (*Pomucheln*) deglutitæ plures mihi obvenere ; insignior trium digitorum transversorum longitudine, duorum latitudine spectatur. Est ex Ove globus succineus mirabilis, quem crustâ gypseâ mucus ventriculi obvelarat, quâ ab Eleëtrotoreutâ imprudenter abrasa, patuit ex pluribus glebis, à calore animalis subactis, fuisse formatum.

VII. His de Succini generatione traditis, veterum aliena placita facilè rejiciuntur ; neq; enim animalium, neq; arborum, neq; maris genitura Succinum esse poterit, postquam fossilis certa matrix in telluris gremio summâ accurratione demonstrata fuit.

Sectio Tertia.

Rudis Succini, & illorum, quæ in eodem apparent, aut ipsi adhærent, vel includuntur consideratio.

C. I.

Collectio Succini ; an molle vel durum ex matrice prodeat ?

§. I. **E**T mare & terra in Prussiam succinea dona confert : sed maris dona partim in litore leguntur, partim ex aquâ hauriuntur : Vadoso scil. mari, signis apparentibus, coloni reticulis conto affixis fundum verrunt, aut fluctibus volventibus eadem adversa opponunt ; hæc quæ haustilia : reliqua, inter ejectamenta, quæ natantia prædæ indicium faciebant, algarum, sarmentorum, lignorum aut arenarum sedulo investigantur & seliguntur, lectaq; audiunt.

II. Ex terra verò, quæ fodiendo acquiruntur, fossilia appellantur : Amam longiori conto præfixam venæ, in montium litoreorum jugis conspicuæ, admovent, tentando sicubi glebam ligno immersam offendant, quâ animadversâ lignum leniter radunt, amâq; subjectâ glebas excipiunt, exceptasq; adducunt, saccoq; à collo pendulo indunt.

III. Fodinas subterraneas Litus Sudavicum ignorat ; in exterioribus partibus fossorum opera hæret, fossioq; ad venarum ductum prisca ignota **MAGNI FRIDERICI WILHELMI** auspiciis primum montes exercuit.

IV. Nec tamen ubiq; fossioni patet litus, sed certorum recessuum juga ista operâ fatigantur ; *Erosß, Gubnicken, Ekrosß, Dirschkeim, Warnicken, Strobschnee, Palmnig* : & sicubi matrix lignea se conspiciendam præbet, atq; ad eandem facilis ac tutus est aditus.

V. Succinum uti ex matrice producitur, quod in fossorum operas intentus ipsemet expertus sum, rigidum & durum tactu dignoscitur : contingit aliquandò frangi dum protrahitur, sed vitio glebæ ; Succinum enim Succino duritie præstat.

VI. Non pauci tamen & prisca & nostro ævo mollia ac Ni- quida quidam ab alterâ parte durâ, ab alterâ mollia succina sibi visa jactitarunt : quæ mihi isto nomine oblata, nec fragrantia, nec sapore, nec deflagratione se succina probarunt ; ca-

ta

ſu iraq; inter hauſtilia reperta bitumina iſtis Auctoribus in ſuccineum cenſum referre placuit. Verùm & picea gleba, & carbo foſſilis, & ſegmentum pice navali abductum, aliaq; plura unà à fluctibus maris in litus projecta, iſtâ ratione ſuccinei cenſûs habenda forent.

VII. Opinio, quæ in fundo maris ſcaturigines liquidi bituminis commenta eſt, ut à ſalſugine maris coagulatum ſuccinum haberet, mollia iſtiusmodi ſuccina peperit: Neq; hauriendo, neq; fodiendo, neq; legendo ſibi mollia cognita, illi qui rerum ſuccinearum aſſiduam curam gerunt, aſſeverarunt omnes. Ipſe, magnos ſuccinorum rudium acervos perſcrutatus ſedulò, nullum molle adverti, quod virtutis experimento ſuccinei generis agnoviſſem.

VIII. Vulgo perſuaſum eſt, diſcrimen foſſilia & hauſtilia intercedere duritiei potiffimum, & puritatis, ac cruſtæ diverſis notis. Verùm falluntur, qui iſtud in animum inducunt ut credant: Evenit ut extra matricem alienis in locis ſepulcorum robur aut calor aliquid vitii contrahat, craſſiori etiam cruſtâ ſuperinductâ; hi tamen caſus nativorum differentiam minimè inferent: Æque intra colles ſubmarinos, ac intra litoreos, pro varia bituminis & ſalium copiâ ac virtute nobiliora & ignobiliora ſuccina generari certus ſum.

C. II.

Varia ſpecies rudium glebarum; Phænomena; exterius annata.

§ I. **I**N glebis ſuccineis formandis mirum Naturæ elucet ingenium: ut in lucem eduntur, pira, amygdalas, cepas, piſa, aliaſq; fructuum ſpecies, aut peregrinorum corporum ſimulachra, vario luſu referunt; Guttarum hiſ apud Electrotoretas nomen, quum globolaſam figuram maximâ ſui parte expriment.

II. Major pigmentorum in cruſta denudatis admiratio. Literata Naturæ Succina plura vidi: teneo in quo albeſcens linea flexu ſuo concinnè literam S. Latinorum efformavit, reliquâ fruſti facie flavâ: Arabum ac Hebræorum characteres quædam ruditer exhibent.

III. Præterea arbuſcularum, frondium, nubium, rudium, aliarumq; quarumcunq; rerum delineamenta in ſuccino variato curioſus oculus advertet.

IV. Eſt mihi Pectore tenus efficta ſenilis imago, in ulna infantem

infantem reclivem monstrans ; IESUS parvulus in sineonis amplexu hærens animo obversabatur, quando primum hanc Naturæ picturam intuebar.

V. Rumor increbuit, fidem habentibus Erudicis, ducatum Belgii fœderati insignibus & Symbolo conspicuum intra Succinum ductu Naturæ dilineatum comparuisse. Ego vanum arbitrator rumorem ; neq; cohærent quæ de nummo Auctores prodidère ; alii polonicum grossum simili Naturæ ingenio impressum tradidère ; pari fide : mihi incredibile videtur, illorum, quæ prudentiæ consilio, artiq; ministerio peraguntur, ectypa à naturâ, animæ vitali destitutâ, reddita esse unquam, aut posse reddi.

VI. Cæterum & quæ Succinis concreta adhærent, memoratu non indigna puto : Inter hæc Algæ vesicularis & tenui foliæ rami, radicibus firmiter infixis, ex succineis glebis propululantes invenient locum ; tum filix parvulus, eminentiori liberâ, latiori parte Succino obvoluca : Alii glebæ lamina ferrea agglutinata est : Et segmenta lignorum, conchyliâ, varique alia adnasci contingit.

C. III.

Animalculorum Succino inclusorum accuratior demonstratio.

§ I. **A** Nimalculorum succinea funera, jam Plinio & Martiali celebrata, intentiorem curam exposcunt ; ultra triginta species insectorum in meis succinis numero ; muscas, araneas, culices, formicas, papiliones, apes, millepedes, teredines, curculiones, erucas, scarabæos, ex cornutis & deauratis aliquot, & quorum nomina memoriam subterfugiunt.

II. Sunt qui & perfectiora animalia Succino condita memorant, ranas, lacertas, pisciculos. Quibus ut fidem habeam ægre à me impetro, quamvis Plinius lacertam, Martialis viperam Succino tumulatam habeat ; Sed & isto ævo pretii cupidò artis fallacias intendere novit. Hermanno decantata Ranæ & Lacertæ sepulchra non uno modo mihi suspecta redduntur. Pisciculos fraude artis Succino inclusos, jam aliis animadversum est.

III. Nativa animalculorum succinea seretra ab arte elaboratis illo maximè distinguis, quod in istis non procul à superficie insecta implicita reperiuntur, in his verò medullium occupant ; scilicet artem non ita feliciter occultarent. Electrotoreu-

ta, si extimas partes excavarent, illisq; animalcula crederent, translucentia enim succinea lamina fraudem proderet. Si quoq; solidum purum, nullis fissuris hians, nec crustarum compage distinctum est Succinum in quo sepulta sunt, illud non à natura fabricatum scias monumentum; Pleraq; enim glebæ succineæ, quibus animalculorum exuviæ sunt repositæ, id quod millies contuitus sum, corticatim cohærent, aut fissuris hinc inde sunt intersectæ, ex quibus & pars exuviarum aliquando exetius conspicienda prominet.

IV. Neq; omnium intra succinum reconditorum animalculorum par est conditio: Alia situ obducta, alia nitida, quædam succineo fulgore splendentia intueor: Duas apes & erucam, nidumq; curculionis situs obtexit; scarabæus fulget; ex muscis quædam nitent.

V. Porò alia vivacitatem, alia languorem præ se ferre; nonnulla quasi evigilantia, cum conatu vinculo isto se extricandi, conspicias.

VI. Quædam Succina integrum examen insectorum, & ejusdem & diversi generis, involutum, commonstrant.

VII. Vexata hinc Curiosorum quæstio, quomodo Succinum animalcula opprefferit? Non pauci difficultate quæstionis permoti fætum arborei succi Electrum contendunt, quasi resinis aut gummi arborum adrepentia animalcula irretirentur facilis: Verùm absq; experientiæ suffragio; neq; in resinosis aut gummosis stillis hunc in modum, si rectè memini, inclusa insecta magno numero, si modo ullo, Curiositas hætenus detexit; extrinsecus adherentia conspeximus, non ita fuso liquore obtecta.

VIII. Alios gravitas argumenti eò adegit, ut negarent esse quæ in Succinis videntur animalcula; Phasmata ludos istos dare. Sed fractorum aut lectorum inspectio hos refellit, manifesta enim insectorum supersunt indicia; licet enim corpuscula animalculorum vis bituminosa ita subigat, ut fibris succineis intercurrentibus viscera condensata in lapidem indurescant, quando facilis per rariorem texturam insectorum effluviis succineis est commeatus, tamen corporis alieni habitum luculenter discernere datur; Apumq; nostrarum exuviæ, interaneis consumptis istud ob oculos egregiè sistunt. Possent Phasmatibus etiam opponi, quod quidam viscera animalculorum in Succinis distinctè sibi cognita affirmant: Verùm artis commentum ejusmodi succina concinnavit; quæ natura composuit, non ita discreta monstrant viscera.

IX. Fu-

IX. Funestos itaq; casus, quibus infecta à Succinis sunt oppressa, ut rectius percipiamus, repetendum memoriâ, quod infectis usu veniat, si quando tempestatum aut hiemis injuriâ compelluntur, cavernas & latebras ubiq; quærere, inibi; somno sepulta delitescere; id quod toties contuemur, quando muscæ ex rimis fenestrarum vetustate exesarum situ conspersæ subitò prodeunt, hypocausti vel Solis calore excitatæ.

X. Quare cum & litorea latibula non unum genus insectorum subintret, in illisq; aliquando hæreat invicium, aut obdormiscat, exhalationibus bituminosis à calore subterraneo in laticem collectis, ubi in matricem Succini, quæ latibulum ac dormitorium interea præbuit, liquor destillat, eadem implicat & obtegit, gremioq; suo suscepta quando succinum evasit, commonstrat.

XI. Contingit bestiolas in dormitoriis istis à calore subterraneo excitari; aut in vivas fluor bituminosus impingitur; sed quum nullum vigilantibus patet effugium, eandem cum dormientibus sortem subire coguntur, ut tamen fortis tunc suæ in sepulchris succineis relinquunt memoriâ; vivaciori atq; animosiori corpusculorum simulachro.

XII. Firmat nostram sententiam istud, quod succino sepulta infecta pleraq; sint ex illorum genere, quæ cavernas in dormitoria eligunt: majorem partem etiam languida ac somnolenta, aut mucosa transparent.

XIII. Vivacia, qui cum nisu obluctantur, aut alas expandunt, abitumq; parant, rariora puta. Sed tantam vivacitatem, quæ amoris æstu in coitum animalcula concitarit, ut isto nexu cohærentia succineus latex involvisset, hospitio huic subterraneo minimè convenire autumo; Quare quæ culicum muscarumve istos hymenæos ostendunt feretra suspectis adnumero.

C. IV.

Vegetabilia Succino inclusa; mineralia itidem; & aqua.

§ I. **O**Bvia sunt cuivis Succina, quibus animalcula continentur; speciosiora alia depromam quæ plantarum germina sinu suo obvelant.

II. Est mihi in quo explicata algæ vesicularis folia alas Aquilæ expansas & pedes cum corpore utcunq; adumbrant. Aliud semen tilix, stipitisq; partem; aliud folliculum diductis foliis

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hiantem,

hiantem, quatuorq; semina complexum, ex quibus apex medius exurgit, cauliculo ad superficiem protenso & prominente; est quod muscum, in pergulae s. porticus hortensis speciem, fornicatis operibus compositum obtutui sistit: In alio fosculus minimus marcescens, in altero rosmarini silvestris, Pruffis Korhl dicti, ramulus tribus foliis divisus transparet; Rude aliud algæ memoratae vesicularis ramum majorem per corticem non politum ostentat.

III. Plura ex musco villos disiectos obtinere: Nobile autem illud, in quo pars albescens convallem & colliculum musco investitum exhibet, sed per speculam quasi, quando ex flavo ignei coloris succino, huic amenissimo spectaculo mirabili naturæ artificio quasi vitrum est objectum, per quod mucosi apparatus delicatior esset aspectus: Nec vile alterum aqueo lactescentis coloris, quod villorum muscosorum crispata congeries nobilitat. Spectabiliora hæc herbarum succinea monumenta quam illa animalculorum censeo.

IV. Major copia Corticibus, lignis, & festucis intertexturum; festucæ pineæ videntur, specie istarum quibus formicæ acervos extruunt; Verum accuratiori examini fossilis ligni ac corticis momenta patuerunt.

V. Ex minerali regno quoq; adducenda, quæ succinis inclusa: Vitriolum sapius saporis promptè dijudicandum; Pyrites quandoq; crebrius ferrum, de quo Electrotoreutæ conqueruntur, quod non nisi cum detrimento instrumentorum educatur: Armatura quoq; aurea & argentea, divulsis coagmentatis partibus, in impuro conspicitur.

VI. Sed & aquæ guttas intro receptas diversis alveis stagnantes Succina detinent: qui effluit liquor salsus aut subsalsus, aliquid & insipidus. Non exsiccari, ab aliis cum Luna crescere & decrecere liquor traditur; habeo in quo exiccatus est; habeo in quo perennat semper idem.

VII. Quæcunq; autem ex plantis, mineralibusve succinum complectitur, casu haud absimili, dum in matricem illapsa sunt, à fluore bituminoso obfusa atq; occupata intelligo.

VIII. Aquearum guttarum intra Succinum oclusarum singularis ratio cogitanda: Udam matricem calida bituminosa exhalatio obsepit, intro compulsæ aqua à calore subterraneo consumi nequit, & ob copiam circumstantiis bituminosi laticis nullam rimam quâ difflieret invenit; præcluso itaq; exitu,
captiva

captiva se includi passa est; conatum elabendi, quando in arctum coacta fuit gutta, manifestis indiciis quædam glebæ produnt.

Seçtio Quarta.

Ad quam classem Succinum sit referendum, & quot modis à reliquis differat mineralibus.

C. I.

Succinum non ad metalla, nec ad terras aut salia, nec ad bitumina aut sulphura esse referendum.

§ I. **F**ossile Succinum declaravimus, illisq; quæ rudi adhuc accidunt generationem illustravimus, sed ut penitus natura introspiciatur, genus fossilium ad quod accedat proximè explicandum erit.

II. Metallis non esse accensendum, vel illud arguit, quod nec ductile sit, nec liquabile: sicubi enim in fluorem deducitur soliditati ejus multum decedit, contra quam metallis evenit.

III. Fuerunt, qui Succinum fundendi, & parva frustra in unam molem salvâ firmitate uniendi artem se tenere asseverarunt; inter adeptos numerandi, si idoneis documentis fidem fecerint; neq; minus quàm ex lapide Philosophorum lucrum Electrotoreatæ ipsis promittunt. Ego variis experimentis, dum fusioni Succini operam dedi, frustra istud tentari didici, siquidem Salium vis, à qua maximum succinorum robur, inter solvendum avolat; nec à fuga retinetur, nisi addito aliquo; eo ipso tamen soliditas corrumpitur. Quod si calor tam blandus admoventi posset, qualem natura in animalibus humente vapore miscet, non desperandum arti putarem; Globus enim Succineus in ovis ventriculo repertus ex pluribus minutis coagmentatus est, relictis juncturæ ubiq; vestigiis; quæ ipsa nec fusorium, sed tepidum glutinandis commodum ignem à natura adhibitum fuisse indicant.

IV. Fusa succina, quibus sceleta obducta atq; succinea funera vendicata, vernix sunt, uti amicissimus D. VOGEDING optimè monuit. Solvi olim Succinum & liquefeci, solo ignis adminiculo, nullâ aliâ readmixtâ, sed fragilius justo comperi, imminuta coloris gratiâ, salinis minutis quæ lateribus vasis adhærebant causam reddentibus.

V. Multò minus ad terrarum aut salium classẽ Succinum referendum erit ; quum terris arctius cohæreat, & salibus sit pinguis, utrisq; etiam humidus.

VI. Ad bitumina & Sulphura propius accedit, ut tamen durities ipsum ab his discriminet, tam dura enim ac solida pura bitumina aut Sulphura nemo indicabit.

C. II.

Quod Succinum sit gemma : virtus attrahendi levia & humores corporis humani.

§ I. **D**urities Succinum inter Lapides, splendor inter gemmas collocat ; Neq; fragilitas objiciatur ; fragilis & gages ; gemmæq; gemmis solidiores, nec tamen propterea loco moventur : Electrotoreutæ satis dura Succina experiuntur, alba in primis, ut ferri aciem hebetent ; tormentaq; & mortaria ludicra, à pulveris pyrii explosione illæsa, soliditatem docent : Summa etiam Succini ex duritie & soliditate gloria : faceffant itaq; friabilia ac fragilia, quæ ignobilitate contempta ab Arte rejiciuntur.

II. Sed virtutum, quæ Succinum à reliquis gemmis discernunt, præcipua Antiquis visa attractiva, ut electrica ipsis vocarentur corpora, quæ facultate trahendi quidquam ad se polerent ; & celebre hujus virtutis nomen Platonis etiam ingenium in explicando exercuit. Recentior ætas quæ res naturales intentiori experimentorum curâ explorat, aliis gemmis, lapidibus, vitris, bituminosis, resinosisq; Sulphuri, asphalto, lacce communem vim attrahendi advertit. Reliquis tamen gemmis fortius Succinum attrahet, ut quod attritum pinguis effluvia eaq; tenacia copiosius emittit : Virtutem enim hanc oleosis particulis adscribendam persuasit experimentum, quod de cotophonia gemina cepi ; altera enim post olei destillationem excepta pariter se electricam adducendo levia probabat ; altera verò, quam post Balsami nigri liquorem exemi, licet nitida & quasi vitrea esset, nullam vim attrahendi exerebat : Nimirum illa aliquid pinguedinis retinuit, hæc verò ☺ instar omni bituminosâ pinguedine prorsus exuta fuit.

III. Veteres quædam exceperunt, quæ non adduceret ; Sympathiæ & antipathiæ miraculo ; perperam admodum, siquidem & ocymum & oleosa & humida, ipsaq; aqueas guttas à succino attrahi pro lubitu demonstro, insigni & politâ glebâ admota ;

motá ; eleganti spectaculo, quando effluvis ingredientibus guttas in bullam adfurgit, aut quando pendula transilit.

IV. Sed & in corpus humanum hác virtute Succinum agit : frusto cervici alligato partem, quam leviter attingit, leni sudore humectam tactu percipies. **IL. BOYLE**, Angliæ imò Europæ Eruditæ maximum quondam decus, enarrabat & incredulo mihi asseverabat, illustris profapiæ Virginem globulorum grandiorum lactei albescentis corollâ ita affectam ut os in tremorem & quasi spasimum ageretur, quoties collo suspensam gestaret, remorâ verò corollâ tremorem cessasse & convulsionem. Efficaciam autem attrahendi humores in foniculis quidam globulis succineis pensensere.

V. Sed quod duorum pedum spatio distantia corpora, levia licet, attraxerit, mihi incognitum ; paleari veste induta animalia verò quod rapuerit, prorsus fabulosum : quibusdam tamen persuasum fuit, ut crederent.

C. III.

Odor, Sapor, Color & Levitas Succini.

§ I. **P**ropriæ Succino est fragrantia, qualem nulla gemmarum exhalat ; neq; ex reliquis naturæ foetibus, aromaticæ fortis, quidquam parem odorem spargit ; non thus, non myrrha, non camphora, nec mastiche ; In resinaram intra formicarum acervos abditarum glebulis imitamentum habes odoraminis, sed ut in attritis & accensis discrimen se prodat illicò.

II. Diversus est flavorum five igneorum ab albescentibus Odor ; illorum pinguis, adeoq; blandiora, horum salsa & acriora sunt effluvia, quæ haud similiter nares afficiunt.

III. Peculiaris quoq; inter gemmas Succinis est Sapor ; sed & hic variat, uti oleosarum & salinarum particularum variat miscela ; alba fibras linguæ pungunt, flava non item.

IV. A plerisq; gemmis & colorum varietate differunt : Nigrorem refugiunt ; opaca rara sunt reperta, superant inter pura pellucida.

V. Deniq; levitate parem vix nominabis gemmam ; dono dederam Amico rei gemmarie gnaro, peregrè ex Asia reduci, corollam cum armillis & manubriis cultellorum variegati coloris, nec patriam gemmam dignoscere potuit nisi de pondere admonitus.

C. IV. *Aliæ*

C. IV.

Alia Succini virtutes, quibus à gemmis differt; usus in medendo, citra præparationem Artis Pharmaceuticæ.

§ I. **V**ana quorundam fuit opera in viribus Succini recensendis, quando Virginitatem probandi facultate idem pollere, aut Lunæ decrementis incrementisque respondere prodiderunt.

II. Princeps virtus est corporibus animalium mederi, ad quam gloriam nulla gemma æquè accedit: Crudum citra artis operam est salutare, sive intus sive extus applicetur: Indis & Chinesibus suffitus in delitiis habetur, ut in luxum degeneret: Sed Catarrhis ex pituita suffimentum prodesse vulgus novit; Exhalationibusq; succineis alexipharmacis acceptum quondam tulerunt Electrotoreutæ Regiomontani, quod ipsi à peste manserunt intacti: Certè non efficacior adversus contagia suffitus, quam ex Succino; Neq; ulli ex fodinis litoris Sudavici graves aut pestilentes erupere unquam vapores.

III. Fluxionibus capitis alba perpolita Succina sunt proficua, cervici alligata humores avellunt; blanda quoq; oculis flavorem affricatio; & fonticulis succinei g'obi lenius induntur.

IV. In pulverem contusum ad Urinam ciendam, ad calculum propellendum, ad muliebris sexûs menstruum profluvium movendum multum valere, si cætera sunt paria, quotidiana loquitur experientia. Dono à Generosa Domina acceperam calculum plurimum unciarum, duos articulos digitorum & supra latum, tres longum, quem carnificem Rustica in sinu pudoris tres menses passa erat; dato Succini albi pulvere, cochlearis mensurâ, feliciter carnificinâ liberatâ est; ipsam aniculum ad me adduci curavi, ut omnia exquirerem accuratius.

V. Pariter Succini pulvis, vino infusus, hinc sub operculo incoctus, calido vino epoto, & urinæ & calculo & mensibus trahendis inservit, quamvis minus efficaciter.

VI. In memoratos usus Medicos præstat album sumere; salis enim maxima in his enitet virtus. Atq; PATERNUS PATRIÆ in subditos affectus per præfectum litoris ea propter poscentibus colonis qui circa Succinum occupantur, libras duas albi in tutelam & curam sanitatis clementissimè quotannis dilargitur.

C. V. *Usus*

Uſus Succini in medendo per præparationem Artis Pharmaceuticæ.

§ I. **L**ongum foret minutim recensere, quæ Pharmaceutica in externa & interna remedia ex Succino præparat; præcipua ſolum attingo: Magiſterium reſinoſum ſalubriter Pilularum formâ uſurpatur, nec Baſamò Copaibæ cedit; ſive urina cienda, ſive pituita digerenda, ſive gonorrhæa temperanda: Idem Cephalicis Emplaſtris convenit.

II. Colophonia Diaphoreticis quibuſq; & Stomachicis Emplaſtris congruit; commodo maximo ſi adverſus paralyſin, apoplexiam, aut epilepſiam, aut etiam gangrænâ muniendæ ſunt partes; ſumtu minori: Debilitatos ab arthritide artus benignè fovet: Niſi domeſtica deſpiceremus, vel magis ſi non inconfultis circumſtantiis domeſticis temerè abuteremur. Colophoniam Succini præ divinis quibuſq; ac miraculoſis dictis Emplaſtris commendarem.

III. Oleum Succini Europæ & Aſiæ præclarum præbet medicamen, ſed imprudentiâ Medicæſtrorum infamiam incurrit; Siquidem in gonorrhæa, calculo & menſibus ſuppreſſis ſapè in exitium ægrotis ceſſit: Parca ejus ſit doſis, gutta una & altera aliquot drachmis Sacchari vires impertit; frigido & pituitoſo cerebro una guttula vertici aut ſuturis illita medetur; goſſypio excepta auribuſq; admota ſtatus & tinnitus diſcutit; ambuſtas frigore partes reſtituit; partui difficili fert opem, quod vel Veterinariis in Pruſſia innotuit, quamvis hiſ pulvis magis in uſu Oleum autem eligendum quod æreum, nullâ ab igne notâ empyreumatis impreſâ, albefeſcens, ſubtiliſſimum & fragrantiffimum.

IV. Salis volatilis Succinei contra Epilepſiam aliòſq; affectus Cephalicos à pituita oriundos decantata eſt medicina: Sed & Diureticum inſigne præſtat.

V. Eſſentia Succini eſt olei ſubtilior portio, adeòq; eadem de hac tibi promittes commoda, ſed quod ſpiritus vini mixturâ diluta eſt largius in uſum aſſumi poteſt: valet quoq; ad arcendam gangrænâ extus.

VI. Sunt qui phlegma medicamentiſ adnumerant, ſed quodcumq; ipſi ineſt virium olei atq; ſalis reliquiis debetur, quibus ſi privatur fatuum ac fumoſis exhalationibus imbutum reſtat.

VII. Quod poſtremum deſtillat craſſum oleum non niſi vulnibus in frigidorum artuum medelam conveniet, empyreuma enim

enim graveolens reddit, ut satius æstimem isto abstinere, & colophoniam integris viribus servare.

VIII. Pluribus modis istæ præparationes variant, & aliis combinantur, parumq; abest quin omnibus morbis ex Succino paratum auxilium proftet; sed simplicibus delectamur magis itaq; composita negligimus.

IX Illud unicum adjicio, me justâ analysi ductu naturæ pura ab impuris separando, blando in subsidium advocato igne vires Succini omnes ita coadunare ut salvâ fragrantiaâ nativâ, pinguium & salinarum particularum salvâ quoq; efficacia, externo internoq; usui idoneum remedium evadat: Balsamum Succineum voco, in quo remotis terrestribus graveolentibus partibus volatiliores atq; deliciores amicissimo floris nexu artè coherent, nullo alieno in societatem admisso.

X. Quicquid à succino crudo aut arte quomodocunq; præparato expectari potest, citius, tutius & jucundius à nostro Balsamo præstabitur. Internè formâ pilularum commodissimè assumitur, aut boli; externè Apoplectici, cujus & colorem præ se fert, Balsami in modum applicatur; gingivis, linguæ, palato, in deliquiis, in passionibus hysteris, epilepticis, Paralyticis, cum fructu affricatur: Prophylaxeos ergò quâvis septimanâ bis terve grana quinque, septem, decem, imo XV. tutò usurpantur; similiter in renum, Vesicæ, genitalium certis morbis, admixtis anodynis; contra tinnitum aurium quam oleum affert medelam, at certiozem.

XI. Balsamum hoc ut meditando elicere fecit olei succini vulgaris ob empyreuma ingratus odor, ob cujus fastidium quidam usum prorsus intermiserunt; fecit & ab olei usurpatione periculum, quum igneæ prorsus sit naturæ; fecit & salis volatilis auxiliaris copia, quâ oleum destituitur.

XII. Non malè ap. Hofmannum & Etmullerum Balsami Peruviani gratia oleo Succini jungitur; Ast felicior Peruviani & nostri Balsami Succinei, adversus gonorrhæam & fluorem album imprimis, societas erit.

XIII. Balsamum Succini vulgare ex Δ admixto nihil habet cum nostro commune. Sed nec elegantius Etmullero commendatum quod Succini oleum & Sal volatile triplo olei Nuciæ expressi conjungit, ad illud accedit, nostrum enim & corporationem & colorem ex se ipso habet.

Sectio Quinta.

Chimica & Pharmaceutica Succini analysis, cum
matricis lignæ aliorumque litoris Sudavici
mineralium examine.

C. I.

Succini destillatio.

§ I. **S**uccini notior est destillatio, quam ut describi opus ha-
beat: Et XX & retorta huic negotio inservire valent ;
verum per rimas multum olei & salis elibitur si retortam adhi-
bes, vehementissimam enim olei & salis vim nullum lutum Phi-
losophicum coercebit, præstat igitur retortæ operâ uti.

II. Attendendum autem ut alba, si salis, si olei copiam eli-
cere satagis, ut flava eligas : ex ℥bj. albi recepti salis volatilis
℥ss. quum ex flavi ℥bj. vix ℥j. elicias. Felicius quoq; & suavi-
us oleum proveniet si polita fragmenta, aut nitida, tenui corti-
ce lucida frustra, quàm si impura, crassâ crustâ investita, aut
vulgarem rasuram adhibueris, nihil autem succino est admif-
cendum, quamvis silices & arenas addere olim fuit in usu.

III. Absit ignis vehementia ; ex arena calor leviter intendi-
tur ; atq; justo regimine mox cum phlegmate ætherea olei por-
tio ascendit, quam limpidam peculiari vase excipies ; ubi fla-
vescens oleum prodiit cum sale volatili, cesset destillatio.

IV. Urgeri quidem potest Succinum, ut crassum liquorem
nigrum fundat ; parumq; capitis mortui nigri & splendentis in-
star Colophonix erit residuum, sed hoc omni virtute olei &
salis est spoliatum ; ex ℥ss. albi restabat ℥j. hujus capitis mortui.
Sed præstat aliquas Colophonix vires relinquere, quando gra-
tior hujus præ fætido nigro balsamo est usus.

V. Sal volatile, quod ad rostrum vasis evolavit, aut lateri-
bus adhæsit, calidâ aquâ abluitur, atq; ut ab admixtis oleosis par-
ticulis separetur, chartâ humectatâ solutio percolatur ; tran-
sunte sale, restat oleum : à solutione percolatâ postea super-
fluous humor abstrahitur, ut tertia pars relinquatur, quæ frigo-
ri exponitur, atq; singulares Salis concresecunt cryftalli, milia-
res quasi sive grandinosi.

VI. Alius est modus Sal depurandi, si feculentum vitro lon-
goris colli inditum cinerum aut arenarum calori exponitur ;
niveis enim floccis, sive spiculis ad sublimiora loca evolantibus,

in fundo impurior pars hæret: verùm hæc operatio cum jaçtura vitri & salis est conjuncta.

VII. Quidam & phlegmati separando student, verùm rectius hoc cum aquâ, quæ Sal volatile imbibit jungitur, ut pariter Sale suo exuatur; neq; reiterata destillatio illi conciliabit virtutem, nisi à sale volatili illam acceperit; nec gratus phlegmatis odor, ut in salis volatilis conservationem commendari posset. Accepi ex lbs. albi phlegmatis ʒss. quod salis succinei sapore erat imbutum, reperitâ autem destillatione fumum solum sapiebat, cœtera fatuum & ingrati odoris.

VIII. In Colophonia, si non profus fuerit exusta, aliquid salis latitat, quod ope aquæ calidæ, morâ quâdam macerationis educes: non nullis hoc sal fixum Succini audit; non rectè, quia parilis volaticæ est virtutis, sapore & odore eodem: Colophonix autem virtutem hoc quodcumq; est salis intendit.

IX. Oleum omne, ut aliâ operâ depuretur non opus est, modò recipiens vas justo tempore mutetur, atq; ritè instituatür destillatio, purissimum statim accipies.

X. Qualitates Olei Succinei ex bitumine sive oleo terræ sunt derivandæ, qua in re CL. BORRICHIO minimè refragor; sed quod idem omnes virtutes succinei Petræ oleo vult communes, in hoc dissentio: alteratum enim Succineum odor & sapor ab illo olei petræ aut terræ diversus demonstrat; at olei, ex ligni fossilis destillatione, odor olei Petræ, non autem succinei odori congruit: Credo autem alterationem olei terræ in Succino salium intimæ deberi combinationi.

XI. Quænam verò ista sint Salia determinare non licet, illa ipsa tamen erunt quæ Succini Sal volatile suâ misturâ progenerant.

XII. Nullum enim est Succinum, cujuscumq; sit coloris, quod sale volatili destituatur; atq; à sale volatili omnis ista peculiaris fragrantia; quantoq; sale abundant, tanto in attritu fragrantiora experieris.

XIII. Ut ut autem temerarium Naturæ arcana definire, ex vitrioli tamen Martialis corpore sal istud succineum majori ex parte componi citra crimen audaciæ assero; etenim in albis sale volatili insigniter pollentibus, & odore & sapore Chalcantum tale manifestòprehenditur.

XIV. Sed minimè communi vitriolo Sal Succini adscribimus; Vitriolum alteratum sit oportet quod tale virtutis singularis Sal volatile producit.

XV. Esse

XV. Esse autem Vitriolum Prussicum ab aliarum Regionum chalcantio diversæ naturæ, analysis inferius declarabit.

XVI. Certè ab acido originem trahere sal volatile, acidus, isq; non ingratus, fermè vinosus sapor arguit; ad spiritum Vitrioli Philosophicum proximè hæc gratia acoris in Sale volatili Succini accedit; pungit, minimè corrodens; affusq; sp. vitrioli non effervescit, neq; ebullit, nec consumitur, cum sp. salis armon. commissum bullulis excitatis cum stridore absorbetur.

XVII. Subtilissimum hunc & gratissimum volaticum Salis Succini acorem moderationi bituminosarum exhalationum vindico; quemadmodum V. cum Spiritibus Nitri aut Salis combinatus hos mitiores reddit, ut dulces audiant. Siquidem dum bituminis particulas dispersas calor subterraneus in unum cogit, fit ut hæc per ditiones vitrioli transitum faciant, quas dum permeant, subtilissima vitrioli effluvia eodem calore excitata fecum rapiunt, minori, majori copiâ, atq; in matricem ligneam auferunt, ut junctis seminis Succinea pronascatur proles.

C. II.

Alia Succini Præparationes Pharmaceutica.

§ I. **S**uccini, quâ in pollinem terendo redigitur, levior est præparatio; equidem parùm interest, pulverem contundendo an terendo minutum exhibeas; scilicet utroq; modo prodest, vel brutorum exemplo, quæ avidè Succinorum minutias devorare annotavimus.

II. Verum tamen quod divisio in minima ad faciliorem commistionem cum succo nativo animalis disponit, non inutilis in medicina ista erit opera: Adeoq; miror CL. Ettmullero Commentarium Ludovicianum hoc nomine suspectum visum; quasi Succinum sit subjectum à nullis menstruis solubile; unde dubitamus, inquit, an in pulvere datum, illud aliquam positivam in Corpore habeat efficaciam. Non in mentem venit VIRO industria, quod SCHRODERUM dilucidans Succinum in substantia egregium & singulare adversus Gonorrhæam specificum dixerat: Praxis Prussiæ constans ipsum refellit; refellit & globus Succineus in ventriculo ovis coagmentatus; deniq; Sapor Succini commansi ipsum refellit.

III. Infusionem Succini aut coctionem præterirem, nisi inter euporista domestica meritò hæc præparationes locum sibi dari poscerent: certum est, quod virtus Succini coquendo in vinum transeat; sed & in fundendo atq; digerendo vinum Succino medicatum impetrabis.

IV. Essentiam sive Tincturam affusus Succino Ψ . parat, qui tamen à puris albis flavedine non tingitur; an Ψ igneus præstet, an dilutus, in dubium vocaveris, illum enim oleosæ, hunc salinæ partes deposcunt; verùm cedit Succinum utriq; & per digestionis quamcumq; moram necesse est ut Ψ . tandem redatur dilutior, præferendus itaq; generosior.

V. Felicius autem tinctura proveniet, si ramenta tenuissima cum Ψ sociaveris: quidam ol. \square i. p. d. aut \bigcirc fixati addunt, aut his Ψ acuunt, ut major virtus & ocyus in Spiritum transeat; non malè; nisi quod alieni particeps hæc evadat tinctura.

VI. Sed & ebullitione in vitro oblongi colli succinum felicius dissolvitur, ut virtus promptè suscipiatur, & spiritus illâ factoretur penitus; id quod sola digestio longissimâ morâ demum assequetur.

VII. Majores Magisterium ex Succini extracto per acidum redigere sategerunt, nullo operæ pretio; Si acidum Succini pulveri associare cupis, terendo idem assequeris rectius.

VIII. Præstantius magisterium dabit tinctura abstracto Ψ resinofum istud est, imò ipsa resina sive oleosa pars Succini qualemcumq; mutationem passa; siquidem Ψ . quem distillando recipis succineis viribus imprægnatus intimam sui cum Succino unionem indicat.

C. III.

Matricis lignæ distillatio.

§ I. **S** Elegi lignum fossile siccum cui vitriolum non adhærebat: Verùm postquam & in siccissimo aliquid salini latitare adverti, stellulas nimirum illas radiantes, fila vel strias, quæ, quidem vitriolicum saporem gustui non offerebant sed insipidæ à lingua judicabantur, & has prius educere decrevi.

II. Fragmenta ligni contusa aquâ calidâ maceravi, lixivium subdulcis aluminosi aut martialis potius erat saporis, ut ægrè tandem aliquid vitriolici persentisceres; sed ad chrystallos salinos congregandos inspissatum magis atq; magis vitriolicum saporem prodebat ipsiq; crytalli eundem referebant, nisi quod primum martialis dulcedo linguam afficeret; id quod repetendo solutionem & corporationem in crytallos denuò expertus sum.

III. Exutum sale lignum retortæ indidi; & calore arenæ intensissimo, ut intra vitrum fragmenta canderent, omnem humorem elicui: Lacteus prorsus erat liquor qui prodibat, specie emulsionis

emulsionis amygdalarum; quâdam postea in superficie cuticulâ. & subsidentibus in fundo particulis calcitormibus.

IV. Odor gravissimus sulphureus, qui totum hypocaustum illicò pervadebat; Sed propius admoto liquore nares succineum quid percipiebant, non quidem fragrantis glebæ aut olei, sed phlegmatis aut post destillationem in retorta residui: Sapor quoq; qualis phlegmatis, fumosus ab empyreumate, salso-aciduli quidpiam gustui intermiscens.

V. Lacteus color in liquore postea disparuit, pinguiori relicta cuticulâ. Denuò partem igni feci exponi, si qua sal volatile & puriores olei guttas reiteratâ destillatione exciperem: Verùm Salis volatilis nihil ascendit, oleosæ autem particulæ subtiliores innatabant, non amplius in modum cuticulæ coherentes; quædam etiam formâ globulorum pellucidorum fundum petierant, igneo succini colore conspicuæ.

VI. Exigua portio olei, aliquot guttarum ex lbj liquoris; sapore & odore oleum petrae prorsus imitabatur; globuli verò, ut in fundo resinosi apparent, levi concussione liquori commiscebantur.

VII. Calciformes particulæ tenuiori terrestri portioni adscribendæ erunt, ignis vi sursum elatæ.

C. IV.

Matricis lignæ post destillationem examen Docimasticum.

§ I. **L**ignum ex 6 exemptum brunno-ferruginei erat coloris; multum sulphuris exhalabat; accensum instar fomitis ignem alebat; Superficies ejus leviter rubro pulvisculo conspersa fuerat.

II. Crucibulo impositum per tres horas ignis exercuit; refrigeratum pariter cinnabarino quasi pulvisculo obiectum fuit: flammæ admotum minus promptè ignem suscepit, neq; diù detinuit, nedum ut fomitis instar propagasset: Spirabat autem sulphur auratum, hujusq; saporem commansum præbuit; accensum verò minus sulphuris exhalabat quàm quod in 6 erat relictum: Colore etiam lucidiori.

III. Denuò in Crucibulo ultra novem horas detinuimus, neque accendi amplius potuit, sed instar amianthi album post ignitionem comparebat, nullo sulphuris odore.

IV. Color post tam longam in Crucibulo moram ex griseo partim nigricans, partim splendens: microscopii ope aliæ partes instar scoriarum, aliæ instar chrysocollæ, aliæ instar calcis efformatæ dignoscebantur.

V. Tostum

V. Tostum atq; exustum satis lignum felle vitri admixto igni fusorio expoluimus; & facilè coierunt in massam, quæ granula dispersa Reguli martialis exhibuit postea.

VI. Dum verò in unum corpus ista granula fortiori igne cogere intendimus, colliquata cum regulo massa, ex nigro splendens, vitrea producta est; neq; ad reiterandum examen iusta copia ligni aderat, neq; vitreum coagulum in ulteriorem docimasiam sufficiebat.

C. V.

Vitrioli Prussici examen.

§ I. **D**iversâ specie nativum Vitriolum in litore Sudavico progigni superius enarravimus; qualecunq; verò sit, sive illud amianthi forme, sive fustum alterum, attritu chalybis prodit sibi non cum ♀, sed cum ♂ societatem initam; nullam enim cupri indicem rubedinem relinquit.

II. Nativam amianthi forme solutum & in crystallos redactum idem confirmat; subdulcis enim ac planè martialis primo sensu percipitur sapor, qualis Salis sive solutionis Martis.

III. Crystallos non istâ specie quâ Goslariense concresecunt; solutionem autem prius depurgavimus affusâ urinâ, atq; semotis fecibus concrevit terra foliacea; reliquus liquor crystallos sapphirini fermè coloris inæqualibus angulis exhibuit.

IV. Cæterum ex solutione inspissatâ hincq; filtratâ succedente evaporatione, album Olum prodiit, quod furno pistoris leviter calcinatum loricatæ retortæ inditum sp. vitrioli intra 24 horas fudit egregium, qualem ex Olo martis alias officinæ parare soleat.

V. In Colchotare multum Salis Oli adhuc latere, ope microscopii exploravimus; ut pateat quomodo Olum in colchotare æri exposito regenerari intelligendum.

C. VI.

Terræ corticosæ flavæ, luti cærulei examen.

§ I. **N**IL intentatum relinquere decreveram, meditabarq; omnia litoris Sudavici mineralia ad examen ignis revocare, ut nec terræ bituminosæ, nec sabulo, nec Dactylis idæis, vel aquæ ex litoreis montibus dimananti parcerem; verùm prævidi non nisi SERENISSIMI indulgentiâ ac munificentiâ singulari horum atq; aliorum omnium accuratius scrutinium institui posse; quæ propter studia & conatus meos inhibere

hibere cogor donec SERENISSIMI augusta gratia vires superandæ rei difficultati pares clementissimè largiatur.

II. Terram tamen corticosam ejusdem cum ligno fossili esse naturæ ignis examen confirmavit ; leviori tostione opus erat ut ex hac aliquid metallici eliceremus, licet quod obtinuimus exiguum esset.

III. Ex luto cæruleo olim per destillationem Spiritum nactus sum volatilem sulphurei odoris, & bituminosi quid in superficie comparebat.

IV. Terram verò flavam ad martem inclinare adverti ; & Vitriolici aliquid traxisse ex confinio sapor arguit & odor.

V. Sed horum & aliorum fossilium litoris Sudavici examen Docimasticum accuratius urgebo, quamprimum SERENISSIMI auctoritate & jussu ipsam tellurem altius introspicere & perscrutari datum fuerit.

Sectio Sexta.

De prudentia civili, quomodo hæc Succinum in rem suam vertat.

C. I.

Succinum regale, quomodo curetur.

§ I. QUÆ Physico enarranda atq; demonstranda, quæq; Chimico illustranda erant, succinctè omnia recensuimus ; adjiciendum, quomodo thesaurus hic Succinorum à Prudentia custodiatur, atq; in Reip. usum convertatur.

II. Inter regias opes antiquissimis temporibus repositus fuit, Regibus, qui terras Succiniferas tenuère, jam olim Succina colligentibus, ut magnificentia munerum aliis pares essent. Apud Solinum REX GERMANIÆ, (PRUSSIÆ intelligendus, quum Germania tantis opibus succineis nunquam gavisa sit, tredecim millia librarum Neroni donum misit. Non unius sed plurimorum annorum congestus iste fuit acervus ; intentiori enim licet curâ nostro ævo hausta & fossa condantur Succina, ad mille libras rarò accedunt, quemadmodum Catalogi redituum Succineorum manifestant. Sic & publici Succinorum fuerunt thesauri, qui ab Æthiolorum Legatis Theodorico Gothorum Regi ap. Cassiodorum oblari leguntur ; Barbaraq; gentes pretiosissima quæq; regiis Gazis inferre noverunt.

III. Cessisse tamen & Civibus Succina istis seculis in commercio,

mercium, ex Tacito; & ex Avicenna, quod quondam occupantium fuerint addiscimus.

IV. Prisca autem ut mittamus, Prussia inter regalia erucigerorum ordini Succina vindicavit, aliquo in eadem Episcopi Sambienfis jure. Atq; publicâ autoritate collectio est instituta, severis in depeculatores legibus.

V. Successione Civitatum ordinis æarium accisis Succini redditibus non leve detrimentum passum est, quamvis omnixè omnia ageret ut integro thesauro solidè potiretur.

VI. Post Crucigeros Ducum Prussiae quæ fuerit in servandis Fisco Succinis cura Annales parcius eloquuntur: Destinati tamen operi memorantur litoris Sudavici Coloni, quibus ex Capitaneatibus Schakenfi & Fischufano additi sunt alii: Servituti non statim dies, sed si quod capturæ tempus commodum, diu, noctuq; hieme æque ac æstate.

VII. Stipendium his, domus instructa & agellus atq; à tributis immunitas; haustiq; vel lecti Succini modius modio Salis redhostitur: fossili præsens pecunia adjicit auctarium.

VIII. Crucigeri Dominum Succinorum vocabant qui succineis rebus præerat; alicubi & Commendatoribus ista cura incumbabat. Sub Divo ALBERTO Magistrorum atq; postea Camerariorum nomen frequentius fuit, Equestris dignitatis viris hoc munere defungentibus: Nostrâ ætate partem muneris capit capitaneatus Fischufani Præfectus, partem teloniorum Director, administratore litoris peculiari.

IX. Administratori Custodes litoris Equites (*Dimond Keuten*) præstò sunt; Equitibus autem adjuncti sunt servi Cameræ (*Hunmer musta*) qui pedestres cum Equitibus munus custodiendi alternant, quandoq; si opus est, & horum vices obeunt.

X. Administratoris officium est ad operas ordinandas jussa edere, Succina undiq; recipere, congesta Regiomontum transmittere, furta præcavere, de inventis disceptare, & regale SERENISSIMI ubiq; inviolabile præstare: Hujus etiam est Sal Colonis distribuere.

XI. Equites & servi Cameræ litus de die obequitant aut circumveant, ne quis Succina tollat; iidem tempestates observant, & colonos si hauriendum fodiendumq; convocant, fossamq; & haustum recipiunt.

XII. Nulli Colonorum succina detinere domi licet, sed ad Equitem aut alium, cui istud delegatum, deferunt; quæ in Pillavia

Pillaviæ & Neringiæ recentioris litore leguntur, scriba teloniⁱ ab his Suscipit. Si quando angustia temporis, insigniori copia, in litore seligere non permittit, domum asportandi facultas conceditur; vi juramenti autem proximâ luce eadem reddunt: Inter hauriendum & fodiendum Operariis facculus à collo pender, & furti reus habetur, qui vestimento glebam abdidit.

XIII. Recepta à Colonis Administratori exhibentur, à quo Regiomonti in Succinorum Camera reconduntur, atq; præfente Directore teloniorum discernuntur & divenduntur.

XIV. Olim plures Succinorum Camerae erant, Lochsteti, Dirschkeimi, Memelæ, Germoviæ, singulisq; sui præerant Magistri.

XV. Præter istam accuratissimam Oeconomiam regale hoc gravissimis SUPREMI DOMINI & Juris Provincialis Prutenici legibus est munitum.

XVI. Extra litora, Succina in prædiis Fiscii reperta Præfatis sunt restituenda; quæ in privatorum fundis, si non privilegio Domino vendicari poterunt, fisco necesse est pariter cedant; quamvis hætenus privatis invidendas ex Succino opes obtigisse non memini.

C. II.

Lucrum Fiscii ex rudi Succino.

§ I. QUONDAM Privatis Succinorum captura erat elocata, ut certâ annuâ summâ præsentis pecuniæ 10000 aut 12000. talarorum redimeretur, præterquàm quod in colonos impensæ erant faciendæ.

II. Verùm plus quæstus ad fiscum rediit, postquam publicâ auctoritate non solum curata, sed & divendita sunt Succina, certo pretio cuilibet generi Succinorum ad mensuram statuto.

III. Succinæ rudes glebæ in auctarium pretii discernuntur, Capitales (*Haupt Stuck*) aliquot unciarum pondere, carius veniunt; tornatiles (*Dubly*) palmæ longitudine ac latitudine, minoris constant; minimæ (*Krauß*) his cedunt. Illis autem, quæ aliquot librarum pondera æquant, nulla certa est æstimatio.

IV. Puritas, dignitas coloris, pretium adauget; vilissima habentur impura, (*Dibluck*) pretiosissima alba, lactea.

§ 1. **S**alvo Regum thesauro, prisca Succina distrahere licitum fuit. Julianus Eques Romanus, qui Neronis munus gladiatorium curabat, ad litora nostra missus est, ut coemeret, Auctore Plinio: Pluribusq; Cluverius edisserit, ipsos Gothones, horumq; conterminos Æstios Succinum in Pannoniam & Italiae confinium non modò Plinii, Tacitæ, sed & Herodoti ævo solitos fuisse deferre, recipiente ab Italis Græciâ.

II. Crucigeris Dominis Lubecenses & Stolpenses Succinorum commerciis inclaruere: Postea & Gedanenses atq; Regiomontani.

III. Nostrâ ætate Gedanensium maximus ex Succinis est quæstus, postquam Mercatores Prussica ad se traxerunt, Electrotoreutiarumq; collegium quæ Neringiæ recentis litus offert, solidè possidet.

IV. Cruda Orientalibus Populis magno pretio venduntur; Armeniisq; & Persæ olim Regiomonto asportari curarunt, lucro civium non contemnendo.

V. Cæterum ars Electrotoreutarum majorem quæstum facit sculpturâ ac celaturâ aut torno varias figuras inducendo, ut inter pretiosissima habeantur ex Succinis labrefacta opera.

VI. Operibus pretium intendit si ex eadem massâ integra confecta, si nobilioribus coloribus sunt conspicua, si rariora Naturæ pigmenta monstrant.

VII. Primus ego persuasi ut Italos & Gallos imitentur, qui effigiem rerum & animalium segmentis aut tessellis gemmarum ingeniosè componunt: Et succederet, opus, si SUPREMI DOMINI iussa accederent, facultasq; daretur seligendi, quæ ad vermiculata sive Musiva istiusmodi opera requiruntur; etenim opaci colores, quibus ars maximè indiget, in Succinis occurrunt rarissimi.

VIII. Neq; solum arte Toreuticâ, sed & Pharmaceuticâ ex Succinis lucrum redigi potest; quum Agyriæ Circumforanei adulteratis oleis & balsamis Succinorum tantum argenti lucrentur.

IX. Præterea vernicis ex Succino magnus est usus; atq; laccæ non cedit Succinum, si rectè præparatur.

X. Insectores quoq; pellium, Russi in primis ac Judæi Succinum operæ adhibent; ut & horum ratione ex Succino quæstus promitti queat.

Lucrum Fisci ex lucro privatorum Civium.

§ I. **P**ersuasus sum, nullam Remp. solo naturalium rerum proventu ditescere, sed ut nunc vita est hominum, non nisi artium operâ divitias acquiri: exemplis obviis, quod Regna Provinciæve, quæ opibus pollent, simul & artibus excellant.

II. Electrotoreutarum itaq; ingenia excitanda putavi ut artis beneficio majorem ex Succino quæstum Cives facerent, qui in Fiscum tandem esset redundaturus.

III. Sanè quum munera fociis Regibus aut Rebuspubl. offerenda non parùm sumtuum requirant, utiq; si domi ista parata habentur Parcimonia hæc magnum erit vectigal.

IV. Sed & quum illa temporum nostrorum sit felicitas, ut sentire quæ velis, & quæ sentias dicere licet, patriæ divitias cum SUPREMI DOMINI thesauris arctissimo connubio jungendas censeo.

V. Quod commodius fieri non potest, quàm si succinorum, quibus PRUSSIA præ omnibus Regionibus abundat, commercia ita componantur, ut non solum ex crudis ærarium acquirat, sed ut ex arte elaboratis pariter in illud aliquid derivetur.

VI. Si Electrotoreutarum Collegium, uti est summâ SERENISSIMI auctoritate constitutum eidem auspiciis ad istas opes provehatur, ut pretio conveniente rursus omne Succinum à Fisco possit redimere, quotannis verò designatis artis operibus in Thesauro collatis istam DOMINI SUPREMI indulgentiam demereatur.

VII. Eo futurum spero, ut excitatis ingeniis Regionum Artificum operæ famam, quam diu perdiderunt, recuperent, peregriniq; rursus alliciantur, qui merces succineas hæc locorum conquirant; ex quo genere commercii non unâ ratione Fiscus nova subinde commoda percipiet, siue suas merces importent, siue succineas exportent, præterquam quod Civibus occasio lucrandi præbeatur.

C. V.

Musæum Electorale Succineum.

§ I. **I**lustre Succinei operis Musæum, extrui potest, cui omnium, quotquot Europæus orbis celebrat, gazophylaciorum splendor cedat.

II. Certis

II. Certis forulis hoc Musæum distinguendum; Alius enim locus debetur haustili Succino, in quo & signa quæ Capturam præcedunt, capturaq; instrumenta ingeniose recondita cum ipsa piscatura commonstrabunt.

III. Alius fossili est adsignandus, qui non solum fossorum operam sed & matricem, & in matrice quiescentis Succini glebas, omnifq; generis, quæcunq; litus Sudavicum recondit mineralia ante oculos ponet.

IV. Tertius locus rudium Succini glebarum admiranda sifset, sive moles, sive forma, sive crusta illis admirationem conciliaverit: Hæc; memorata loca augustius spatium occupabunt.

V. Postea Phænomenis colorum insignitius conspicua Succina erunt disponenda; ut non solum pigmenta Naturæ, sed & delineamenta literarum, sylvarum, fluviorum, nubium, aliarumq; rerum complurium, ipsorumq; animalium in Succinis observentur.

VI. His succedent feretra, quibus animalcula, vegetabilia, mineralia, aquas, casus abscondidit.

VII. Inde Artis Pharmaceuticæ in medelam hominum circa Succinum studia distinctis capsulis signanda.

VIII. Demùm & quæ à variis Artibus ex Succino in usus certos parantur aliquem merebuntur locum:

IX. Cunctis istis apparatus succineus Conclavis fulgorem addet; si mensa, si sellæ, si candelabra, si specula, si alia quæq; utensilia Succino inducta comparebunt.

X. Præsertim si in imitamentum Musivorum operum tessellata aut segmentata Succina ars coaptare edocta fuerit.

XI. Neq; magnificentius hæc dici quàm fieri posse intra lustrum demonstrabo, si SERENISSIMUS istam mihi curam clementissimè injunget, illorumq; quibus opus est subsidiorum faciet potestatem: Totum autem Musæum Succineum exornatum reddere, non unius lustri, nec unius ingenii erit labor.

XII. Augeriq; possunt armariola; si exotica, si extra Prusiam reperta Succina, si ex animalibus exempta observatu digna judicabuntur.

S. D. G.



fig-4

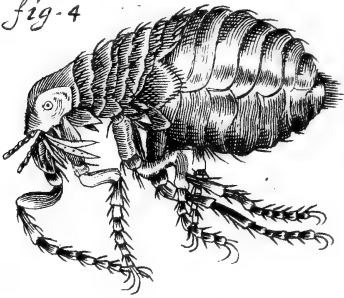


fig-1



fig-3

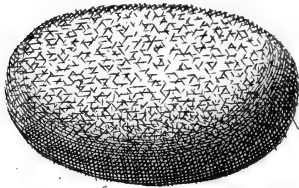


fig-2

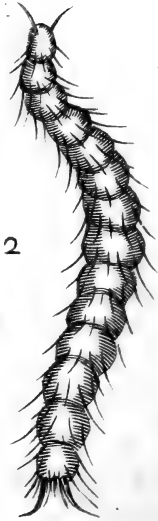


fig-5



fig-7

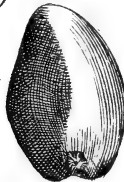


fig-6



fig-8



PHILOSOPHICAL TRANSACTIONS.

For the Month of February, 1699.

The CONTENTS.

- I. *An Extract of a Letter from Leghorn to Dr. Martin Lister, November 34. 1698. concerning Seignior Redi's Manuscripts, and the Generation of Fleas.* II. *A way to make Two clear Spirituous, Inflammable Liquors, which differ very little in Taste and Smell, and being mixed together, do give a fine Carnation Colour, without either sensible Fermentation or Alteration. Communicated by Monsieur Geoffroy, F. R. S.* III. *A farther Account of the China Cabinet, by Hans Sloane, M. D.* IV. *Part of a Letter from Mr. William Derham, to Dr. Sloane; accompanying his Observations of the Height of the Mercury in the Barometer, Rains, Winds, &c. for the Year 1698.* V. *An Account of what Rain fell at Townly in Lancashire, in the Years 1697, and 1698. with some other Observations on the Weather; being part of a Letter of the 12th of January, 1698. from Richard Towneley, Esq; to Mr. William Derham.* VI. *An Account of several Curiousities relating to Amber, lately sent to the Royal Society from Philippus Jacobus Hartmannus (Author of the Account of it published last Transaction) and which are now in their Repository at Gresham-College.* VII. *Part of a Letter of Mr. Dale from Braintree, Feb. 1. 1699. to Dr. Martin Lister, Fellow of the College of Physicians and R. S. concerning several Insects.* VIII. *An Account of a Young Man slain with Thunder and Lightning, Dec. 22. 1698. from Ralph Thoresby, Esq; F. R. S. to Dr. Martin Lister,*

F

Fell.

Fell. Coll. Phys. and R. S. IX. An Account of two Books, 1 Museo di Fisica & di Esperienze, &c. by Signior Boccone. 2. Paradisus Batavus, continens plus centum plantas, &c. with additional Remarks by Mr. John Ray, F.R. S. X. Books lately Printed beyond Sea.

- I. *An Extract of a Letter from Leghorn to Dr. Martin Lister, November 24. 1698. concerning Seignior Redi's Manuscripts, and the Generation of Fleas.*

FOR any thing that *Redi* hath left behind him in Manuscript, although I have enquir'd of a young Physician his Domestick, yet nothing appears: and that second part of *Animali Dentro gli animali* we are like to be without.

We have an ingenious Naturalist here, whose Observations about the Generation of Fleas, I send you, and are as follows.

A New Discovery of, the Original of Fleas, made by the Signior D'iacinto Cestone of Leghorn.

AT last is discovered, by the indefatigable Industry of Signior *D'iacinto Cestone*, the true way of the Generation of Fleas, their Worms, and entire Metamorphoses which have been hitherto obscure, though sought after. The Fleas bring forth Eggs (or a sort of *Nitts*) from these Eggs are hatched Worms; these Worms make to themselves Bags like Silk-Worms, and from out of these Bags come Fleas.

Fleas therefore deposite their Eggs on Dogs, Cats, Men or other Animals infested with them, or in the Places where they sleep, which for being round, smooth, slip ordinarily streight to the Ground, or fix themselves in the Plyes or other Inequalities of the Coverlets and Cloaths. From these are brought forth white Worms, of a shining Pearl Colour, which feed themselves on the Brann-like Substance which sticks in the Combs when Puppies are combed to take out the Fleas; or with certain Downy Substance that is found in the Plyes of Linnen Drawers, or other such like Excrement. They come

come in a Fortnight to the Bigness of Fig. 5. and are very lively and active, and if they have any Fear, or if they be touched, they suddenly roul themselves up, and make as it were a Ball. A little after they come to creep after the manner of the Silk-Worms that have no Legs, with a brisk and very swift Motion. When they are come to their usual Bigness they hide themselves the most they can, and bringing out of their Mouths the Silk, they make round themselves a small Bag, white within as Paper, but without always dirty and fould with Dust. The Bags are to the Natural Eye of the Bigness of Fig. 6. without magnifying. In other Two Weeks in the Summer-time, the Flea is perfectly form'd, without that the Worm quits its *Exuvia* in its Bag, as do the Silk worms, and as do all Caterpillars; which leave in the same their *Exuvia*. The Flea, so long as it is inclosed in the Bag, is Milk white, although it has its Legs, but Two Days before it comes out, it becomes coloured, grows hard, and gets Strength, so that coming speedily out, it streight leaps away.

Hereunto annexed are the Figures of the Eggs, Fig. 1. the Worm Fig. 2. the Bag Fig. 3. and the Flea Fig. 4. but all of them magnified by the Microscope.

II. *A Way to make Two clear Spirituous Inflammable Liquors, which differ very little in Taste and Smell, and being mixed together, do give a fine Carnation Colour, without either sensible Fermentation or Alteration. Communicated by Monsieur Geoffroy, F. R. S.*

TO make the first of these Liquors, put a small Handful of dried red Roses into a Glass Bottle, pour on them rectified Spirit of Wine till it cover them an Inch. Let them infuse in the Cold all together in the Bottle for Four or Five Hours, then pour off the Spirit of Wine, which will be clear and have no Colour.

The Second Liquor is made by putting into some good Spirit of Wine some Drops of good Spirit of Vitriol, or Oyl of Sulphur, so that scarce can the Acid or Sour be discovered by the Tongue.

If

If you put a little of this last Liqueur into the first, it will give a fine redish Colour, without making it troubled or causing any other sensible Alteration.

If instead of this Wine mixed with Acids, you put to the first some Drops of any volatile Alkali's, as of Spirit of *Sal Armoniack*, or other, it will give a Green Colour to the Infusion.

The Two first mentioned Liqueurs were brought to a Meeting of the Royal Society by Monsieur *Geoffroy*, one of their Members, where the first Experiment above-recited being made, it succeeded according to Expectation.

III. *A further Account of the China Cabinet, by Hans Sloane, M. D.*

SEEDS to clarify Water, (*vid. Fig. 8.*) These Seeds I have seen come several times heretofore from the Coast of *Coromandel* and *Malabar*, where they are used for the clarifying Water. They are about the Bigness of a small Pea, only broader and flatter, having *Striae* run from their Center after the manner of the common *Nux Vomica*. The best Account I have had of the way of using them was from Dr. *Brown*, who lived in the *East-Indies* some time, he says they rub or grate them on the bottom of a small Earthen Bason, wherein is contained some Water. This Water and Powder is put into a large Quantity of muddy, or foul Water, which is by this clarified.

Nux pepita seu faba sancti Ignatii. This is figured No. 7. being about the bigness of a Nutmeg, and Triangular. This Fruit is very much esteemed in the *Philippine* Islands for the Cure of many Distempers, as will be more at large seen in the next Transaction, wherein is design'd to be published from Mr. *Buckly*, a further Account of it, and the Description and Figure of its Leaves, Flower, &c. drawn and sent from the *Philippine* Islands, where it grows, by Father *Kamelli*, to Mr. *Ray* and Mr. *Pettiver*, Fellows of the Royal Society.

IV. *Part of a Letter from Mr. William Derham, to Dr. Sloane; accompanying his Observations of the Height of the Mercury in the Barometer, Rains, Winds, &c. for the Year 1698.*

IF any Explication be needful to these Tables, I refer you to *Philos. Trans.* Numb. 237.

The Quantity of Rains which fell through my Tunnel last Year was 122,32 Pounds: which exceeds the Quantity of —97. that being but 77,60 Pounds.

I find Foggy Weather makes the Mercury rise, as well as the North-Wind; as may be observed in the Table, in the Month of *December*, at which time the Mercury was very high, although the Wind was in the Southerly Points. I submit it, whether the Cause be not the increase of the weight of the Atmosphere; by an Addition of those Vapours of which the Fog consists, which are manifestly as heavy as the Air, because they swim in it without ascending? These filling up many of the Vacuities of the Air, without extruding much the parts of Air (as I judge Clouds do) do add considerably to the Weight of the Atmosphere, and so cause the Mercury to ascend. But this I leave to better Judgments.

It may not perhaps be ungrateful to you to observe, that the greatest Range I have ever observed the Mercury to have, is no more than 2,12 Inches; it being here never higher than 30,40, nor lower than 28,28 Inches. the lowest it ever was, within my Observations, was

G

Jan.

Jan. 24. last, about Two of the Clock in the Afternoon ; about which Hour Mr. *Townley* (whose Name you well know) observed his Barometer to fall to 27,80 Inches, which, he says, was remarkably low.

I find it will be necessary for me to add Two Columns more to each Month's Observations, *viz.* One for the Thermometer, another for the Flying of the Clouds, which oftentimes fly in a Point different from the Winds, especially before the Wind shifteth its Course. Mountains, &c. may cause some Variation, but as little at *Upminster* as almost any where. This last Column will be necessary, among other Uses, to shew the Reason why the Mercury varies sometimes : As suppose the Wind was in the Southerly Points, and the Clouds flew from the Northerly ; the rising of the Mercury would readily be accounted for.





A Register of the Weather, Winds, Barometer's Height, and Quantity of Rain falling at Upminster, in Essex, the Last Six Months of the Year One Thousand Six Hundred Ninety Eight.

Day	July. 6. 12. 9.				August. 6. 12. 9.				September. 6. 12. 9.				October. 7. 12. 9.				November. 8. 12. 9.				December. 8.																							
	Weather	Winds.	Barom.	Rain.	Weather	Winds.	Barom.	Rain.	Weather	Winds.	Barom.	Rain.	Weather	Winds.	Barom.	Rain.	Weather	Winds.	Barom.	Rain.	Weather	Winds.	Barom.																					
1	Cloudy	WNW 1 W by S 1 WSW 0	29. 78		Fair	SW 2 W by N 3	29. 51		Cloudy Cold Day	NNW 0 W 1	29. 50		Misting Warm Fair	S 3 SW b.S 4	29. 37		Frost Sleet Cloudy	SW b.S 2 S W 2	29. 63		Hard Fr Fair Snow 3	N b.W 0 E by S 0	29. 81																					
31	Fair Cooler Cloudy	W by S 5 W 4	41 52		Cool Fair with Rain	NW 0 NW b.N 3	83 85		Hard Frost Cloudy		62										Frost and Fair	W 0 WNW 2	29. 23																					
Total																																76												

V. *An Account of what Rain fell at Townly in Lancashire, in the Years 1697, and 1698. with some other Observations on the Weather; being part of a Letter of the 12th of Jan. 1698. from Richard Towneley, Esq; to Mr. William Derham.*

	1697	1698
<i>January</i>	5 13	6 47
<i>February</i>	7 17	5 88
<i>March</i>	4 93	20 16
<i>April</i>	4 12	20 95
<i>May</i>	11 88	8 95
<i>June</i>	8 92	6 45
<i>July</i>	13 50	10 37
<i>August</i>	40 25	21 50
<i>September</i>	46 90	21 79
<i>October</i>	27 60	22 26
<i>November</i>	10 72	24 72
<i>December</i>	24 50	20 42
	<hr/>	<hr/>
Sums	205 70	189 92
	<hr/>	<hr/>
These doubled	41 040	37 984

In the Table of the Observations I have only set the Quantity of Rain in Pounds and Centesimals, which if double, you will have them to answer to those Numbers formerly printed in the *Philosophical Transactions* giving the Numbers of half Pounds, and (near enough) the height of the Water also. So the last Year there fell

G 2. 189,92

18992 Pounds *Troy*, which doubled make 37.984 Inches, the Inches the Water would have filled any Cylindrical Vessel.

As far as I have learn'd, the Mercury rises and falls much after the same measure in most parts of our Island, and of this you may better judge by some Observations I have here transcribed and sent you of the very low Stations, *Dec.* 28. about Three of the Clock Mercury 28,17. on the 29th about 2 h. $\frac{1}{2}$ 28,18. and *Jan.* 2. about the same Hour 28,05. and this time it hardly rise before I went to bed; and on the 6th still about 3 h. 28,19. but this time before 9 at Night it was got to 29,28. what I note is; that though once I saw it lower many Years ago, yet never since I kept my Observations, did the Quick-silver descend so often to those Pitches; or when it was found very low, did it ever continue so for any considerable time, as it hath done this Year, during which it hath never been very high, and as I remember, generally much lower than other Years. This hath proved very unseasonable here, and so backward, that I thought I had never known the like; but examining my Observations, I find that of 1673. much what as late, though the Consequence proved not so fatal to these Parts or all *Europe*, as this.

VI. *An Account of several Curiosities relating to Amber, lately sent to the Royal Society from Philippus Jacobus Hartmannus (Author of the Account of it published last Transaction) and which are now in their Repository at Gresham-College.*

1. **F**rustum quod variam concretionem Succini corticatum cum armatura auri exhibet.
2. Frustum album sale volatili abundans, ut sapor salis linguam afficiat.
3. Frustum insignis duritiei cum sapore vitrioli.
4. Frustum in quo insignis cavitas aquæ plena.
5. Frustum in quo lignum fossile.
6. ——— in quo festucæ quasi abiugnæ.
7. ——— quod fibras ligneas matricis in qua situm fuit, exhibet.
8. Gutta oblonga.
9. Gutta oblonga altera.
10. Gutta succinea.
11. Gutta minor.
12. Gutta minor altera.
13. Feretrum aliquot muscarum.
14. Feretrum aranæ.
15. Litera F primordium musivi ex succino operis.

SUPERIUS.

16. } Lignum fossile.
 17. }
 18. Terra foliata s. Corticata.
 19. Lignum in lapidem metallicum indurescens.
5. Vitrio-

20. }
 21. } Vitriolum nativum fufum c. fibris ligneis.
 22. }
 23. }
 24. } Vitriolum nativum SSS. cum terra amianthiforme.
 25. }
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VII. Part of a Letter of Mr. Dale from Braintree,
 Feb. 1. 1699. to Dr. Martin Lister, Fellow
 of the College of Physicians and R. S. concern-
 ing several Insects.

HEREWITH you will receive a *Cervus volans* or two, which I take to be different from those described by *Moufet* in his *Theat. Insect.* p. 148, 149. these are plentifully found about *Colchester*, especially towards the Sea-Coast. Besides these I have happened upon divers sorts of Scarabs, which I cannot find figured in your curious *Tabulae Mutæ* in the Appendix *Hist. Animal. Angl.* as the *Bénézetos* *Moufet.* p. 152. a Species or two of *Cantharides*, three or four sorts of *Lady-Bugs*, and others; which, although of most of them I have at present but single *Specimens*, yet if you desire the sight of them to design and fill up the Vacancies of your Plates with, they shall be sent up to you. Last Summer being on our Sea-Coast at *Harwich*, I observed no less than five or six Species of *Cochleæ Marine* two of which I have since found to be already noted by you in your excellent *Hist. Conchyl.* as of English Production, viz. *Secl. 5. n. 19. and 43.* A third I have which is by you figured, viz. *n. 13.* but is not marked as found in *England.* The fourth agrees with your *n. 8.* in Figure, but having no Name, I cannot be positive, I therefore desire your Name of it:
 This

This I did see taken out of the Sea by the Fishermen, among Sea-Weeds, and is solitary. The other two (if they are distinct) I have herewith sent you, desiring your Opinion. Among other things which the Fishermen brought up, there were divers of those Marine Animals, which by Dr. *Molyneux*, *Philos. Trans. n. 225.* are taken for nondescripts, and refer'd to the Classis of *Scolopendræ Marinae*, these our Fishermen call, *Sea-Mice*, and are described by *Rondeletius*, and by *Mouset*, and *Johnson*, figur'd under the Title of *Physalus*, but badly. I had like to have forgot observing to you, that the Female *Cervus Volans* is pretty well represented by *Mouset*, in his first table at the end of his Book, but without a Name, I have sent you one of them also, which was found in *Coitu* with the Male Else very different. I should be glad to see your Journal to *Paris*, or any of those petrified Shells you found there, if you can spare them.

VIII. *An Account of a young Man slain with Thunder and Lightning, Dec. 22. 1698. from Ralph Thoresby, Esq; F. R. S. to Dr. Martin Lister, Fell. Coll. Phys. and R. S.*

Jeremiah Skelton, who lived with his Father *Daniel Skelton*, at *Warley* in the Vicaridge of *Hallifax* in *Yorkshire*, observing a Storm coming, said, I think it will be Rain, I will go and gather in some of the Corn (a late Harvest, which has been very unkindly in some parts of the North) which was out at a Farm they had in the *Cold-Edge*, about a Quarter of a Mile from their own Dwelling; while at this Work, bringing in a Burden and casting it upon the Barn-Floor, the Tempest begun

gun as he came forth again; whereupon he step'd aside for shelter within the Barn Door, and while there, was struck with a dreadful Flash of Fire; a young Woman that liv'd with her Father in the House, that belong'd to this Farm, being sadly affrighted with the Thunder and Lightning (for part of the Sulphurous Matter came down the Chimney, and fill'd the House with a strong Scent, like that of Gunpowder after firing) she leaves the House, and not seeing the young Man about the Barn, goes with speed and tells the Family he was related to, that she fear'd he was slain. They came to the Barn and found it even so: A sad Spectacle, the young Man cast down and many Stones about him; he was laid upon his Face, wholly naked, save a small part of his Shirt about his Neck, and a very little of a Stocking upon one Foot, and so much of a Coat-sleeve as covered the Wrist of one Arm, his *Clogs* driven from his Feet, one not to be found, and the other *Cloven*, his *Hat* not to be found after search, and the rest of his Garments torn into *small Shreds*, and cast at considerable distances one bit from another, the Hair of his Head and Beard singed as tho' it had been with a Candle, and a *little Hole* below his left Eye, which they supposed might be made with the Fall upon a Stone, for there was a great Breach made upon the Barn, the Door tops, both of Stone, broken, and the wall above them fall'n, with the Slate and Water-Tables. The Young Man would have been Two and Twenty Years of Age next *June*, is said to have been sober and hopeful, was buried at *Luddenden* the *Munday* following, *viz Dec. 26. 1698.*

IX. An Account of Books.

- I. *Museo di Fisica & di Esperienze*, &c.
By Signior Boccone ; with additional Remarks
by Mr. John Ray, F. R. S.

THIS Book is made up of many curious Observations, Natural and Medicinal, about various Subjects, not digested into any certain Method, but miscellaneously disposed : Each Observation dedicated to some Noble or Learned Person.

The Four first Observations are concerning that dreadful Earthquake that happened in *Sicily*, in the Year 1693. and contain a particular and exact Account of all the Accidents and Effects or Consequents of it. It had Two main Fits or Concussions, which may be called Two distinct Earthquakes : The First was on the 9th of *January*, about Five Hours after Sun-Set. The Second was on the 11th of the same Month, at about Twenty one Hours of the Day, according to the *Italian* Account. This was stupendous beyond Humane Imagination, and lasted about Four Minutes with fierce Pulsations, the Earth so leaping up and rebounding, that it was impossible for a Man to keep himself on his Feet, unless he stood still, firm, without Motion : And he that cast himself, or was cast down upon the Ground with his whole Body, was tossed to and fro, and carried from one place to another by the Shocks I shall not mention any Particulars ; there having been a full and exact Account and Description of this Earthquake inserted in these Transactions.

The Fifth Observation is concerning Yellow Amber, or *Succinum*, and its Original. He endeavours by many Arguments to prove, that Amber is nothing else but

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Naphtha

Naphtha, or *Oleum Petroleum* coagulated or condensed. I was told by a Chymist at *Montpellier*, That *Oleum Petroleum* was the same with Oyl of Jet or *Gagates*, and not to be distinguished by Colour, Taste, Smell, Consistency, Vertues, or any other Accident, as he had by Experience found, which renders Signior *Bocccone's* Opinion probable, there being great Affinity between Jet and Amber.

The Sixth Observation is about some Alcalick and Medicinal Earths of *Italy*, particularly the *Terra Virgine aurea*, known in *Venice* by its Salutary Effects: This is found in the State of *Modena*, at a Place called *San. Paolo*, near the City of *Reggio*. It is of great Use in putrid and malignant Fevers, in Hypochondriacal Passions, above all it is wonderful in stopping Hæmorrhagies or Fluxes of Blood.

The Seventh Observation gives us an Account of the Powder of *Claramont* (so called from the Name of the Author, who hath written a little Book about it) or *Terra de Baira*, because it is found at a Place called *Baira* near *Palermo*. It is found also in other Places of *Sicily*, and is of a White Colour. It hath the same Vertues and Uses with the *Terra Vergine aurea*. He speaks also in this Observation of the Mineral Bezoar-Stone of *Giraldinus*; and of the *Terra Melitensis* or *Petra S. Pauli*, and gives us the Receipt of the *Pulvis* of *Fondacaro*. More Experiments of the Vertues of *Terra de Baira* he gives in the Twelfth Observation.

The Eighth Observation gives a farther Account of the *Lapis Bezoar Mineralis fossilis* of *Sicily*, which is a kind of *Geodes*: This reduced to Powder, and given in a convenient Vehicle, is of great use in Malignant Fevers, Small Pox and Worms, &c. Of this Stone he hath treated largely in his *Recherches & Observations Naturelles*, Printed at *Amsterdam*.

The Ninth presents us with several sorts of *Terra Lemnia*. 1. One found near the City of *Roan* in *Normandy*. 2. One found in the Mountains of *Siena*, agreeing in all Points with *S. Paul's Earth* of *Malta*. 3. One found in the Mountain of *Maiello* in *Abruzzo*, which our Author thinks a fit *Succedaneum* of the *Terra Virgine aurea* fore-mentioned. In this Observation the *Unicornu fossile* is briefly touched.

The Tenth adds more sorts of *Terra Lemnia*, as that of *Mililla* in *Sicily*, and the *Terra Bezoartica* of *Nocera*, which he accounts a sort of *Lemnia*. This is endowed with *Alexipharmac* Vertues, being found by Experience to be very efficacious against Malignant Fevers, Heat of Urine, and Fluxes of Blood. It agrees in Taste, Smell and Vertues with that of *Lemnos* or *Malta*. The *Aqua Santa* or *Aqua di Nocera* (described by *Annibal Camillus* in a certain Treatise of his) running through the Mine or Veins of this *Terra Lemnia*, impregnates its self with the Particles thereof, and thereby becomes so cordial and corroborant, that it works miraculous Effects in many Diseases, so that it is the Glory of *Italy*. It is to be used as other mineral Waters.

In his Twelfth Observation he gives us a more exact and particular Description of the *Fungus typhoides cocci-neus tuberosus Melitenfis*; names many Places besides *Malta*, where it is to be found, as about *Tunis* in *Barbary*, in a little Island near *Cozzo*, in divers places of *Sicily*, especially near *Trapani* in the Salt-Works, and in a little Island called *Ronciglio*, &c. He commends it as a sovereign Medicine against the *Dysſentery*, either taken in Powder or made into a Syrup.

The Thirteenth is concerning an Urn found in *Malta*, containing Ashes and a Balsamick Liquor.

The Fourteenth contains an Account of the *Italian Medicinal Manna*, found and gathered not only in *Calabria*, but many other Places, which he Names, and assures us that it is no Celestial Dew, or *Mel Aereum*, but a Gum or Exudation of the *Fraxinus rotundiore folio C. B.* or *Ornus*. But I meet with little in this Observation concerning *Manna of Calabria*, but what is to be found in Botanick Books. Here he gives us an Account of Four sorts of *Manna*, found in the Eastern Provinces, which he received by Word of Mouth from a discalceate Carmelite Fryar, who was a Missionary into those Parts. He speaks in this Observation of a sort of Dew, which in the Isle of *Corfica* falls on the Leaves of some Plants, in clear, hot, and dry Weather, and condenses into great Drops, which being gathered by the Country-men, and tasted, is found to be a delicate sweet *Manna*; but being struck by the Sun-beams, is insensibly dissolved and dissipated, leaving only upon the Leaves whereon it fell, some Impressions or fine Capsules of a white Colour.

The Fifteenth Observation concerns the Properties and Medicinal Uses of the *Manna of Calabria*. Here he gives us a Proverb the *Calabrians* have concerning *Manna*. To a sick Person that wants Physick they prescribe, *Va e piglia la Manna, perche ò ti sana, o ti ne Manna, i. e. Manda*, Go and take *Manna*, for either it will heal thee, or else send thee; viz. to another Life. Which Proverb had its Original from Experience of the unhappy Effect that *Manna* hath had upon some sick Persons, who having taken it too old, have died by excessive Purgings. But this is a Caution all Physicians give, not to take *Manna* above a Year old. Dr *Paulo Manfredi*, a Physician of great Reputation at *Rome*, acquainted our Author, That he had often experienced that *Manna* will purge with great Convenience exhibited in a much less Dose than it is commonly given in, if dissolved in a copious

pious Liquor, viz. One single Ounce in a Pound of Broth or distilled Water.

The Sixteenth is about the Venomous Spider or *Tarantola* of *Corfica*. The Island of *Corfica* he tells us, produces neither Porcupines, Wolves, nor Vipers; but instead of these last, it breeds venomous Spiders, called by the Inhabitants *Tarantola* or *Malmignatto*. Of which there are Two sorts, the One hath a round Body, and resembles the *Tarantola* of *Apulia*, and in like manner bites, impressing on all the Parts of the Person bitten, an irreparable Cold with Pain and Cramps and Swelling in the whole-Superficies of the Body. The other Spider stings, makes no Web, is in Shape of the Body like to a Horse-Ant, he hath but Six Feet; whence it appears to be really no Spider, but of the Ant-kind. Its stinging is attended with many dangerous Symptoms, as Lividness of the Flesh, an intolerable *Spasmus* or Cramp, sometimes stopping of the Urine and natural Evacuation; a kind of Congelation of the whole Habit of the Body. For Cure, they use Cupping, Scarification, burning the Wound, applying to it *Theriaca*, or *Orvietan*, and giving inwardly strong Wine with Venice-Treacle to drink.

The Seventeenth Observation is of the *Tarantola* of *Apulia*, which is a beaten Subject, and of which more hath been said than is true. Notwithstanding what our Author hath written, I am not fully satisfied, that the Dancing of the *Tarantati* to certain Tunes and Instruments, and that these Fits continue to recurre Yearly, as long as the *Tarantola* that bit them lives, and then cease, are any other than acting Fictions and Tricks to get Money. The Symptoms that attend the biting of the *Tarantola* of *Apulia*, as also the manner of Cure and Remedies, are the same with those mentioned in the precedent Observation. The Stinging of a Scorpion produces

produces the same Effects with the biting of a *Tarantola*. If a *Tarantola* be removed out of its natural Place, v. g. to *Naples*, *Rome*, &c. and there admitted to bite, it doth no harm at all; which is very unlikely; but that the *Tarantola* bred at *Rome* are innocent, is probable. *The same being experienced in the stinging of Scorpions, which in Africa is deadly, but in Italy, if they are bred there, Innocent: and I doubt not but that we in England have the same Species of Spider with the Tarantola.*

The Eighteenth Observation is about a venomous Spider of *Sardinia*, whose Bite is very dangerous, swelling the whole Body, &c. and causing Death in a few Hours. It's cured by Oyl Olive, in which the Creature is suffocated, set in the Sun in Summer-time, or upon a Stove for some Days, anointing the part therewith Morning and Evening, and giving some Treacle inwardly. Here he discourses a little upon the *Pietra de cobras*, which he thinks most probably to be a Mixture or compound thing, not a simple Body; concerning the salutary Effects, whereof Naturalists are not agreed, Signior *Redi* stoutly contradicting Father *Kircher*, with his Experiments. In another Place he saith, that some affirm, that the Stones with which Signior *Redi* made his Experiments, were not true and genuine ones; and here he gives several Instances of Cures wrought by the Use of this Stone, well attested.

The Nineteenth Observation is concerning Poisons, and their Preservatives or Antidotes. Here he gives us Two Receipts of the famous Electuary, called, *Orvietan*; and saith, that he had found out, that some Empirick, noted for the Preparation of this Medicine, put into it some Plants of *Asarabacca*, and as many Stalks of *Gratiola*, which are so far from being Alexipharmical, that they Purge with Violence, and gives an Account of this Practice. He saith, that he cannot, without Reluctancy, believe

believe that *Asclepias* is an Alexipharmick, because it is so like to Dogsbane, indeed it is a Species thereof, and because Physicians never prescribe it alone.

In the Twentieth he gives us more Antidotes against the Biting of the *Tarantola* of *Apulia*. And here he discourses concerning Signatures, which he approves, and gives us Signatures of several Plants of his own Observation; which as I can make no great Account of, so neither do I utterly reject.

The One and Twentieth contains some Instances of the Strange Effects of a kind of Fear or Terror, called by the *Sicilians*, *Scanto*; the like to which, excepting those I suspect to be fabulous, are sometimes occasioned by Frights with us. He discourses in this Observation concerning the inward Use of *Cantharides*; and tells us, That in the upper *Hungary* they give them to Men bitten by a Mad Dog, from One to Five, and to beasts in a greater Quantity, in Spirit of Wine, *Theriaca* or Crums of Bread; and that after the Use of them, those bitten do not make bloody Urine. Others affirm that they are of much Use in the *Gonorrhoea*. He tells us, That all the Physicians and *Aromatarii* he had consulted, agree in condemning the inward Use of them. But yet, after all, he predicts, That *Cantharides* will have the same Fate with *Mercury* and *Antimony*, which after various Censures and Oppositions, at last found Credit with those very Physicians which at first defamed them, and abhorred the Use of them as dangerous and Mischievous.

The Title of the Two and Twentieth is concerning Obstructions, Fluxes, Intemperies of the Liver, and a Periodical *Volvulus* or Twisting of the Guts.

The Three and Twentieth is concerning regular Periods of the Ague and other Diseases; here he discourses of the Root *Napus*, celebrated by *Tho. Bartholine* for the
Cure

Cure of the Colick in *Norway*. He observes that the Notes of *Imperatoria major* *C. B.* agree very nearly with those of *Nuput*, mentioned by *Bartholine*; and judges it to be the same.

The Four and Twentieth presents us with curious Actions of some Animals. And the Five and Twentieth with extraordinary and curious Effects of some Plants, One I shall mention, If with the Flowers of *Fraxinella* we touch other Flowers, as Roses, Violets, Gillyflowers, Orange-Flowers; These, although they be Odoriferous, suddenly lose their natural Scent, and assume that of the *Fraxinella*.

The Six and Twentieth is concerning the extravagant and prodigious *Effluvia* of some Plants and some Animals.

The Seven and Twentieth about various curious Effects produced by Nature.

The Eight and Twentieth treats of the Bees of the *Hyblean* Mountains in *Sicily*; and those of other Provinces, wherein I find little but what is to be met with in Books written concerning this Subject.

The Nine and Twentieth gives an Account of the Pitch of *Castro*, well known in the Ecclesiastick State, famous for its medicinal Vertues, and experienced for the Cure of many Diseases. It is found in the Campagna of *Rome*, issuing out of the Cracks or Fissures of a Mountain above the Village of *Castro*, Ten Miles distant from the City of *Veroli*, belonging to the House of *Colonna*, and Sixty from *Rome*. Here he mentions several sorts of Bituminous Oyls, and Pitches found in other Countries; there being scarce any Province in *Europe*, in which there are not found of them.

The Thirtieth exhibits a Description of the *Macaluli* of *Sicily*, which is a certain Place near *Agrigentum*, where there is a continual Fermentation, and visible bubbling up

of the Superficies of the Earth, which at times swells and rises up a Yard high in the Form of a little Hill, and sinks again in a strange manner, &c. To this he adds several Stories of Eruptions of Vapours and Fumes out of the Earth, divers of them mortiferous: And Two Letters, the First about *Petroleum*, found in the State of *Modena*, and a *Vorago*, which oftentimes in a Year vomits out Smoak, Flame, and an Ash-coloured stinking Lome or Mud. The Second about an Oyl or Balsom found in a Well near *Viterbo* in *Italy*.

The One and Thirtieth gives an Account of the Oyl of *Juniper*, and the Natural Productions of the Territory of the Duke of *Parma*.

The Two and Thirtieth concerns the *Glossopetræ* of *Malta*, and other formed Stones, concerning the Original and Formation of which he embraces the Opinion of *Columna*, *Steno* and *Scilla*, that they were really the Parts or Covers of those Animals which they represent. He answers the principal Objection against this Opinion, *viz.* those Clusters and Lumps of Lenticular Stones of a Saffron Colour amassed together, which are frequently found in *Malta*, and of which we have some very elegant ones; which seem to be the *Minera* or *Ovarium* of those Bodies they call Serpents Eyes; these he supposes may be the Eggs of some Fish, which produces or breeds them in a little Cistula or Bag; by which means they come to be united together in such Lumps; which is the best Answer to this Objection I have yet met with; if at least there be any Fish which produces her Eggs in such a Manner.

The Three and Thirtieth is about the Alternations of a certain Well near *Chambery* in *Savoy*, much resembling the Vicissitudes of our Ebbing and flowing Well at *Giggleswick* in *Yorkshire*.

To this he adds several Examples of Wells which flow at certain Seasons of the Year, as the *Crotta* of *S. Epiphanius* at *Pamagusta* in *Cyprus*: One at *Sussenage* near the City of *Grenoble* in *France*: A small Well in the Province of *Lionois*, by the Way side which leads to *Gabiano*, where the *Petroleum* is gotten, which runs now one way, now another, contrary to the North and South-Winds.

The Four and Thirtieth is a Philosophick Conversation containing several Conferences about Natural and Medicinal Matters. The First concerning the Pleurisie: The Second concerning Womens Vapours, or the *Suffocatio Uterina*: The Third concerning the *Cancer* in Womens Breasts: The Fourth concerning Chirurgical Helps for Wounds, Tumours, Strokes, and Pains: The Fifth concerning certain Medicinal Matters.

The Five and Thirtieth exhibits some Vertues and Uses of divers common and neglected Plants, which grow in almost all Countries.

The Six and Thirtieth gives an Account of the various sorts of Cheese, and some other Milk Meats, made in *Italy* and other Places.

The Seven and Thirtieth is a Discourse of *Joan Baptistia Hodierna* concerning the hanging of Clouds in the Air, and of Snow, &c.

The Eight and Thirtieth is an Account of a Simpling Voyage of *John Baptistia Triumphetti*, Botanick Lecturer in the *Sapienza* of *Rome*, and Demonstrator of Simples in the Physick-Garden there; in which Voyage he gives an Account of the Sulphur-Mine at *Solfatara*, and the Manner of distilling Sulphur out of it. 2. Of the making of Iron, of the Furnace where it is melted, and the Forge where it is hammer'd, declaring the manner of both. 3. Of the Mine and Preparation of Roch Allom near *Rome*.

Most

Most of the following Observations are about the Nature and first Impression of Coral, and other *Lithophyta*, *Fuci*, & *Musci Marmi*, *Antipathes* and *Sponges*, of which sorts of Bodies he gives us the Description of several Species: The original of divers Marine Productions, and other imperfect Plants, as *Fuci*, *Corallines*, *Zoophytes*, *Mushromes*, and the like; with the Descriptions and Figures of several Species of these Bodies. Several Sorts of the *Pietra Stellaria* or *Astroites*. Lastly, he adds a Discourse concerning Mushromes.

The Two and Fortieth and Four and Fortieth Observations we have already given an Account of in the Abstract of his other Book.

The Three and Fortieth Observation is about the Turchoises of the New Rock, which are artificial Stones Chymically prepared; the Manner of Preparation see here.

This Work contains great Variety of Matter, and a multitude of Medicines, simple and compound, for almost all Diseases and Infirmities. The Author shews himself to be a Man of great Candor and Ingenuity, speaking evil of no Man, nor detracting from any; without Emulation giving a fair Character of every one that deserves it, and that rather beyond than short of their Merit, according to the excessive Civility of his Nation.

2. An Account of *Paradisus Batavus*, *continens plus centum plantas*, &c. with additional Remarks by Mr. *John Ray*, F. R. S.

THE learned and much celebrated Herbarist Dr. *Paul Hermans*, Author of this Work, whose Name alone is sufficient to recommend it to the ingenious Reader, designed therein to give us the History of such rare and non-descript Plants, as well *European* as *Indian*, as were cultivated either in publick Physick-Gardens, or those of
 I 2 private

private curious Persons, in and about *Holland*; as we see now accordingly performed. Of some of those he presents us with both Descriptions and Figures, of others with Descriptions only, and of others which had been before described, but not delineated with Figures, referring us for their Descriptions to their first Authors. Of the first Kind, this Work contains more than an Hundred Species, digested in an Alphabetical Order. The Author intended a Second and Third Century, for which he had prepared Materials, having caused many more Plants to be drawn by Hand, which are not as yet engraven, a Catalogue whereof the Editor hath added to the end of the Book, which it were to be desired, some Publick-spirited Persons or Societies would be at the Charge of cutting in Brass, that so great a Treasure be not wholly suppressed and lost.

All that I shall or need say of this Piece is, That the Descriptions are very accurate, and sufficient alone to lead us into a certain and unerring Knowledge of the Plants described, and withal concise, and not encumbered with superfluous and unnecessary Stuff, which obscures rather than illustrates; and that the Icons are answerable to the Descriptions, not needing their Assistance to give us a certain Idea of the Species they represent; to which I may add, that they are so exactly delineated and curiously engraven, that for their Elegancy alone, they may invite the Curious in Sculpture to purchase the Book.

But beside the Subject of the Work, that is, the Descriptions of the more rare Plants therein contained, the Author gives us some remarkable Observations by the by, as p. 19, &c. An exact Division of *Mallows*, or *Malvaceous* Plants; which he distinguishes into Two Kinds; 1. Such as bear naked Seeds. 2. Such as bear Seeds enclosed in Cafes or Vessels. To this last kind he appropriates the Name of *Althæa*, referring the common *Althæa*

thea of the Shops to *Malva*, strictly so called. I think it had been more proper, to avoid Confusion and Mistake, to have left in quiet Possession of the Name *Althæa*, the Plant on which it was imposed by the Ancients, by which that Plant is denoted in all the Writings of Herbarists and Physicians, Ancient and Modern; and imposed a new Name on the Indian Mallow, as Monsieur Tournefort hath done, viz. *Ketmia*. Such as bear naked Seeds he divides into *Malvæ* in Specie so called, and *Alceæ*. The Notes of *Malva* he constitutes, Many naked semilunary Seeds, disposed in the Form of a Rundle or *Placenta*; a double *Calix* divided into Eight Segments or more, as it were into so many Leaves; Flowers made up of Five Leaves or *Petala*, joined at the bottom, and a Style in the Middle, furnished with many *Apices*; or instead of such Style, made up of many Leaves [*Petala*]; simple Leaves, alternately situate, either roundish or oblong, either entire and undivided, or divided but not deeply. Those called by the Name of *Alcea* are, he saith, of Two Kinds. Those of the first Kind agree in their principal Parts with Mallows, [*Malvæ*] only their Stalks and Leaves are somewhat more rough, and these divided into narrower and deeper *Laciniæ* or Jags. Their Flowers have no *Petala* in the middle, but a Style with many *Apices* proceeding sometimes singly, sometimes many together out of the Bosoms of the Leaves. Those of the latter Kind have naked Triangular Seeds, Five for the most part, rarely more or fewer, close joined together into a Head [*Capitulum*] either of a smooth Surface, or echinated after the manner of *Xanthium*. Their Calices are divided into Five Segments, their Flowers like those of the precedent Kind, but less, their Leaves either entire only nicked in the Edges, resembling the Leaves of Hornbeam, Elm or Mulberry, or divided less or more deeply into Lobes: Those of the Second Kind, or Indian Mallows, which

he

he calls by the Name of *Althææ*, bring forth Seeds either angulose or round, in Vessels divided into Five Cells, more or fewer, of different Form and Magnitude; having malvaceous Flowers and Calyces; leaves alternately situate, some whole, some divided into Lobes, some deeply laciniated.

Another Remark he gives us concerning the Plants, called by the distinct Names of *Apocyna* or Dogsbanes, *Asclepias's* or Swallow-worts, and *Neria* or Rose-bayes, which Three he reduces to one Kind; the Characteristic whereof he makes *Siliquæ*, or Cods of one Piece, opening long-ways, and containing Seeds piled one upon another *imbricatim*, each having a long appendant Filament of Down. For whereas some make the Difference between these to be, that the Swallow-worts have single Cods succeeding each Flower, but the Dogs-banes and *Nerias* or Rose-bayes double; and that the *Neria* are shrubby or arborescent Plants, containing a Limpid or Yellowish Juice, whereas the *Apocyna* yield a Milk: He shews that these Notes are not proper to one Kind, but agree promiscuously to all the rest. For sometimes the Swallow-worts bear single Cods; *he might have said always according to the Intention of Nature*; and on the contrary, the *Apocyna* do not always bear double Cods, but sometime solitary or single. Neither doth *Nerium* only grow up to the Magnitude and Stature of a Tree, or contain a limpid yellow Juice, but also some sorts of *Apocyna*; neither doth Swallow-wort only yield a limpid watry Juice, but some sorts of *Apocyna* also. Besides though this Juice in Swallow-wort be limpid in the beginning of Summer, yet towards Autumn it grows thick and Milky; as *Fab. Columna* hath observed. Of these *Apocyna*, which are very numerous, he gives us a Catalogue, containing both those observed by himself, and those described by others, which he distinguishes into Two Kinds, 1. Erect. 2. Scandent. 3. He

3. He gives us an Enumeration of such Plants as may be comprehended under the general Name of *Aron*, the Characteristick whereof he makes to be a *Bacciferous Plant*, having a *monopetalous cucullate Flower*; whereof there are Four sorts called by the Names of *Aron*, *Arisarum*, *Dracontium* and *Colocasia*. *Arisarum* differs from *Arum* in being less and slenderer in all its parts. *Colocasia* from both, in having smooth, umbilicate Leaves, without any Spots; the Foot-stalk inserted not in the end, but in the middle of the Leaf, after the manner of the *Cotolydonei*; Flowers sometimes single, sometimes more than one proceeding out of the same folliculate Foot-stalk; a Style thicker and shorter than *Aron*, and terminating in a slender Point. *Dracontium* differs from *Arum* and the rest, in having a Leaf deeply-lacinated or divided into many Jaggs.

X. Books lately Printed beyond Sea.

T*Raite des embaumemens selon les anciens & les modernes, avec un description de quelques compositions balsamiques & odorantes. Par Louis Penicher Ancien Garde des Marchands Apotiquaires de Paris. In 12mo. 1693.*

La Galleria Di Minerva Overo Notizie Universali, Di quanto e stato scritto da Letterati d'Europa non solo nel presente Secolo, mà ancora ne' già trascorsi, in qualunque materia Sacra, e Profana, Retorica, Poetica, Politica, Istorica, Geografica, Cronologica, Teologica, Filosofica, Matematica, Medica, e Legale, e finalmente in ogni Scienza, e in ogni Arte si Mecanica come Liberale. Tratte da Libri non solo Stampati, ma da stamparsi, ove oltre à quanto insegnano gli Atti di Lipsia, e d'Inghilterra, l'Efemeride di Germania, la Biblioteca Universale di Francia, ed i Giornali

nali de' Letterati d'Italia, saranno inserite nuove curiosità, ed insegnamenti, a profitto della Republica delle Lettere, con intagli de' Rami opportuni à suoi luoghi. In Venetia, 1696.

Eusevologia Romano, ovvero della Opere pie di Roma, accresciuto ed ampliato secondo lo stato presente, con duo trattati della Accademia Librarie celebri di Roma dell' Abbate Carlo Bartol. Piazza. 2da impressione, Roma 1698. 4to.

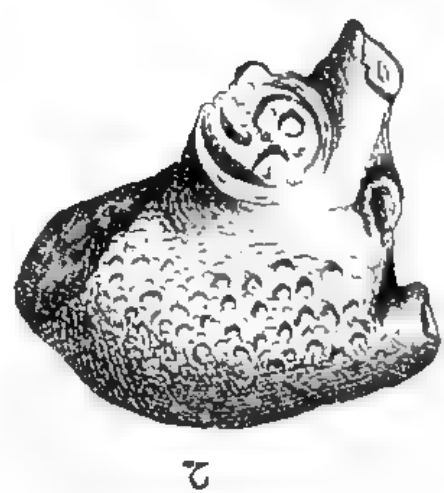
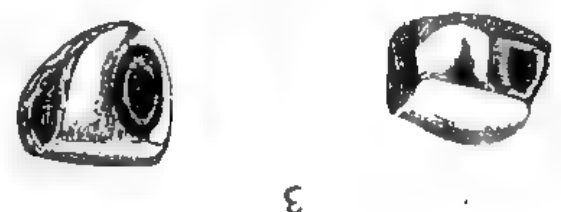
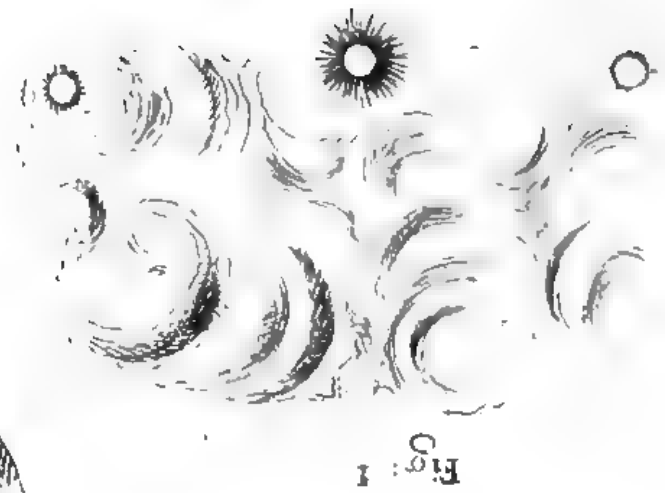
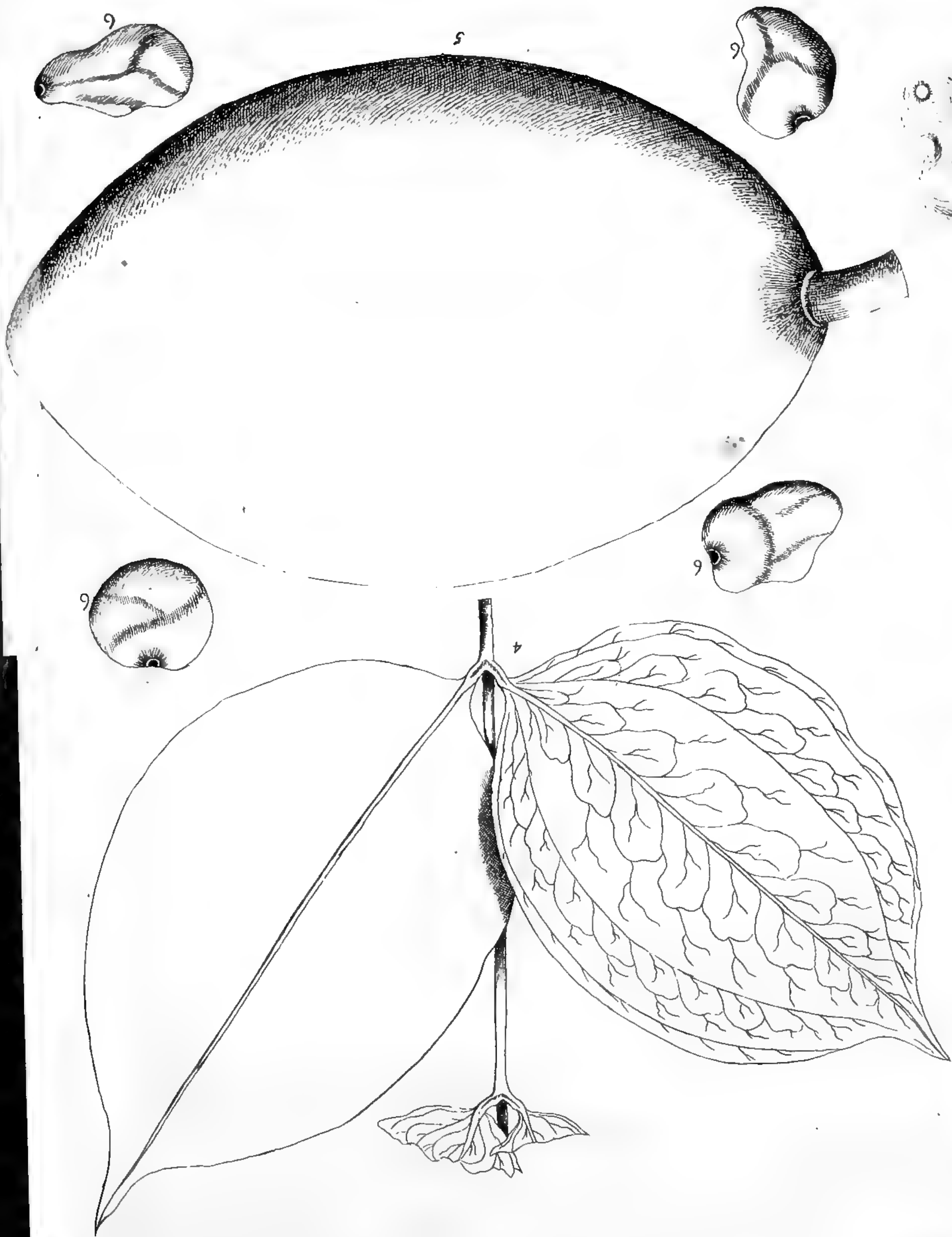
Historia della Guerra di Brasilia fra i Portuguesi ed Hollandesi, &c. con molte charte, Roma. fol. 1698.

Numismata Pontificum Romanorum quæ a tempore Martini V. usque ad annum 1699. Vel autoritate publica, vel privato genio in lucem prodire, Explicata, ac multiplici eruditione sacra, & prophana illustrata a P. Philippo Bonanni Societatis Jesu Romæ, Anno 1699. Typis Dom. Ant. Herculis in via Parionis.

The Natural History of Sicily, wrote by P. Cupani, will be soon finished; the Author is now at Messina taking care of the Graving.

The Publication of P. Boccone's Two curious Books lately mentioned in these Transactions, as well as that of Dr. Herman, having been encouraged from England, some few Copies of each of them are come over, and to be sold by Mr. Smith and Mr. Walford at the Prince's Arms in St. Paul's Church Yard, and Mr. Bateman in Pater-Noster-Row, Booksellers.

London: Printed for Sam. Smith, and Benj. Walford, Printers to the Royal Society, at the Prince's Arms in St. Paul's Church-Yard. 1699.





287

PHILOSOPHICAL TRANSACTIONS.

For the Month of March, 1699.

The CONTENTS.

- I. *A further Account of what was contain'd in the Chinese Cabinet, by Hans Sloane, M. D.*
 II. *Of Coal-Borings, Communicated by Dr. Martin Lister, Fell. Coll. Phys. & R. S.* III. *Situs novi Cometæ mense Februario, Anni 1699. in Regio Observatorio Parisiensi Observati.*
 IV. *Part of a Letter from Dr. Cay to Dr. Lister, concerning the Vertues of the Ostracites.* V. *An Account of the Vertues of Faba Sⁱ Ignatii, mentioned last Transaction.* VI. *A Further and more Exact Account of the*
 K *same*

same, sent in a Letter from Father Camelli, to Mr. John Ray, and Mr. James Petiver, Fellows of the Royal Society. VII. An Account of a Stone found in the Stomach of a Lady on Dissection, another in the left Kidney, and some smaller ones in the Gall-Bladder. By Mr. William Clerk, Surgeon. Communicated by Dr. Charles Preston. VIII. Part of a Letter from Mr. Busfiere, to Dr. Sloane, wherein he gives an Account of the new way of Cutting for the Stone by the Hermit, with his Opinion of it. IX. The Extract of a Letter from Mr. Petto, concerning some Parelly, seen at Sudbury in Suffolk, December the 28th, 1698. Communicated by Dr. Beverley.

I. *A further Account of what was contain'd in the Chinese Cabinet, by Hans Sloane, M. D.*

A Sea-Horse Tooth.
Cow-Bezoar. This was roundish, as big as a Hens Egg, made of *Lamine*, or Plates, one Layer on another, after the manner of true *Bezoar*, but melts when applied to the Candle, and therefore is not true, but factitious.

A pair of Brass Tweezers.

A round *Metallick Speculum*, used as a Looking-Glass, two inches Diameter.

A *Malaya Purse* made of Straw, Platted or Woven as are Straw-hats.

Two Bone Probes.

Four *China Pencils*, with these the *Chinese* write their Letters, as we do with Pens.

One wide Tooth'd Comb of one piece of wood.

One strait tooth'd Combe: Its Teeth are all distinct flat pieces of wood, sharp at both ends, set together and fastned to one another by two pieces of Reed, laid over their middles.

An Instrument to clean the Combs, of three Teeth.

Nux Vomica.

Bamboo Stone.

Books of *China Leaf Gold*, the Leaves of some of which are an Inch and half square, others four Inches. The Paper was of the ordinary *China Paper*, likely made of Silk or Cotton. The *Chinese* Guild Paper on one side with this leaf Gold, then cut it in long pieces, they then weave it into their Silks, which makes them, with little or no Cost, look very rich and fine. The same long pieces are twisted or turn'd about Silk Thread by them, so artificially, as to look finer then Gold Thread, tho' it be of no great value.

A Sheet of brown Paper from *China*. This sort of brown Paper, which is smooth and thin, is made use of in lieu of Linnen Cloath or Rags, to spread Oyntments on, to apply to Sores, in the Hospitals in *Paris*.

Two Steel Instruments for polishing Rasors, each of them crooked and two inches long.

Semen Phaseoli Zurattensis; or Couhage, Rai hist. plant. used for Curing Dropsies.

A great black *Scarabæus*, a Scarlet Butterfly, an Ash-coloured Capricorn, a Locust, and a *Phalæna*, all to pieces.

An Indian Hone, a blackish Colour.

A *China* Hone like ours.

An *indian* Hone, to be used after the Stone, to smooth the points of Lancets, &c. this is made of a kind of white Wood, as light as touchwood.

A Painters Brush, made of the Stalk of a Plant, the Fibres of which, at both ends, being fretted asunder and tyed together again, serve for a Brush.

A Box of several kinds of *China* Ink, with Characters on them.

It were to be wished other Travellers into Foreign Parts would make such enquiries (as Mr. Buckley, who sent these to the Royal Society has done) into the Instruments and Materials made use of in the places where they come, that are any manner of way for the Benefit or innocent delight of Mankind, that we may content our selves with our own Inventions, where we go beyond them, and imitate theirs wherein they go beyond ours.

II. Of Coal-Borings, Communicated by Dr. Martin Lister, Fell. Coll. Phys. & R. S. which Role or Record he had from Mr. Maleverer, of Arncliffe in Yorkshire.

Thomas Waike bored for Coal at Mauston near Leeds, in the Grounds hereafter named, May the 20th, 1639.

In the Rye-Close, or upper Pig-hill, on the East of the way, 38 Yards, from the North East Hedge.

In Earth 1 Yard
in yellow Clay 1 yard
in blew Ramel 1 yard
in black Slate 1 Quarter
in grey metal Stone two yards and two quarters.

in black metal 2 quarters
in grey Stone 2 yards
in a Whinstone 1 qua.
in grey metal 2 qua.
in a Whinstone a Foot
in grey Metal a foot
in Iron-stone 6 Inches
in a Cowshot coloured stone, with many Iron Girdles in it, 9 yards 2 qua.

in black stone 2 yar. 2 qua.
in a Mous-coloured stone, one yard

in black Metals 1 qua.
in grey stone 2 yar. 1 qua.
in a Cowshot coloured stone with many Iron Girdles in it, 8 yards.

in a grey metal 2 qua.
in Coal a foot
in a dark grey Stone 2 qua.
in a Whinstone a foot
in a dark grey Stone 1 yar.
in a Cowshot coloured stone with Catheads in it, 1 yar.
in black Metal mixt with Coal, 2 qua.
in Cowshot coloured stone, 3 yar. 2 quar.

In all 21 Fathom.

The Charge 9l. 5 s.

We Bored 140 yards West from the former place, I suppose in the Taith Garth, about 20 yards S. W. from the N. E. Hedge;

In yellow Clay 3 yards
in Orange coloured stone 8 yar.

in a Cowshot coloured stone 2 yar.

in black metal 2 quarters
in Cowshot coloured stone 1 yar. 1 qua.

in Coal mixt with Metal, 1 qua.

in a blew metal 2 qua.
in Coal 3 qua. 6 inc.

L: in

In a Cowshot colour'd stone
2 yards

In all 9 Fatbom.

The Charge of Boaring, 2l. 1s. 3d.

We Bored in the Severals
upon the West side of the
Fish-ponds;

In yellow Clay 3 yards
in yellow stone 2 yar.
in Cowshot coloured stone
1 yar. 2 quarters
in blew stone 5 yards
in Coal 1 yar. 3 qua.
in grey metal 1 quarter 7
inches.

in Coal, under this Coal a
hard grey stone 1 yar.

In all

The Charge 1 l. 12 s. 6 d.

We Bored at the West-end of
the East-hall close ;

in Earth 1 yard
in Coal 2 qua. and 3 inc.
We Bored 40 yar. by East
upon the dip.

in earth 2 yards, 2 quarters,
3 inches
in Coal 1 yard, 1 quarter,
5 inches.

We Bored 30 yards by
East further still upon the
Dip ;

in earth 3 yards
in grey Metals 3 quarters

in Coal 1 yar. 1 quarter 5
inches.

in Earth 9 Yards

In al 4 Fatbom.

In all the Charge 3 l. 3 s. 9 d.

We Bored in the West
Close adjoining to Win Moor;

in yellow Clay 3 yar.
in Orange coloured stone
10 yards
in a Whinstone 2 qua.
in an Orange coloured
stone 2 yar. 2 qua.
in a Cowshot colour'd stone
2 yar. 2 qua.

In all 9 Fatbom.

The Charge 2 l. 1 s. 3 d.

September 22. 1659.

George White, and James
Stringer, Bored in the East-hall-
Close, 10 yards from the East-
Corner of Mr. Moor's broad
Ing.

In Earth.

Thence 20 yards
In Earth 1 qua.
in Coal 1 qua.
Thence again 20 yards.
In earth 1 yard
in Coal 2 qua.
Thence 20 yards towards the
orth.

In

In Clay 3 yards

Thence from the said Corner of the Broad Ing towards the West 30 yards, from the Ash in the South-hedge, towards the North 5 yar.

In Clay 2 yar.

in Coal 1 yar. 1 qua.

Thence towards the North 10 yards

in Clay 2 ya. 5 inc.

in Coal 1 ya. 2 qua.

Thence 10 ya. further North, in Clay 1 yard 2 qua.

in Coal 1 ya. 2 qua.

We sunk to it, and find it to dip S. W. and firm Coal. The Pit we sunk in the West Close is 17 yards deep, the Coal on the N. W. Close 2 yards thick, on the S. E. in the old Pit about twelve yards N. W. the Coal was 1 yard 2 inches thick.

Thence about 8 yards S.W. from the said Pit in the East-hall Close, about ten yards from the S. Hedge,

In Earth and Cowshot 8 yards

in Coal 1 qua.

Blew Cowshot-stone 5 yar. good Metal for Sowing.

Thence about 50 yards from the West hedge, and 40 yar. from the South Hedge,

In Earth 3 yards

in Clay and blew Metal 4 yards

in grey stone 1 qua.

in red Stone 3 qua.

Cowshot Earth with Brass Oar

Thence in the middle of the West end of the said Hall Close, twenty yards East from the Bush Ash in the West Hedge,

in Cowshot Earth with Iron beds, 6 yards

in Coal firm 1 yard 2 qua.

Thence West in the West-hall-close, about 45 yards West from the said Bushy Ash, and 85 yards from the South Hedge.

In Cowshot Earth with 3 Iron Beds, 6 yards

in Coal 1 yar. 2 qua.

Thence 90 yards further West, about 45 yards from the South Hedge

in hard Cow-shot Earth, with 5 iron beds 7 yar. 1 qua. 10 inc.

in Coal 1 yar. 2 quarters 6 inches

Between these two places, about twenty yards to the N. 2 or 3 yards deep.

in 5 yards

in Coal 4 yards 1 qua.

Thence in the said West-hall Close 46 yards North, from *James Hunters* and *Cbr. Ambles Hole*, for they then began to bore in the said Close

in yellow Clay 2 ya.

in Blew Clay with rotten
iron stone, 1 ya. 3 qua.

in grey stone 1 qua.

in Coal rotten 1 ya. 5 inc.

So that from the little Ash
in the East Hedge of the said
West hall-clofe to the West
end 20 yards; from the little
Oak in the said Hedge, the
Coal is about 1 yard 2 inches;
about ten yards towards the
North from that line, the
Coal *Baffets* out, but good
Coal on the South,

Thence about 40 Yards
from the West Hedge of the
East part of the Severals, a-
bout

From *Hunters* and *Amblers*
Boring, to the North in that
Clofe.

in Clay and sandy Earth,
1 ya. 2 qua.

in Coal 2 ya.

Thence 25 yards to the
South

in Clay and yellow Sand,
2 ya. 2 qua.

in soft white Stone or Cow-
shot, 1 ya. 1 qua.

in Coal very firm, 1 ya.
3 quarters

Thence in the West Severals,
in the first Furrow on the
East of the Fish pond
Close by the North Hedge,
in Earth and Iron Stone,
1 ya. 2 qua.

in Coal

Thence South in the same Fur-
row 15 ya.

in Earth and iron Stone 1
ya. 2 qua.

in Coal

Thence 9 yards further South
in the same Furrow,

in Earth and Iron stone 1
ya. 2 qua.

in Coal

Thence in the said Furrow
close by the North Hedge,
in Earth 1 qu.

in white Sandy stone 3 qu.

in Yellow sand stone 2
ya. 10 inc.

in Coal firm, 1 ya. 3 qua.

in hard *Spaven*, 1 ya. 5 inc.

in hard Stone

Thence to the South, below
the lowest of the old Pits,
10 yards, close by the great
Stone, in the said West Se-
verals,

in yellow Clay 1 ya.

in yellow sandy stone 2
yards

in Cowshot stone 3 ya.

in hard white stone 1 ya.

in Cowshot stone again, 3
ya. 3 qua.

in Coal 1 ya. 3 qua.

in grey *Spaven*, 1 yard 7
inches

Thence from the South East
corner of the *East* Ditch
of the Gate Close, for
120 yards along the said
Ditch, this Coal breaks
forth

forth one yard two quarters deep
 Thence 20 yards further N. in the said Dirch,
 in Earth 2 qua.
 in yellow stone or rather white, 4 yar. 2 qua.
 Thence in the West Severals again, close by the South Hedge, 70 yar. from the E. Hedge,
 in blew Clay with Iron stone, 4 yar. 1 qua.
 in Coal 2 qua. Mr Moore's out-break
 Thence in the long Close, part of the West-field, 40 yards from the N.W. corner of the gate Close,
 in Clay 1 yard
 in a smit of Coal 2 qua.
 Thence to West 15 yards,
 in Earth 3 qua.
 in Coal
 Thence 25 yar. further W. 40 ya. from the old Pitts,
 in yellow Clay, and rotten iron stone, 1 ya. 3 qua.
 in Coal pipe 2 inc.
 Thence at the South end of the long Close by the S. Hedge,
 in Earth 1 yard
 in Cowshot 2 qua.
 in Coal (the out-breach of the Severals Coal) 1 yard 1 quarter
 Thence in the gate Close, by the W. Hedge about 160 yards from the Lane,

in Earth 2 qua.
 in yellow stone 1 yard 2 quarters.

December 1st. 1659.

George White and James Stringer, Bored in the East Cow-Pasture, by the E. Hedge, near the N. Corner, by the first Oak,

in Earth 2 yards 2 quarters
 in Cowshot Earth 2 ya.
 in black Metal 3 ya. 2 qua.
 in Cowshot 3 qua.
 in black Metal 1 ya.
 in grey Stone 4 inc.
 Thence in the middle Cow-pasture, by the E. Hedge, near the N. side, against the Maple Tree,
 in blew black Earth 2 ya.
 in Cowshot Earth with Cats-heads, 3 ya.
 in black Earth 1 ya.
 in Coal 1 qua.
 in Spaven 1 qua.
 in White Clay and Stone, 2 yards.
 Thence North about twenty yards West from the tall Ash in the E. Hedge,
 in Clay mixt with rotten iron stone, 2 ya. 2 qua.
 in stiff brown Metal, 2 ya. 2 qua.
 in Cowshot Earth mixt with black.

Thence

Thence in the nether end of the W. Cow-pasture, near the damm, 10 yards from it, and 30 ya. from the N. Hedge,

in Earth and Clay 3 ya.

Thence 4 yards to the S. 15 yards E. from the S. E. corner.

in Earth 1 ya. 1 qua.

in Coal 6 inches

Thence 50 yards South, near 20 yards from Peasing Hedge, Peasing Gap, 5 ya. South from the young Oak in the Damm,

in yellow Clay with iron stone, 3 yards

in Cowshot 1 yard

in Coal 6 inc.

in white grey stone, 1 ya.

in black Metal, 1 qua.

in Galliard

Thence in the West end of the Pease Ing, 2 yards from the Ash in the midle of the West hedge, 75 ya. from

in Earth 3 qua.

in Cowshot 1 qua.

in Coal (I suppose hard bond) 3 qua.

in grey Metal, 2 yards 2 quarters

in Coal (I suppose thin Coal) 2 quarters

in grey Earth 4 ya.

in Coal (I suppose Crackling) 1 qua.

in grey Spaven, 3 qua.

in grey stone, 1 ya. 1 qua.

in Galliard

Thence 18 ya. South

in yellow Clay 2 ya.

in Coal mixt with Earth 3 quarters.

N.B. *This was done for the Concerns of a Private Family; but because it may be of some use to the Naturalist, Dr. Lister was willing to part with it. It was twice as long again, but scarce any thing but Repetitions of the same things in Nature, and therefore he Transcribed no more; but this is as it were a Specimen.*

III. Situs

III. *Situs novi Cometæ mense Februario, Anni 1699. in Regio Observatorio Parisiensi Observati.*

NOcte sequente diem 19 *Februarii*, anni hujus 1699. in Observatorio Regio Parisiensi inter hiatus nubium quæ à diebus aliquot Cælum obduxerant, videri cæpit exiguus Cometa instar stellæ nebulosæ tertix magnitudinis, illi persimilis quæ mense Septembri 1698. fuit observatus.

Situs erat inter stellas informes Sextæ magnitudinis propè circulum polarem arcticum supra caput Aurigæ, æquali ferè intervallo inter cubitum occidentalem Persei & caput majoris ursæ, illas adscribit Tycho informibus circa ursam minorem Continuatæ observationibus per intervalla temporis quibus eadem nocte & sequenti nubium motus eam cæli regionem aperiebat, visus est proprio motu iter suum dirigere Capellam versus, cum exigua deviatione ab ejus circulo declinationis adeo ut si diebus præcedentibus cæli serenitas affulsisset videri potuisset polo arctico proxima. Ea erat ejus velocitas ut unius diei spatio septem circiter gradus magni circuli perficeret, quo motu potuit ante dies 4 ipsi polo fermè adhærere & stellæ polari sociari, seseque nautis qui stellam hanc ad itineris directionem frequenter observant, videntam exhibere.

Ejus transitum per hujus urbis verticem, & deinde ejus conjunctionem cum Capella post biduum observandam expectabamus; sed optatissimum spectaculum & observationibus ad Cometæ distantiam a terra inquirendam, instituendis maxime opportunum, nubes quæ rotas no-

ctes sequentes cælum obsedere nobis invigilantibus inviderunt. Quærendus post hac erit Cometa hic in via quæ per stellas aurigæ, quæ inter Taurum & Geminos, per Orionem, Leporem & Columbam aut circa perducitur, quam viam primæ observationes quæ haberi poterunt comparatæ cum nostris prioribus quarum meminimus, exactius determinabunt. Nec enim licet ex unius tantum diei intervallo quod hætenus minus commodè observari potuit longiorem tractum exactius definire.

Habitarum hætenus observationum quæ Cometæ locum accuratius determinat ea est quam habuimus hora Sexta post mediam noctem sequentem diem 19 Februarii. Comparavimus Cometam cum stella sextæ magnitudinis quam Tycho appellat secundam earum quæ sunt in linea recta cum polo, quas quatuor recenset quæ tamen non sunt invicem in lineâ rectâ quamvis proximè inter se differant intervallo latitudinum quas illi assignat. Cometa igitur in transitu per circulum horarium præcedebat hanc stellam minutis horariis 15' 53'', quibus debetur differentia ascensionis rectæ grad. 4. 43' erat autem Septentrionalior eadem stellâ minutis 8. Unde supposita hujus stellæ longitudine ex latitudine Tyconica ad hoc tempus, Cometa refertur ad gr. 15. 51'. Geminorum, cum latitudine Septentrionali gr. 37. 25'.

Movetur Cometa hic ad cæli partes oppositas illis ad quas tendebat Cometa anni præteriti cum esset fermè in eadem distantâ a polo in quâ noster hic cum primum visus est, nec valde ab eodem loco remotus.

Cometa autem mensis Septembris eandem prosequutus est viam quam inter sidera tenuerat Cometa anni 1652. a nobis Bononiæ observatus, cujus occasione editis literis ad serenissimum Franciscum Estensem Mutinæ ducem, eam viam per eadem sidera quæ noster tenuit anno 1698. distinctè

distincte descripsimus. Ille mense Decembri ab Austrilibus cæli partibus per astra Leporis, Orionis & Tauri ubi Eclipticam secuit cum inclinatione graduum 76, & per Perseum ad Cassiopeam pervenit, ubi videri desinit mense Januario, anni 1653. Hic videri cæpit initio Mensis Septembris in eadem Cassiopeæ parte ubi ille videri desierat, indeque pergens per humeros & brachia Cephei, ubi latitudinem maximam ab Ecliptica habuit graduum 76. transiit inter Draconem & Cygnum, per pellem Leonis in Hercule, per Ophiucum usque ad Constellationem scorpii, quam tenebat in ultimis observationibus a die 24 ad 28 Septembris habitis. Ex his autem observationibus collegimus cometam hunc Perigeum obtinuisse die 7 Septembris vesperè cum maximâ velocitate apparenti graduum fere decem unius diei spatio.

IV. Part of a Letter from Dr. Cay to Dr. Lister, concerning the Vertues of the Ostracites; with a Remark of the Doctor's on it.

I Have been waiting a considerable time for a further and fuller Account of the Virtues of the *Ostracites*, from Dr. Home of *Barwick*, from whom I had the first Account of its being so extraordinary a Medicine in the *Nephritis*, but as yet have not got all the Satisfaction that I would have in the matter. However, lest you should think I forget to make a Return to your last obliging Letter, I rather choose to send you the following Account, imperfect as it is, than make you wait any longer for a better.

M.

Dr.

Dr. Home, in a Letter to me in *November* last, tells me, ' That he never us'd this Medicine to any that he knew to be troubled with a Confirm'd stone (being perswaded that no Medicine can break a large stone) but only to such as were afflicted with Gravel or small Stones; that some of his Patients were cured without evacuating any gravel or Stones at all, that others evacuated both: That it never does its Work suddenly, (being not remarkably Diuretick) but that it rather dissolved the little Stones than forced 'em. That none that he ever gave this Medicine to, however grievously and frequently afflicted before, have ever been troubled with Nephritick pains since; That his manner of giving it, is in fine powder mixed with about a third part of *flores Chamomel*: Dose from half a Dram to one Dram in White-wine. That the greatest Dose is often apt to offend and nauseate the Stomach; That he once gave it alone with a weak infusion of Chamomil Flowers, in White-wine after it, but that this did not so well.

Thus far he. I can say but little yet of my own Knowledge of this Medicine, having had it but a short while, and not us'd it yet to any but one Gentlewoman, whose frequent and violent Fits of the Gravel, made her lead a Life uneasy enough. I gave her this Medicine not mixed with *flores Chamomel* (for at that time I was unacquainted with Dr. Homes manner of giving it) but with powdered *Semina Saxifrag*. I cannot say, that since she used this Medicine she never had any Returns of her pains, but she neither has them so violent, nor so frequently; and whenever she is threatned with them, she most certainly finds ease by that time she has taken three Doses of her Powder: And she has since the use of this Medicine voided a great many small Stones: But the reason perhaps why she is still threatned with the
Return

Return of her Nephritick Pains, is, that she has never follow'd her Medicine throughly, but upon the third Dose, finding such certain Ease, she gives it over, till a new Fit forces her to use it again. But however, this having done so much more for her already, than any thing she ever met with before, she is so pleas'd with it, and speaks such great things of it, that I believe she will soon furnish me with opportunities enough of giving it a fair and full Tryal; and when I know more of it, you may expect to hear further. In the mean time it may not perhaps be amiss for you to be using it your self; and I dare promise you, that you'll find somewhat in it, that will make you set a Value upon it.

I take this Shell to be that which you call *Ostracites maximus rugosus* & *asper*; and which you have with the utmost exactness described. It burns to a Lime as other Shells do, and as the *Selenites* (tho' weakly) does. It yields no Volatil Salt, tho' I try'd it in a naked Fire; nor does common Oyster-shells, fresh-taken and used, afford above half a Scruple of a Liquor somewhat moderately Urinous, from four Ounces of Shells. And it may be, if they were long dryed and exposed to the Weather, they would loose even that, and yield no more Volatil Salt than the *Ostracites*. I confess I was somewhat surprized at this matter; since there are who say, that even the other Shells, that are commonly call'd petrify'd, yield a Volatil Salt: and I had my self from the Shells of Crustaceous Fishes, (particularly of Lobsters) had a Volatil Salt and fetid Oyl in no inconsiderable quantity; even in a Sand Furnace. But these sort of Shells differ from other Shells (as you have exactly observed) in this too, *Quod in his umbo ad cardinem leviter rostratus est, qui tamen in Ostreis paulum aliter est*. They differ too in their specifick Gravity,

these being more ponderous than common Oyster-shells, and somewhat near the specifick Gravity of the *Selenites*. But indeed they differ one from another in Gravity, as well as from other Shells, as they partake more or less of a Tophaceous Substance that coats many of 'em on the inside, and which perhaps may be somewhat akin to the *Selenites*. And whether they may not have many other very different qualifications one from another, according to the several different Beds they are found in, I think there may be some reason to doubt. I have observed some such differences among the *Cornua Ammonis*, having had one or two small ones from our Coal-pits here, that had a considerable mixture of the Pyrites; whereas these that are found about *Whitby*, approach, I think, more to the nature of the Alum-stone; and perhaps the *Cornua Ammonis* of the Ancients were found in Beds of somewhat yet more valuable; since *Pliny* says they were of a Golden Colour, and were reckoned, *inter Sacratissimas Æthiopiæ gemmas*. I know *Agricola*, [*De ortu & causis Subterraneorum*, lib. iv.] accounts for this Golden Colour after another manner: *Cornua Ammonis inquit succo aluminis infecta aurei coloris sunt*. And I am ready enough to think, that there is some truth not only in this Observation, but in what he immediately adds, *Idem inquit & aliis quibusdam lapidibus accidit*. For I cannot but attribute the extraordinary appearance of Colours in the *Peacock-tail Coal*, to its being infected with the *Sucus Aluminis*, having seen some pieces of this pretty sort of Coal, shoot into true and genuine Alum. Yet I cannot take this to be all the reason of the Golden Colour of the *Cornua Ammonis* of the Antients, since I think, if this had been all, they had never been numbred, or deserved a place among their Gems.

But

But be that matter as it will, I think its time to put an end to a Letter, that's already grown much longer than was design'd ; I shall therefore add no more concerning these Shells, being unwilling to burn my Fingers with that intricate and perplex question, *What they are ?* All that I shall say of this matter shall be only this ; If they be real Shells, their being found in such different parts of the World, and at such great distance from any Sea, may serve for a fair and convincing Argument of the Universality of the Deluge. And if they be not Shells, but only stones form'd by (what some People call) Fanciful and sporting Nature, we may at least conclude thus much from it, That since even these *Lusus Naturæ*, these Freaks, and random strokes of Nature, have not only a Beauty, but a real use, that nothing in Nature is made in vain : And that many other Fossils that we now contemn as toys and trifles, fit only for furnishing out a *Museum*, may have other remarkable Virtues, that may in time bring even them to be taken notice of, and valu'd, as well as the long neglected and despis'd *Ostracites*.

The Doctors Remark.

N. B. *The Golden Colour is from its being a Pyrites, that is Iron stone. Again, All the Conchitæ kind, but more particularly the Belemnitæ & lapides Judaici, were known to the Antients for Specificks in Gravel.*

V. An

4. Deinde ante-dictæ rasuræ stagnans fluxum sanguinis applicatæ cuicumque vulnere. Et cum anno præterito, 1692. daretur bibi fæminæ laboranti profluvio sanguinis diuturno evasit incolumis.

5. Fugat febres, nam me præsentem eodem anno datum fuit cuidam infantulæ laboranti intensissima febre ut biberet & illico aufugit febris.

6. Juvat Parientes fæminas ad hoc ut facilius, & felicius creaturam expellant.

7. Venio tandem ad quotidianam experientiam : Mire proficit pro quacumque repletionem & cruditate Stomachi & contra proficit pro dysenteria & frequenti dejicienti cupiditate temperanda.

De modo applicandi Medicinam supradictam.

Dividat quisque granum in tres partes ad modum illius quod divisum mitto, & cum senserit necessitatem, immittat in os per quadrantem horæ, vel per dimidium, & deglutiat salivas quæ destillaverint, ac postea bibat quasi duas aut tres uncias aquæ frigidæ & videbit effectum.

Aliter quærat fragmentum durissimum testaceum, aut quid simile illi quod mitto, ac in parte concava ponatur parum aquæ frigidæ, & ibi refricetur fructus (sicut indicat illud quod mitto) & aqua illa ponatur in vascula cum rasuris, & iterum ter aut quater fiat similiter usquedum habeas duas uncias illius confectiois & lotionis fragmenti testacei ac grani fruticis, ac postea revolvatur & bibat patiens.

Item divisum granum in frusta si frigatur cum oleo (præcipue Olivarum) & Oleum illud bibatur aut plagis applicetur, aut membra spasmo laborantia cum eo ungantur, est Medicinale ut supra.

Hoc Experimento Comperimus.

F. Joannes à Jesu.
V. A

V. *An Account of the Vertues of Fabâ S^{ti} Ignatii,
mentioned last Transaction.*

INdex virtutum quas experti sumus in fructu quodam amarissimo Philippinarum qui dicitur de *Caba longa*.

Aiunt quemdam venenarium venisse ad Patrem Societatis Jesu ut eum interficeret cum halitu masticando herbas infectas, sed contrarium accidit, nam Maleficus cecidit semi-mortuus; Ex illis vero qui concurrerunt dixit unus, (forte Venenarius,) Patri, habes tecum aliquod Prefervativum, & Reflectione facta, respondit Pater, habeo hic fabam quandam amarissimam cujus virtutes me latent. O Pater, dixit Indus, hoc est contra Maleficos, & hic miser sine dubio jacet semivivus, quia volebat maleficare te; exploratoque ore illius invenerunt illic supradictas herbas notorie venenatas: Ex hinc cepit magnificare hic fructus, & paulatim explicat sequentes alias Virtutes.

1. Habet Virtutes illius metalli quod *Tumbaga* dicimus, & compositi illius quod *Ilingo* dicitur, proficit enim contra spasmos ac ventos infectos, & contra quoddam genus spasmi quem nos dicimus *sotan*.

2. Proficit ut evomatur quodcumque venenum, si rasuræ ejus bibantur cum *Aqua frigida*, item contra morsus venenatorum, si simul applicentur morsui aliquæ rasuræ ejus.

3. Item si aliquod Membrum laboret spasmo proficit, si super partem infectam applicentur supradictæ rasuræ.

VI
 IV. *A Further and more Exact Account of the same, sent in a Letter from Father Camelli, to Mr. John Ray, and Mr. James Petiver, Fellows of the Royal Society.*

De Igasur, seu Nuce Vomica legitima Serapionis.

Catolongay quam alii Cantarà vocant : est Nuce Vomica legitima Serapionis ferens planta, quæ arbores quasvis altissimas sese involvendo scandit : Truncus lignosus, levis, porosus, & brachialis quandoque crassitudinis, corticisque scabri, crassi, et cinerei : Folia ampla, nervosa, amara, Folio fermè similia : Florem Balustixæ similem fructus in sequitur Melone major, qui delicatissima cuticula quæ splendens, lævis, et viroris luridi, ceu Alabastrini coopertus, subter quam alius cortex delitescit substantiæ quasi lapidescentis. In hoc, carne amaricante, flavâ, & molli, qualis est caro fructus Mangæ, interjectâ, nostræ, seu legitimæ Serapionis Nuce Vomica, quæ recentes ab argentea lanugine splendent, juglandinis vix non pares, inæquales, variæque formæ, non rarò quatuor, & viginti coarctantur ; quas Indus Igasur, & Mananaog, id est, Victoriosas, Hispanus Nucleos, s. pepitas de Byfayas, aut Catbalogan, alii Fabas Sancti Ignatii vocant. Hæ resiccatae avellanâ nuce cum putamine pares, aut etiam paulò majores, nodosæ, durissimæ, diaphanæ, & quasi corneæ substantiæ sunt, saporis semine citri multò intensius amari, coloris autem inter album, & glaucum, prout & Serapio tradidit.

Multi

Multi nescio quo oraculo edocti, Nucem Igasur reticulæ fructus Salagsalag immittunt, ex collo suspensum gerunt; & ità ab omni veneno, peste, contagio, incantationibus magicis, Philtris, & specialiter à sopto, seu veneno, quod solummodo insufflatum perimere narrant, imò & ab ipso dæmone se liberos, ac immunes esse imaginantur.

Quod Ch. Miralles in suis collectaneis affirmat scribens non tantùm virtutem habere depellendi corporis morbos, sed & malignis spiritibus speciali quadam oppositione resistendi; Magos etenim Barangas dictos ad præsentiam hujus nucis inquietari, conturbari, & sudore suffundi ac si in nescio quo arduo negotio, angustiis, periculisque pleno versarentur. Quòd experienciã didicisse, insuper, & id ipsum sibi alios fide dignos visos affirmasse addit. Unde pactum cum dæmone habere dictos Barangas, seu maleficos herbarios suspicatur, præsertim cum rumor ferat hosce impios medicos, si in simplicium cognitione erudiri velint, consanguineorum proximum interimere obligari.

Alii à jam dicto sopto, seu toxici insufflamine quo malevoli Indi passim quos male cupiunt perimunt, Alexium Lopez in Guiguan, & Petrum Oriol, præter alios hacce nuce præmunitos, servatos fuisse ferunt. Sumunt autem, uti Vulgus narrat supradicti Herbarii eis familiaria et nota Aconita, quæ faucium latere uno recondunt, buccã alterã verò contrayerbas, prouti hujates loquuntur, id est, antidota, nè videlicet sibimet ipsis mortem mastigent: his ità ore detentis arte, & dexteritate diabolicã sibi contrarios, & insenos viperarum more intoxicato halitu impetunt, quo perculsi, ac perplexi mox humi prosternuntur, & animam agerent, nisi eis jam experto remedio hacce scilicet nuce opem ferant. Addunt si quis hanc nucem secum portarit, ipsum qui similibus deleteriis buccellis alterum interficere attentaverat

penas confestim luere Talionis, uti Indus qui, Alexium Lopez inter fictas amicitias, de medio tollere cupiens, casualiter hanc nucem secum habentem expertus fuit: quâ occasione primùm Hispanis innotuit Igasur virtus, & efficacia. Quomodo autem naturaliter ut non nulli volunt, Igasur virtutem toxici, in distans agendo repel- lat, judicent alii.

Pulveris Igasur ꝑj. quondam Vincentio Olzinæ tem- peramenti melancholici prædito ad vomitum ciendum propinavi: Hic dyspepsia, diarrhæa, & frequenti vo- mitu, cum ructibus acidis, nec non flatuum copia mole- stabatur; sed statim ac sumpsisset tremore totius corpo- ris trium horarum spatio persistente, unâ cum pruritu, & vellicationibus convulsivis horrendis ut pedibus in- sistere nequiverit, quæ in maxillis vehementiores erant, ac magis molestæ, itâ ut quodammodo ridere cogeretur: correptus fuit. Nulla interim notabili pulsus alteratione, Vomitu, aut alio quopiam insequente symptomate. De reliquo dein non nihilum melius sensit.

Similem tremorem, & convulsiones spasmodicas quas V. Olzina expertus fuit, sensit, & passus est Johannes Osaeta, unâ cum summa præcordiorum angustia, ver- tiginè, animi deliquio, & sudoribus frigidissimis. Hic Melancholico-Hypochondriacus sanitatis cupidus nucem recentem integram devoraverat. Cui oximel, & oleum cum tepida exhibendo, quo plurimum viscosi phlegma- tis cum nucis particulis rejecit, opem tuli.

Joachimus Affin Nucis sumpserat partem tertiam & si- mili modo ut V. Olzina, & Johannes Osaeta ultra tres horas affectus fuit. Hic præter motus contractivos, & in- voluntarios, fornicationis sensum, & specialiter in capi- te expertus fuit. Similes denique pœnas, A. Varaona, A. Girau, & alii luere.

Vulgus autem Nucem Igasur, ad cuncta absolutè corporis humani mala amovenda, nullâ habitâ temporis, morbi, ætatis, aut dosis ratione indifferenter exhibet, & adhibet, miraculososque inde subsequutos effectus narrat, narrat videlicet magnificiendo suam Panacæam, & deprædicat successus bonos, reticens infaustos: Nec dubium quin aliquando, à tam vehementi spirituum animalium irritatione, ac alteratione humorum ab hac nuce causatâ, hæterogenea, ac incongrua una cum tam infesti medicamenti particulis eliminantur, quibus rejectis, humoribusque crassi meliori restitutis, sanitas optata subsequatur.

Qua ratione virtute polleat, & repellendi, & alliciendi uti vulgus opinatur, nunc scilicet sanguinem de vulneribus profluentem sistendo, nunc Lapidis colubrini instar, venenum è viperarum, aut etiam aliorum venenum vibrantium animalium moribus, uti è vulneribus telis intoxicatis inflictis proliciendo: ignoro.

Nucis Igasur denique vires, & virtutes, non propriâ experientiâ, sed relatione acquisitas, nec non de variis Indorum, aliorumve curiosorum, & observationibus, & adnotationibus excerptas, ac collectas, amicè quondam à Dominico Conzales rogatus in formam digessi sequentem.

Modus ordinarius, & communis utendi Nuce Igasur est, imponendo eam integram tantillo aquæ calidæ, spatio donec amara reddatur, exhibendo dein dictam infusionem. Alii pulveris modicum in substantia propinant. Alii unam, alteramve offerunt deglutiendam frustulam. Alii-nucem integram Amuleti ritu de collo suspensam gerunt.

Vomitum pluries causare solet, dejectiones nonnunquam, motus spasmodico-convulsivos fermè semper in Hispanis, Indis non. In Veneni periculo, & spirituum inordinatè tumultuantium conflictu, posthabitâ temporis

ratione usurpanda erit : In aliis accidentibus, aut morbis jejuno ventriculo in aurora, attamen vomitûs ciendi gratiâ convenientius unâ alterâve post assumptum cibum hora dosi ʒss. cum aliis levioribus vomitum cientibus exhibebitur.

Qui nucem integram secum portarint, affirmant multi (fides sit penes authores) præservare à Peste, incantationibus magicis, philtris, sopito, seu herbarum venenatarum afflitu, aëris præterea nescio quo ut volunt contagio, Hispanis Malaire, & pasmo, id est, stupore, Indis Soutan (à quo similiter præservare ferunt corallium nigrum, Ungulam Rhinocerotis, Dumbagam, Ingo, & Testudinis scutum :) Catalepseos attamen species potius esse videtur, eo etenim correpti terrore veluti panico percussi corruunt, sensibus & voce privati obstupescunt, mortuisve sæpius similes obrigescunt : Revulsoria verò, & crudeli musculorum in tibiis, ac brachiis flagellatione, quâ sanguis inibi aggestus dein scarificationibus elicitur, revocantur, & curantur.

Nucis frustulum, aut fragmentum (aut rasuræ modicum) Viperæ, Basul, est Eruçæ pilosæ, atque nociferæ, ad tactum vehementem pruriginem causantis species, aut aliorum venenatorum animalium morsui, vulneri sagittâ, vel alio intoxicato telo facto adimpositum, venenum lapidis Culebrini instar adhærendo extrahere communicavit F. de la Zarza. Alii in hæmorhagia narium, & ad sanguinem è vulneribus profluentem sistendum, pulverem recommendant.

In Malviento, Malaire, Soutan, & pasmo, Catalepseos species est, stupore, Apoplexia, Paralyfi, sive syderatione, lethargo, Epilepsia, Morbo caduco, astmate, & catharro maligno, ac suffocante, dentium dolore, & aliis defluxionibus frustellum supponitur linguæ apophlegmatizandi gratiâ, ità enim caput à copia viscosi phlegmatis liberatum, ægri pluries levamen percipiunt, & sæpius

(25)
sæpius jamjam agonizantes, ut ità dicam resuscitentur;
& aut confiteri, aut alia quæ pro tunc conveniunt de-
clarare valent.

Pulverem, aut infusum, aut oleum infra descriptum
propinant, & dilaudant in feбри tertiana & quartana. Ve-
neni periculo, aut supra: Sopto, Buyasso, est Buyo,
seu Betele confectio mortifera (cum semine ut opinor
stramonii, aut simili narcotico) quæ si assumpta non peri-
mit, hominem perplexum, attonitum, hebetem, stu-
pidum, & torpidissimum reddit: Ab hujuscemodi con-
fectione devorata, aut masticata, infra posito oleo curata
fuisse scio, & Botete sardinæ nocivæ comestæ suspici-
one.

Ad urinas item, menses, & Puerperia suppressa pro-
vocanda, partum difficilem facilitandum, secundi-
nam, factum mortuum & Lumbricos expellendos effi-
cacem reperi.

In dolore colico præterea, cibi indigestione, crudita-
te ventriculi, & concoctione læsa, diarrhæa, Tenesmo,
& obstructione Epatis, ac lienis, uti & in omnibus supra
enumeratis morbis exhibent.

Oleum verò ex Igasur simpliciter infusione paratum,
emeticum est efficacissimum, valet ad eadem ad quæ nux
ipsa, hoc ad magi Barang præsentiam effervesce, & vase
quo asservatur exilire vir retulit fide dignissimus. Idem
& alii in suis scriptis affirmant.

Hoc Oleum alii efficacius reddere cupientes compo-
nunt: Ex Igasur, Tambal de Garigara, Tambal de
Sangil, Tambal de Bornei, Salagsalag, Camaesa, Ma-
nungal, Alagao, Salibutbut, Tambalisay Marbar Mo-
lavin, Borogtongon, Palyaccan Panambuc, Pancoro,
Nola lasso, Bagatapon, Oringun, & aliis, vulgò jazeite
de Tambal, à cortice sc. emetico Mananangtang appel-
latur, Violenter purgat per superiora, & inferiora, do-
sis ʒj. ʒij.

Lignum.

Lignum Sanctum Luzonis Quaiaco utiliter substituitur, de reliquo concoctionem adjuvat, & dejectam ciborum excitat appetentiam. N. B. Prægnantibus exhiberi non potest, quin abortum patiantur.

Lignum Colubrinum Manungal, decoctum ejus venenis omnibus, venenatorumque animalium moribus succurrit, febrifugum est, & anti-astmaticum, obstructions inveteratas reserans, & abjectam ciborum restaurans appetentiam: Ictero præterea, octo dierum spatium in aurora haustum medetur, lumbricos pellit, & colicos dolores mitigat. Decoctum ex ʒij. paratum, dejectiones ferme quinque causare solet.

Cortex Vomitorius Mananangtang, datur in pulvere à ʒj. ad ʒiv. pituitosa & lenta, nec non biliosa per vomitum, & secessum potenter evacuat, unde in febribus, ventriculi repletionem, aut ex humoris viscosi turgescencia, cachexia, & hydropse feliciter exhibetur. In omni veneni periculo c. decocto Manungal; & ad ventris lumbricos educendos plurimum facit, &c.

The Figures of the Leaves, Flowers, &c. of this Plant are in the Table. Vide fig. 4, 5, & 6.

VII. *An Account of a Stone found in the Stomach of a Lady on Dissection, another in the left Kidney, and some smaller ones in the Gall-Bladder.* By Mr. William Clerk, Surgeon. Communicated by Dr. Charles Preston.

IN the year 1690. having the Curiosity to visit the Mineral Wells, called *Moffet Wells*, in the County of *Annandale* in *Scotland*, I had there an occasion of Dissecting a Lady who had been drinking of the Waters, by advice of her Physicians, for a Distemper in her Stomach, *viz.* a continual Vomiting, as also for the *Dolor Nephriticus*; How long she had been troubled with these Distempers, or what time she continued to drink of the Waters I had no account; only this I know, she dyed in a fit of Vomiting, the reason whereof seems to be plain and obvious; for upon dissecting the Stomach, I found a Stone of the bigness and form as in *fig. 1.* the corner *a.* was almost fixed in the *Pylorus*, so that the passage from the Stomach to the intestines was near quite shut up. The substance of this Stone is a little Spongy, weighing about eight Drams and an half. On Dissection of the left Kidney, I found also a Stone of the same Substance and form, as represented in *fig. 2.* weighing about five Drams, and in the Gall Bladder I found several Stones, as represented in *fig. 3.* weighing two Drams.

That Stones daily generate in the *Vesica Urinaria*, Reins and *Vesicula fellis*, is a thing very ordinary and common; but that Stones should be bred in the Stomach.

mach of a human Body, is not so very common; However, it seems they have been produced by the same common Cause and petresying Matter. But I am apt to believe some extraneous body has given origine to that of the Stomach, as it happens frequently even in those extracted from the *Vesica Urinaria*. Monsieur *Tolet* in his Treatise of *Lithotomy*, relates a Story of a Soldier that was cut for the Stone, and an Iron Tag taken out of it, *Paræus, lib. 25. chap. 15.* reports the like. *Hildanus de Lithiasi Ch. 3. col. 2.* writes that a *Geneva* Man dying after twenty eight years complaint of Gravel, on dissection they found a Stone whereof a Leaden Bullet was the Kernel, which he had received by a Musket Shot. *Joseph Cavillart, Obs. viij.* relates a parallel Case.

Stones generated in the Stomach excite horrid pains, but there are scarce any clear signs by which they can be distinguished from others, except the continuance of the pain; sometimes they are ejected by Vomit; but we have a most notable instance of Stones adherent to the bottom of the Stomach, in *Horstius, lib. Inst. p. 142. viz. Religiosus quidam nobilis ordinis Sancti Benedicti & Monasterii campidonensis custos septem circiter annos per Intervalla miris modis conflictatur cum morbis & præter Ceteras res sæpius de dolore circa regionem Cartilaginis eniformis conquerebatur, post mortem apertus fuit & ventriculo Dissecto plures quam triginta calculos nunc majores nunc minores fundo ac substantiæ ventriculi pertinacissime adherentes cum maxima adstantium admiratione extraxit.* That several extraneous Bodies are oft-times found in the Stomach, being swallowed over, either wilfully or by accident; We have the Authority of *Senner. lib. prax. 3. par. 2. ser. 1. cap. XV. primo enim compertum est nummos, globulos plumbeos, clavos, mucrones gladiatorum & Cultorum,*

rum, gemmas, metalla, & alia, deglutita fuisse, quorum historias varias collegit Schenkius, lib. 3. obs. 2, 3, 4, & seq.

Secundo varia & monstrosa sæpe in ventriculo genita aut quocunque modo producta & vomitu rejecta fuisse observatum est teste Forresto, & aliis quamplurimis. Lapidis etiam ovi gallinacei magnitudine ibidem generari Schenk. lib. 3. obs. 9. capillorum veluti glomos, vomitu rejectos fuisse refert Monardes, lib. 3. De Hist. simpl. med. & notabilis, sed certa est Historia de extractione cultri ex ventriculo, & vulnus idoneis medicamentis sanatum ægræque virus evasit.

And amongst the Rarities in the Anatomy Hall at Leyden, there is preserved a Knife ten Inches in length, which was cut out of a Peasants Stomach, and he lived eight years after. It has been of a long time the received Opinion of Physicians, that Wounds in the Stomach were mortal, but we have also a late instance of the contrary, *Philos. Transf.* Numb. 219.

It were easy to give a number of fresh instances of the swallowing down of Money, &c. and there are some late Accounts in *Philos. Transf.* but there is a Gentleman one Mr. Cameron, an Episcopal Divine, who some years ago in a frolick swallowed half a Crown, who is alive to this Day, and finds no great Inconveniency thereby.

That Stones are not only formed in the Stomach, *vesica urinaria*, Reins and *vesicula fellis*, but also in all other parts of the Body, is without all controversy confirmed by manifold Observations and Experience, for Stones in the Brain, *vide Philosop Transact.* Numb. 228. Stones cut out of the Kidnies, Numb. 233. Stones in the Ureters and Kidnies, Numb. 233. Stone as big as an Hens Egg in the Gall Bladder, Numb. 233. Stone bred at the root of the Tongue, Numb. 247. *Tulpius*

in his *obs. Med. lib. 2. cap. 25.* has these words, *Calculus ubivis Locorum in homine reperiri certum est. Vidit eum ex utero erumpere Hipp. ex pulmone Galenus, ex capite Hollerius, ab Intestinis Trincavellius ex Liene ac fellis vesicula ut alii, sic nos, ex Lingua ac colli glandulis, sed calculum qui in arteriis Inveniret equidem hæcenus inveni neminem, Paræus, lib. 25. ch. 15.* says, he took one from a Man's Knee. *Horst. lib. obs. 4. pag. 249.* mentions one who voided Two hundred thirty three Stones *per Annum*, and another that voided One hundred and fifty: *Page 150.* relates a case where Two hundred were taken out of the Gall Bladder, some quadrangular and of a brown and yellow colour; but that which is more strange is, that Stones should be found even in the Heart it self. *Horst. lib. 4. cap. 25. Quodque notatu dignum circa valvulas dextri ventriculi calculum ex tartaro concretum instar minoris castaneæ nucis compressioris Membranosæ valvularum substantiæ adnatum conspicitur,* pag. 253. *Historia medico rara & observatu haud indigna de calculo, viz. Magnitudine nucis castaneæ minoris, post continuum capitis dolorem è naribus per palatum rejecto.* For Stones found in *angulis oculorum*, vide *Platerum*, page 906. *Ch. xv. aliquando emunctione calculum excretum vidimus, ex puitione cum tussi calculos rejectos fuisse non solum ego sed & alii observarunt; ex ore quoque alii calculi aliquando prodierunt, veluti e Linguae tumore, sicut aliqui notarant: per anum calculum Scyballi formam experimentem redditum domi quoque asservamus, aliumque qui ex equi alvo prodiit in partu fetum Lapidescentem seu petrosam exclusam à matre se vidisse medicus quidam nostri seculi clarus mihi narravit, idemque scripto publico testatus est. Cutis poros tophuli exigui innascuntur indeque eximuntur per aperturas, sponte vel sectione factas, tophi è nodis podagricorum plures sæpenumero prodierunt.*

Those.

Those Stones in the Nerves, are nam'd by *Paulus Ægineta*, *Nodosæ nervorum concretiones*.

Now that Stones are generated in all parts of the Body, is almost clear to a Demonstration, confirmed by so many observations of credible Persons, but more ordinarily are formed in the Kidnies, and *Vesica Urinaria*, because more properly design'd to separate and contain the serum of the Blood, and for that reason Stones in the Reins, and *vesica urinaria*, are more troublesome to Persons afflicted therewith, then in any other part of the Body; (1.) Because the parts are more sensible; (2.) Because they stop the passage for evacuating the Serum, that is continually separating from the Blood, and by consequence distend the Vessels, and so cause horrid pains.

As for the Figures and bigness of those Stones, that is a thing very uncertain, for they are found of all Forms and Shapes, some bigger, some less; some of a prodigious bigness, for which *vide Philosoph. Transact. Numb. 222.* and *Tolet's Treatise of Lithotomy*.

Stones are not only found in Human Bodies, but also in several parts of other Animals, as Bezoar Stone found in the Stomach of a kind of Goat in both Indies, as also in the Stomach of Monkeys (which is esteemed the best:) There is also a kind of Bezoar called *Cow Bezoar*, found in the Stomach of a Cow. *Hippolithus* found in the Stomach of Horses, *Ægagropila*, in the *Capra Alpina*, &c. it were needless to mention any more, these Instances being sufficient.

The Writers of the *Materia Medica* ascribe great virtues to these Stones, and particularly the Bezoar, and have wrote large *Encomiums* upon them, to whom I refer. But if Physicians would consider seriously the true worth of them, and virtue in the Cure of Diseases, they would find, that their vertue proceeds more from their

being brought from a foreign Country, and a common vogue and esteem they have got in the World, then from any intrinsick vertue they have in the cure of Diseases; and that which seems most to recommend them is their extravagant Price: Whereas we can name twenty Medicines in the *Materia Medica*, that each of them is as effectual, if not more, in the Cure of Diseases, and to be procured at less Charges.

VIII. *Part of a Letter from Mr. Bussiere to Dr. Sloane, wherein he gives an Account of the new way of Cutting for the Stone by the Hermit, with his Opinion of it.*

Here is the Description of the way of performing the Operation, for the extraction of the Stone out of the Bladder, by Brother James an Hermit in *France*, as I received it from *Paris*.

He maketh use of a Steel Staff, much bigger and shorter than those which are commonly made use of; it is shorter from the top to the bending of it, it bends more than ours, he hath but two, one for Men and another for Children.

His Conductor is slender and longer than ours, the point whereof, which goes into the Bladder, being of the Figure of a Lozenge, is wide and open in the extremity.

His Forceps have longer branches than ours; but the holds of them are shorter and wider, with many large Teeth within.

The *Eurethra* with which he draweth the Sand or Gravel, which remain sometimes in the Bladder after the Stone is out, is shorter than ours.

His Knife is much longer and slenderer than ours.

He causeth the Patient to ly flat upon his back, either upon his Bed, or upon a Table, whereupon is a soft Quilt, in such a manner, that the Fundament is three or four Fingers over the Table, some Servants supporting his Thighs and Legs.

He useth no Ligature to fasten the Patient, giving him more liberty than we do ; he causeth his Legs to be bent against the Thighs, but not the Thighs against the Belly, except the left, which in his Operation he useth more or less as he thinks fit.

Then he introduceth the *Catheter* or Staff into the Bladder ; which though bigger and shorter than ours, yet seemeth to run in easier : Very often he holdeth it himself with his left Hand, pressing it close toward the Fundament, in order to dilate and extend the Membranes of the Bladder ; then he feeleth with the Fingers of his right Hand, to find out the staff through the Skin ; so having felt it, he runneth his incision Knife at the bent of the left Thigh, upon the fat protuberancy below the Ischium Bone, directly upward by the rectum to the Bladder, which he pierceth by its neck, and sometimes a little above it.

When he Cutteth, the cutting parts of his Knife are turned upward and downward ; having thus pierced the Bladder, which he knoweth when the Urine runneth out ; then he turneth his Knife, and thrusteth it a little further, in order to open the Bladder wide enough, that his Finger may go in easily ; then he withdraweth his Knife, and enlargeth the Wound in the out-ward

ward Parts, of the length of two or three inches; after which he thrusteth his Finger into the Bladder, in order to know more precisely the bigness and situation of the Stone, and make it loose, but chiefly to dilate the Overture of the Bladder, by tearing its Membranes.

Then he introduceth his Conductor into the Bladder, along this Finger which is in it.

When the Conductor is in the Bladder, he taketh the Staff out, and introduceth the Forceps by the Conductor into it, with which he gets hold of the Stone, and draweth it out.

If he find any difficulty, either in getting hold of the Stone or in drawing it out, he useth all the ways commonly used, raising the left Thigh more or less, putting his Finger in the Fundament, and sometimes into the Bladder, in order to examine the situation of the Stone, and loosen it, in case there might be any adhesion with the Membranes of the Bladder. Having found out and removed the Cause of the difficulty, he thrusteth the forceps again into the Bladder, and gets hold of the Stone, and pulls it out.

It is to be observed, that this second time, nor on any other, he useth no Conductor, the Forceps running in very easily.

He never thrusteth either his Finger nor any instrument into the Bladder, without steeping them in Oyl of Roses.

He never useth any *Dilatatorium*, nor *Canula*, or Tents in the Wound, except sometimes small Dossils in the Lips of the outward Wound to keep them open for a little while.

He useth no Oyntment at all for the Wound, applying only a Pledget steep'd in Oyl of Roses upon it, for he understands

derstands nothing at all in the way of dressing Wounds, nor in the Dyet which the Patient is to observe, which things he doth not value.

In this way he Operateth as dexterously as any of our best Operators.

Very often he Cutteth the Patient upon the Gripe, almost in the same manner as was used formerly, except that he maketh the Incision in the same place as for the former; this way he liketh better than the other, and it seemeth to be more favoured by him, and indeed it is surer, though the pressing upon the Belly, which he doth, is a very bad Method.

He Cutteth Women upon the Staff, and in the same place as Men; he did perform this Operation in my Presence upon Three, One whereof was but a Girl of Eleven years old; which maketh me believe that he useth the same way in all, though in them he did cut the internal Neck of the *Uterus*.

But to tell you my Opinion, That way, neither in Men nor in Women, is not so sure as the ancient way, by reason that the point of his Knife not being directed by the Staff, he is always in danger of piercing all the Membranes of the Bladder through and through; and besides the place whereupon he maketh the Incision, being full of considerable Vessels, one can hardly avoid the cutting some of them, we have observed in almost all that dyed in his Hands, that there was a great deal of Blood in the Bladder, and in some, in the Cavity of the Abdomen.

He succeedeth better when the Stone is big and large, than when it is small, by reason that a big Stone not only extendeth the Bladder, but it stoppeth the point of the Knife; He did refuse to cut one, in whose
Bladder.

Bladder there was but a small Stone ; which confirmeth me in the Opinion , that the unsuccessfulness of his Operations proceedeth from the point of his Knife, not being stopt neither by the Staff nor Stone ; for when there is but a small Stone, the Bladder being empty , he must necessarily cut the whole Bladder throughly, and consequently cut some of its own Vessels, which causeth the Hemorrhage, which is the better voided when the Stone is very large.

Now, *Sir*, to tell you my Opinion, though I cannot approve that way on all occasions ; yet, I think it might be successfully improved in some particular Cases ; give me leave, *Sir*, to give you an Account of my Observations about it, since I received the former Account.

I took a Body, in the Bladder of which I put a Stone, the Staff being in the Bladder, I did press it downward, hard enough as to be felt through the Teguments, and made the Incision upon it in the bent of the Thigh, in order to know whether it would not be a surer way by securing the point of the Knife ; by that way I got my Conductor and Forceps into the Bladder, and drew the Stone very easily ; but afterward, by the Dissection of the Body, I found that the Artery of the *Penis*, and the *Vesiculæ seminales* were cut through and through, which cannot be avoided, because the Artery and Vesiculæ lye immediately under that part of the Bladder which the Staff presseth upon.

I took another body, and having put in the Bladder a small Stone, I made the Incision much lower, and pierced the Bladder under the Staff, by which Incision

on I drew the Stone ; then dissecting the Body, I found the Bladder cut through, and its Arteries, which can hardly be avoided, the Bladder being then so much Contracted, that both sides of the Bladder are cut, before the Operator either feel the Stone, or see any Urine running out.

I took a third Body, in the Bladder of which I put a very large Stone, the Staff being in it, I made the Incision upon the fat Protuberancy, under the *Ischium* Bone ; and piercing the Bladder below the Staff, I found immediately the Stone with the point of the Knife, with which I cut the Bladder, the length of an Inch ; through which having introduced the Conductor, and then the Forceps, I got hold of the Stone and drew it out very easily. Then I did Dissect the Body, and found, that neither the *Vesiculae Seminales*, nor any Artery had been cut, by reason that the weight of the Stone pressed the bottom of the Bladder ; lower than the Vesicula's and Arteries.

My Opinion is then, that this way might be made use of when the Stone is very big, and willingly, I would prefer it to the old way ; for by this way we avoid that extraordinary and violent dilatation of the Neck of the Bladder, which the Stone causeth when it is very big, and which is the cause of the Inflammation and Mortification of the Bladder that killeth the Patient.

But when the Stone is small, or of but an indifferent bigness, the old way is easier and surer.

Though I have not tried this way upon Women, yet I cannot approve it at all, since one cannot avoid cutting the Neck of the *Uterus*, the Ci-

catrrix of which might prove to be of some ill Consequence, in case the Woman should come to be with Child.

In Women, when the Stone is but indifferent big, the old way is preferable to any other; but if it was very big, then I had rather to thrust my Fingers into the *Vagina*, and bring the Stone as near the neck of the Bladder as can be, and cut the Membranes of the *Vagina* and Bladder upon the Stone: I did cut a Woman in *Hambourgh* by that way, of which I drew a Stone, weighing five Ounces and a half, who did Recover very well. By this way we prevent the incontineny of Urine, which followeth always the Extraction of great Stones in Women.

I cannot approve neither the cutting upon the Gripe, as it is practised by some Mountebanks; Because in that way one cutteth through the *Prostates*, which destroyeth the parts of Generation. I have observed that all those which have been cut by that method, were never fit for Generation.

VIII. *The Extract of a Letter from Mr. Petto, a Grave Divine, Concerning some Parelia seen at Sudbury in Suffolk, Decemb. 28th, 1698. Communicated by Dr. Beverley.*

ON August 28. 1698. being the Lord's-Day, about Eight a Clock in the Morning, some Persons saw the Appearance of Three Suns; 'tis said, then the Apparition was most full, or a little after. There is really but one true Sun, the Reflection of its Beams cause such Images, as if they were Suns: About half an Hour after Eight of the Clock, I myself saw this; There was in the East, a dark, dusky, watry Cloud in the Form above described; where these Lines are, and below it towards the middle, was the true Sun, shining with fierce and piercing Beams, that Persons could not look upon it; on each side were the Reflections with the true Sun in the middle, as you have it in Figure 1. Elsewhere much of the Firmament was of an Azure, Light, Blew Colour. The Circles which I saw, was not of Rainbow Colours, but white: There was also, higher in the Firmament, more over our Heads, and towards the South, at the same time, at a considerable distance from the other, the form of a half Moon; but I think it was more then twice the bigness of a half Moon, with the Horns turned upward, and within of a fiery red Colour, and more like

like a Rain-bow Colour: These all faded gradually; They continued in all, I suppose, two Hours: There were very many Spectators.

The Moon was then about Two Days old, and might well enough be seen (in the day time) in such a Posture as is described.

LONDON: Printed for *Sam. Smith, and Benj. Walford,* Printers to the Royal Society, at the *Prince's Arms* in *St. Paul's Church-yard.* 1699.

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Fig: 1.

Fig: 2. of Dupre.

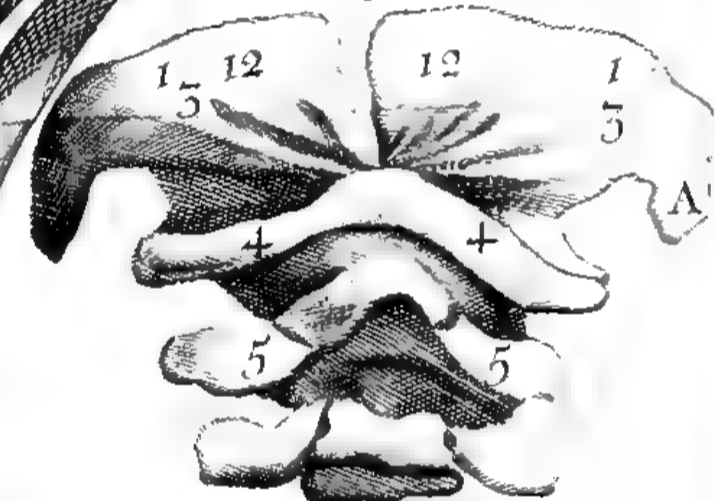


Fig: 2.

Fig: 1. of Dupre.

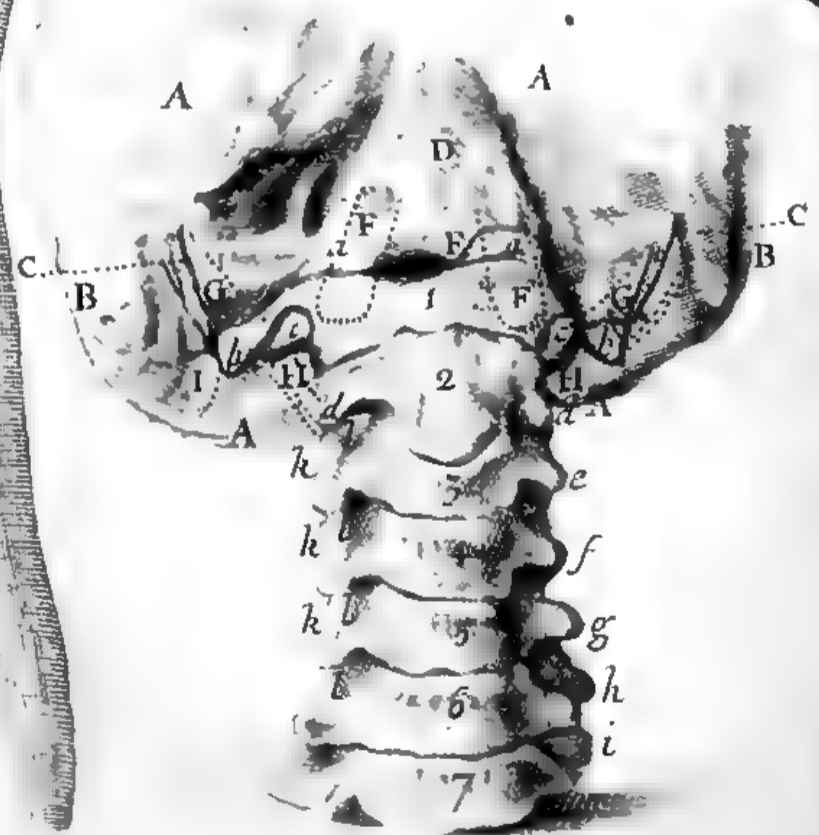
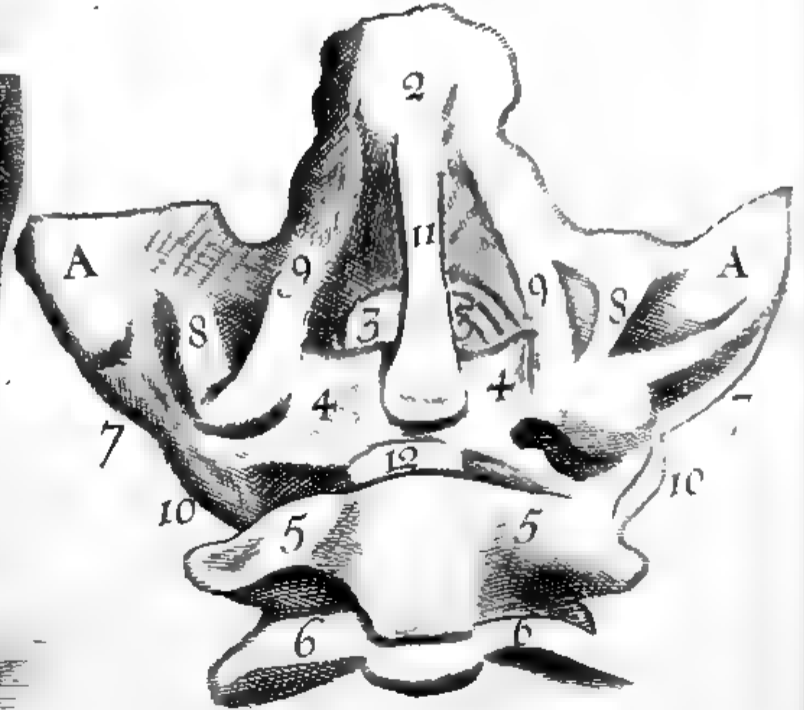
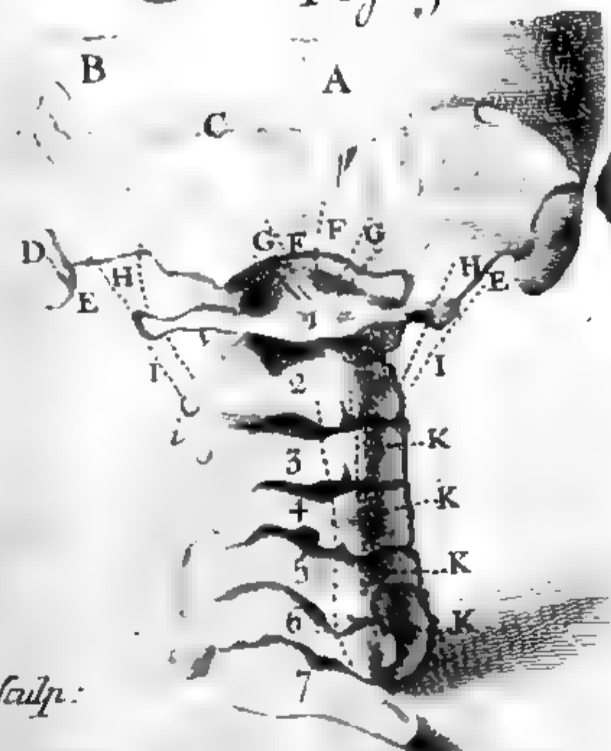


Fig: 3.



I. Sturt sculp.

PHILOSOPHICAL TRANSACTIONS.

For the Month of April, 1699.

The CONTENTS.

- I. *A Relation of the small Creatures called Sable-Mice, which have lately come in Troops into Lapland, about Thorne, and other Places adjacent to the Mountains, in innumerable Multitudes.* II. *Some Observations made at a Meeting of the Royal Society, Concerning some Wonderful Contrivances of Nature in a Family of Plants in Jamaica, to perfect the Individuum, and propagate the Species, with several Instances analogous to them in European Vegetables.* By Hans Sloane, M. D. III. *An Extract of a Relation Printed at Paris, containing a Remarkable History of a Fætus without the Womb.* By Dr. Fern. IV. *An Observation of some Parelîi seen at Canterbury.* By Mr. Stephen Gray. V. *A Supplement to the Account of a*
 Scolopendra

Scolopendra Marina, &c. Described Numb. 225. of these Transactions. By Dr. Tho. Molyneux, F. R. S. VI. An Abstract of an Account of Five pair of Muscles, which serve for different Motions of the Head, on the First and Second Vertebra of the Neck; and of Two Ligaments, one of which fastens the Head to the First Vertebra, and the other fastens the First to the Second, with the History of an Uncommon Appearance of a Humane Skull. By Mons. Duprè, Surgeon in Paris. With Remarks by William Cowper. VII. An Anatomical Account of a Child's Head Born without a Brain in October last, 1698. By Mons. Buffiere. VIII. Part of a Letter from Mons. Geoffroy, F. R. S. to Dr. Sloane, giving an Account of the New Regulations of the Royal Academy of Sciences at Paris. IX. An Account of a Book. *The Natural History of the Chalybeat and Purging Waters of England, with their particular Essays and Uses, &c. with Observations on the Bath Waters in Somersetshire.* By B. Allen, Med. Bac. Printed for S. Smith and B. Walford, in St. Paul's Church-yard.

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- I. *A Relation of the small Creatures called Sable-Mice, which have lately come in Troops into Lapland, about Thorne, and other Places adjacent to the Mountains, in Innumerable Multitudes. Communicated from Sir Paul Rycaut, F. R. S. to Mr. Ellis, and from him to the R. S.*

IN the Year 1697. these *Sable-Mice* were first observ'd, being near as big as a little Squirrel, their Skin streaked, and spotted black and light brown; they have Two
Teeth

Teeth above, and as many under, very sharp and pointed, their Feet like those of Squirrels ; they are so fierce and angry, that if a Stick be held out at them, they will bite it, and hold it so fast, that they may be swung about in the Air ; they are fat and thick, and without any Tail.

In their March they keep a direct Line generally, from North-East to South West, and are innumerable Thousands in each Troop, which for the most part is a Square, they march by Night, and in the Twilight, and lye still by Day.

The Distance of the Lines they go in is of some Ells, all Parallel to each other, so that the places they have gone over, look like the Furrows in a Plowed Field. If they meet any thing that might stop them, they avoid it not, tho' it were a Fire, a deep Well, a Torrent, Lakes, or Morafs, but without any Hesitation venture through, and by that means, many Thousands of them are destroyed and found dead in Waters, and otherwise.

If they be met swimming over Lakes, and Attacked with Oars or Boat-hooks, they neither Retreat, nor offer to run up the Oars, &c. but hold on their Course, and if they be forced out of it, they presently return into it again ; when they are met in Woods or Fields and stopt, they set themselves upon their hinder Feet like a Dog, and make a kind of barking or squeeking noise, leaping up as high as a Mans Knee, or near 8 Feet, defending their Line as long as they can ; and if at last they be forced out of it, they creep into holes, and set up a cry sounding like *biabb, biabb*.

They never come into any House, nor meddle with any thing that is Man's Meat ; if a House happen to be in their Way, there they stop till they die ; but through a Stack of Hay or Corn they will eat their Way ; when they march through a Meadow, they endamage it much,
by

by eating the Roots of Gr^{ass}; but if they encamp there by day they quite spoil it, and make it look as if it were Burnt, or strewed with Ashes. The Roots of Gr^{ass}, with rotten Wood, and the Insects in it, are their chief, if not only Food.

'Tis said these Creatures are very Fruitful, and bring forth eight or nine at a time, which is scarce to be believed; tho' it be certain that they breed, yet neither does that hinder their march; for some of them have been observed to carry one young One in their Mouth, and another upon their Back.

It is reported, that some poor Laplanders, wanting other Food, have killed and eat several of these Creatures, and found their Flesh to taste like Squirrels: Dogs and Cats when they kill them eat only the Heads, and Birds of Prey only their Heart: During the Winter they lie under the Snow, and have their Breathing holes upon the top of it, as Hares and other Creatures use to have.

The Common People are very glad of these Guests, fore-telling there will follow great Plenty of Game, as of Fowl, Squirrels, Lo-Cats, Foxes, &c. where of late years there has been great scarcity: Some old People say, these sort of Creatures were seen in Lapland, about 20 or 30 years ago, and that thereupon they had abundance of such Game.

The Mice here mentioned, are the same with those called Mures Norwegici, and Described by Olaus Wormius, in a small Book wrote on this Subject, and Printed 1653. 4to. which Book is Re-printed Verbatim in his Museum. beginning p. 322. There being some Particulars in this Relation, not taken notice of therein, it was thought convenient it should be Printed.

II. Some

II. *Some Observations made at a Meeting of the Royal Society, Concerning some Wonderful Contrivances of Nature in a Family of Plants in Jamaica, to perfect the Individuum, and propagate the Species, with several Instances analogous to them in European Vegetables.* By Hans Sloane, M. D.

THE many Contrivances of Nature, or rather the Supreme Being, who Created, and orderly disposed all things, to bring to Perfection several Vegetables and Animals; and after the unavoidable dissolution of the *Individuum*, to keep the *Species* from being lost, notwithstanding many adverse Contingencies and Necessary Ends they are design'd to serve, seems on many Accounts to Deserve, if not Require our Regard and Attention. Those who spend some of their time in these Observations, will not want Occasions of Admiring the great Wisdom and Power of the first Contriver and Preserver of all things; nor Means, by imitating Nature, to bring some of the most useful Arts to a greater Perfection, then hitherto they have come.

I shall at this time endeavour to Entertain the Society with some Observations of this kind, that I thought sufficiently Recompens'd some pains I was at, by the pleasure I had in admiring the Mechanisms I met with, then shew the things themselves to the Members present.

In *Jamaica*, the Neighbouring Isles, and Continent of *America*, grow many sorts of *Mistletoe*, *Parasitical*
R Plants,

Plants, as they are called by some, or *Epidendra* by others; which grow not on the Ground, on Rocks, or in Waters, &c. but on the Bodies or Arms of Trees, after the manner of *Misseltoe*, like to which they bring forth Roots, Leaves, Stalks, Flowers and Seed. There being none other but *Misseltoe* in *Europe*, so remarkable for these Particulars, I was constrained, to Convey the clearest Idea of the thing to be described, to give the Name *Viscum*, to all the several Families of them, tho' they differ'd very much from it, and almost as much among themselves, by that name designing only a Plant like it in growing on Trees, and bringing forth Roots, Leaves, Stalks, Flowers and Seeds on them, as other Plants do on the Ground, or in the Soils they grow.

The particular Family of these I now intend to speak of, is that kind I have called *viscum Cariophylloides*, from having its seed Vessel somewhat like that of *Clove-July Flowers*, and the particular one of that Family I shall describe, whereby to give a Notion of the rest, shall be what I name in my Catalogue of *Jamaica Plants*, p. 76. *Viscum Cariophylloides maximum flore tripetalo pallide luteo semine filamentoso*, and which is commonly in that Island called, *Wild Pine*, whose Description follows: A great many brown Fibrils encompass the Arms, or take firm hold of the Bark of the Trunk of the Trees whereon they grow, not as *Misseltoe*, entering the Bark or Wood, to suck Nourishment, but only weaving and matting themselves among one another; and thereby making to the Plant a firm and strong Foundation, from whence rise several Leaves on every side, (*fig. 1. a a, &c.*) after the manner of *Leeks*, *Ananas*; whence the Name of *wild Pine*, or *Aloes*, being folded or enclosed one within another, each of
which

It grows on the Arms of the Trees, every where in the Woods, as also on the Barks of their Trunks, especially when they begin to decay, their Barks receiving the Seed, and yielding then more easily to the Fibrils of this Plant's Roots, which in some time dissolves them, and ruins the whole Trunk.

The Contrivance of Nature in this Vegetable is very admirable and strange, the Seed has long and many Threads of tomentum, not only that it may be carried every where by the Wind, as pappous and tomentose Seeds of *Hieracium*, *Lisymachia*, &c. are; but also, that it may by those Threads, when driven through the Boughs, be held fast, and so stick to the Arms and extant Parts of the Barks of Trees; so soon as it sprouts or germinates, altho' it be on the under part of a Bough, or the Trunk of the Tree, its Leaves and Stalk rise perpendicular or streight up; because if it had any other Position, the Cistern before mentioned (by which it is chiefly nourished, not having any Communication with the Tree) made of the hollow Leaves, could not hold Water which is necessary for the Nourishment and Life of the Plant.

In the Mountainous as well as dry low Woods, in scarcity of Water, this Reservatory is necessary and sufficient, not only for the Plant it self, but likewise is very useful to Men, Birds, and all sorts of Insects, whither in scarcity of Water they come in Troops, and seldom go away without Refreshment.

Besides, the Authors mentioned in my Catalogue of *Jamaica* Plants, p. 76. to take notice of this Plant I find *Huldrich Schmidel*, cap. 46. p. 77. of his *Navig.* Printed 1599. 4to. to have the following passage, which I believe relates to this herb.

Ex

Ex nostris autem hominibus multi siti moriebantur, licet ad hoc iter apud istos Carchconos mediocri aquæ copia nos instruxeramus. Inveniebamus autem in hoc itinere, radicem supra terram extantem, magna lataque folia habentem, in quibus aqua tanquam in vase aliquo manet, nec inde effunditur, nec etiam tam facile consumitur, capitque una harum radicum aquæ circiter dimidiam mensuram.

And Capt. Dampier, in his Voyages, Vol. 2d of *Campeche*, p. 56. says thus.

‘ The *Wild Pine* is a Plant, so called, because it
 ‘ somewhat resembles the Bush that bears the Pine: they
 ‘ are commonly supported, or grow from some Bunch,
 ‘ Knot or Excrecence of the Tree, where they take root
 ‘ and grow upright. The Root is short and thick, from
 ‘ whence the Leaves rise up in Folds, one within ano-
 ‘ ther, spreading off at the top: They are of a good
 ‘ thick Substance, and about Ten or Twelve Inches long,
 ‘ the outside Leaves are so compact, as to contain the
 ‘ Rain Water as it falls, they will hold a pint and a half
 ‘ or a quart: and this Water refreshes the Leaves, and
 ‘ nourishes the Root. When we find these Pines, we
 ‘ stick our Knives into the Leaves, just above the Roots,
 ‘ and that lets out the Water, which we Catch in our
 ‘ Hats, as I have done many times to my great Relief.

There are some Contrivances in Plants growing in some *Europe*, come near these of this kind of Vegetables in particulars. The *Virga pastoris*, or wild teasel, (and most *Plants* call’d *Perfoliated*) has its Leaves enclosing its Stalk, and so set by pairs opposite to one another, and joined by their Bases, that they make a hollow place fit to contain some Water, which though open, yet without doubt, contributes to the perfecting of the Plant.

Several

Several *Fuci* are lately discovered to have Seeds, which when ripe break out of their places, and by means of a glewy Juice, fasten themselves to the Stones or Substances at bottom of the Sea, where they are to grow. The common *Viscum* has such a glewy substance, I suppose, for fastning its Seed to the Barks of Trees.

Small *Mosses* heretofore thought to have no Seed, are now known to have great Plenty, and that so small, as I have seen it rise up from the ripe Head in Form of Smoak, which is without question, that it may be carried by the Air and Wind, to Walls, Trees, or other fit Matrix for its Vegetation.

There is a *Fungus* called by *Clusius*, *fungus minimus anonymus*, and by Dr. Merret, *Campaniformis niger multa semina plana in se continens*, which I have shewn this Society many years since, that when Ripe, opens to the Rain, which on filling a Cup, wherein lie its Seeds, they are washed out on every hand, to Propagate its Kind.

There are many Families of Plants with Pappous or Tomentose Seeds, as *Dandelion's*, *Erigerum's*, *Lyfimachia's*, *Clematis's*, *Anemone's*, &c. that when Ripe, their Seeds are, by means of their Feathers or Wings, scattered to all neighbouring Parts by the Wind. This is so effectual a way, that the *Aster Canadensis annuus non descriptus Brunyer*, *hort. Bles. p. 10.* or *Conyza annua alba acris*, *Morif.* which came at first from *Canada*, is now become a wild Plant in many places of *Europe*, where it never was observed to grow, and far from the Gardens where it was first Planted, from whence the Seed had been carried by its Wings, so that I have seen it in some Parts of *France*, very many Leagues from such Places.

There

There are likewise many Plants, which have Seed-Vessels so contrived, as with a Spring, and sometimes smart noise, when they are ripe, to throw off their Seeds several ways, to a considerable distance; most Plants having Pods, as Furze, &c. those called, *Noli me Tangere's*, or *Herbæ Impatientes, cucumis asininus*, Cranesbills, and many others, have this artifice to sow themselves. Amongst these who have this Property, none is more surprizing then one in *Jamaica*, called Spirit-weed, which when its Seed is ripe, the Vessel containing it, on the least touch of whatever is wet, does instantly open its self, and with a smart noise throw its Seeds several ways to a considerable distance. Likely the Design of Nature being, that the Rainy Season being proper for Sowing, its Seed should be kept in its Seed-Vessel, the best Preserver of it from Injuries, till then.

Lychnis's, *Poppies*, *Antirrhinum's*, and many others, have their Seeds in heads, which when ripe, are open at top, and by the Winds, and help of their Partitions, are scatter'd and directed to all Quarters.

These Instances, and many more, very obvious and wonderful, tho' not taken notice of, might be given, to shew the great endeavours of Nature to perfect the *Individuum*, and propagate the Kind, which for that reason, I am apt to believe, are all (without the loss of one *Species*) Preserved to us from the Creation to this day.

It will be easy, from the History of the *Viscum* before mentioned, to believe, that no ordinary Culture could make this Plant rise from its Seed; and that if its Seed were planted in the richest Ground, it would certainly perish. Wherefore I am of Opinion, that one considerable way to improve Gardening, and the Cul-
ture

ture of Plants, would be to give a Description of the Plants themselves, then the Soils, Climates and Countries where the Vegetables to be Cultivated naturally grow, and what Seasons, Rains, and other Meteors they have, which being imitated, as much as possible, perhaps some Plants might thrive better, then now they do in the fattest Ground. And to this purpose, I have been assured by an Honourable and very Ingenious Person, that he has known some Plants, particularly *Centaurium minus*, which not growing the ordinary way, was tried by dropping the Seed on the Surface of the Ground, amongst the Grass, by which artificial imitation of Nature it came to Perfection, which no other ways could be brought about.

III. *An Extract of a Relation Printed at Paris, containing a remarkable History of a Fætus without the Womb, made by Dr. Fern.*

IN the *Journal des Savans*, of Monday the 26th of November, there was an Account published of this Fact from a Letter of M. Saviard, which was Printed in the *Transactions*: But our Author finding that deficient in many Particulars, and not agreeable to Truth in divers others, thought himself able to oblige all Lovers of Natural History, by a more exact Relation of so remarkable an Accident.

A certain Goldsmiths Wife, whose Husband had been reduced to Poverty by misfortunes in Trade, being near Nine Months gone with her Fifth Child, was constrained to seek Relief in the *Hotel Dieu*, where she was received the 20th of September.

This Unfortunate Woman was then about Thirty four Years of Age, of a tender Constitution, had had Four Children before, all which had done very well; but with the present she had been very ill, and endured a great deal of Misery. The Midwife who examined her Body, found a considerable Rising on the Right-side near the Navel, which very much resembled a Childs Head, her Belly below that place bearing no Proportion to that above, or to the time of her Pregnancy. On the Left side there was nothing singular. The Midwife thought she felt through the *Vagina*, a thick Membrane filled and distended with Water, and in it the Heel of a Child, bent towards the Thigh; but she could not be assured whether this was within the Womb or

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not,

not, by reason the inner Orifice was drawn so high, under the *Os Pubis*, she could not, without some difficulty, touch it with the extremity of her Finger. Upon trying some time after, she found the appearance of things very much changed, and at that time she could not discern any thing like the *Fetus* she had before felt. The oddness of the Case, made her desire of the Patient a particular Account of the Time and Circumstances of her being with Child: To this the other replied, That for the first six Weeks she had great and continual Pains, which shot towards the Navel, and terminated there, and these lasted till the third Month; that from thence to the Sixth she had frequent Convulsions, Apoplectick Fits, terrible *Synopes*, which had very much Frightned those about her, and obliged them to give her the Sacraments, despairing of her Life; that from the Sixth to the Eighth Month, she had enjoyed a much better Health, which in some measure had strengthened both her and her Infant; that the Pains she had endured since that time seemed to be so many alternate Throe's, (probably proceeding from the repeated strokes of the Child's Head in that Place, where the Teguments were so thin, by reason of their great Extension, that the hardness of the *Cranium* could plainly be discerned through them.) In this Condition was this miserable Woman when she was received into that Hospital, till her Affliction encreasing, she could not lye on her side or back, being forced to sit in a Chair, or Kneel in her Bed, with her Head resting on her Breast. These strange and unaccountable Symptoms rendred the Midwife very doubtful how to proceed, and obliged her to apply her self to M. *Hemmerer*, and M. *Joney*, the first of which was at that time Physician to the Hall, and the other a Master Surgeon of the House; these Gentlemen

were

were as unable to resolve what Method to take, as she had been before. The Womans Term was now near expired, the *Cæsarean* Operation seemed on one hand Cruel and Dangerous ; on the other hand it was probable, there was some *Hernia* or *Laceration* of the Womb, and no hopes of a Natural Delivery. In these difficult Circumstances it was thought best to leave the Work to Nature, and prepare the Woman for her Labour, by opening a Vein in her Foot. The Evacuation was ordered to be small [in which regard was had to the Weakness of the Patient, and the nicety of her Constitution] However, after this time the Child made no more efforts, and the Tumor subsided, there remaining only an Hydropick Indisposition, which might be perceived by the Fluctuation ; and a great quantity of Water came away for several days, from the Orifice of the Vein ; insomuch that she who seemed to have her lower Belly and Thighs extremely distended, was very much extenuated before her Death.

After the Patients Decease her Body was opened by M. *Jouey*, in the Presence of M. *Colignon*, Master-Surgeon, Madam *Gouey* the Midwife, and divers other Persons. Upon the first Incision through the Teguments, there came away two or three Pints [of *Paris* Measure] of Water and Blood, and there appeared the Head of a Child naked ; and when the Parts were all laid open, there was found an intire Female *Fætus* contained in a sort of Cover or Bag, which at once served it both for a Womb and Membranes. M. *Jouey* took the Child with the Umbilical string out of the Mothers Bellie, tracing the string to the *Placenta*, into which it was inserted. This last appeared like a great round lump of Flesh, and adhered so firmly to the *Mesentery* and *Colon* on the left side, that it could not be separated from them without some trouble. On one side of this Lump was

a lesser, about the size of a Kidney, which principally adhered to the Mesentery, and received several Branches of the String into it.

The larger Lump was round, and the greatest part of it adhered to the Bag or Case which contained the Child.

As for the Case, it was Corrupted and Mortified in part, which probably might proceed from the frequent strokes of the Infants head.

This Case or Bag sprung from the edges of the Tube, or *Fimbria* of the Right Ovary, which was more entire than the Left, and proceeded obliquely to the Left side, terminating at the bottom of the *Pelvis*. In its descent it sent out a small Portion between the Womb and the *Rectum*. This Bag, by compressing the Neighbouring Parts, had gained a considerable space in the above-mentioned Cavity; in such manner, that a great part of the Child's Body was lodged at the bottom of it, in a bended Posture, with the Head Projecting forwards which formed the Prominence near the Navel.

This Bag seemed to be nothing else than an Elongation and Distension of the Tube, and an Expansion or Production of the broad Ligament on the Right side, which was evident from its continuity to those Parts, and the Distribution of the Spermatick Vessels, which were larger than usual, and passed from the extremity of the Tube to the larger Lump.

In the next place viewing the Womb he found it entire, and in its natural State, except that it was something larger than ordinary, being about the size of that of a Woman Ten or Twelve Days after her Delivery, and no marks that the Child had been lodged in it. *M. Jouey* having observed this, thought fit to desist for the present, being desirous to have some eminent Witnesses of so extraordinary an Accident, or any Rarity
he

he might happen to discover in his further Enquiries.

According to his Desire, about Two a Clock in the Afternoon, M. *Hemmerer*, Doctor of Physick, M. *Du Verney*, Professor of Anatomy and Chirurgery in the *Royal Garden*, M. *Mauriceau* a famous Man-Midwife, and M. *Merry*, Surgeon and Anatomist of the Academy of Sciences came to the *Hotel Dieu*, and the Womb being carefully Dissected in the Presence of these Gentlemen, together with the Senior Surgeons of that House, and divers others, whose Curiosity had drawn them thither ; it was unanimously agreed, that the *Fœtus* had never been in it, [it being as was noted above, in the same state as in Women, who are not with Child, except the small Dilatation of its Bulk, which might arise from a Compression of the Vessels, and interception of the Reffluent Blood, by the unnatural Position of the *Fœtus*.]

In thrusting a long and slender Probe through the Right Horn of the Womb, it easily past into the Tube of the same side, for Three Fingers breadth in length, but it could not be thrust further by reason of the Constriction of the Tube in that part. The Capacity of the Tube could not be distinguished, the *Parietes* of it, by their Coalition with the *Chorion* and *Amnios* of the Child, forming the Bag in which the Child was included, which extended from the Tube on the Right side to that on the Left, and was agglutinated to the *Viscera* of the lower Belly, the *Rectum*, and to the back part of the Womb, as appeared by some Fragments remaining on those Parts after the Separation.

Our Author Annexes some Reflections on this extraordinary Subject, which we shall not here Recite ; however it must not be omitted what this Gentleman informs

informs us, That formerly in Dissecting the Body of a Woman, who supposed her self to be Three Months gone with Child; he found the Womb very small, not larger than in Virgins, and a hard Substance in the Right Horn, which being opened, appeared to be the Skeleton of an Infant, with the Navel-string, smeared round with a white Matter, not unlike Plaster, which he shewed to M. *Du Verney*, and other curious Persons.

IV. *An Observation of some Parelly seen at Canterbury.* By Mr. Stephen Gray.

FEBRUARY the 26th, 1693. being *Sunday*, about half an Hour after Three in the Afternoon, chancing to look out of a Window that faced South-East, I saw not far from the South to the Westward, an Appearance of somewhat not much unlike the Sun, when seen through Clouds, *viz.* with its *Periphery* not exactly defined, from which it likewise differed, in that one half of it was coloured deep Red and Yellow, the other White. I went immediately into the Garden, taking a *Theodolite* with me, in order to take its distance from the Sun, which the room would not permit; but was then presented with an Appearance exactly like the former, but on the opposite side of the Sun; I took the distance of this from the Sun, which was 23 degrees to the Westward; but before I could take the distance of the Eastern one, it Vanished, but soon after Re-appear'd, and then I perceived manifestly, that they were both situate in the extremities of a *Semi-circle*

circle, whose Center was the Sun, passing betwixt it and the Zenith. This Appearance continued about half an Hour.

Des Cartes in his Book of Meteor, calls such Phenomena *Parhelia*, or *Mock Suns*, and gives us the History of Five seen at *Rome*, in the year 1629. *March* the 20th, and Demonstrates, that there may sometimes, according to the Laws of Refraction and Reflection, appear Six at one time, viz. Five mock Suns, and the true one.

I chanced to be at home alone, and saw no Body to whom I could impart what I saw, till after the Mock-Suns vanished, nor do I hear of any, but my self, that saw them; yet may you be certain, that I have not deceived my self or you.

V. *A Supplement to the Account of a Scolopendra Marina, &c. Described N^o 225. of these Transactions. By Dr. Tho. Molyneux, F. R. S.*

I Find a Letter (*Philosoph. Transact.* Numb. 249.) of Mr. Dale's to Dr. Lister, wherein he mentions the *Scolopendra Marina* I gave an Account of, Numb. 225. of the *Transactions*, as described by *Rondeletius*, under the Title of *Physalus*, in his Book, *De Piscibus*; but I must crave leave to differ from him in Opinion as to this Particular: For I conceive that Author could not understand by the Name of *Physalus*, what I mean by *Scolopendra Marina*, è *mare Hybernico*, &c. but some other

other Marine Animal: For if we'll suppose *Rondeletius* saw what he there describes, and expressed his words according to what he saw, I think we cannot imagine that he and I had the same object before us, or the same Idea's in our Thoughts; and this will appear evident, by comparing his words with mine, which do not only disagree, but seem in many Particulars down-right Contradictory to one another; as where he says of his Animal (Lib 15^o De Piscibus, pag. 429.) *Ore caret*, whereas I say, the mouth of mine was a very large patulous Opening for the Bulk of the Animal. He says, *In medio latior est & Extrema gracilescunt, Pudendi muliebris speciem referens*, whereas I say, 'twas bigger at one end, and went taper or gradually, lessening towards the other; he says, *in Dorso tumores parvi eminent verrucas Piscatores nostri vocant*, I am sure I could observe none such, but say, the Back was covered with a short soft sort of down, in Colour, Texture and Substance like that which grows on the Leaf of *Tussilago*: *Venenatum esse experti sumus*, says he, whereas I found two of the *Scolopendra's* I described in the Stomach of an Animal that had devoured them, and Digested one as its natural Food and Sustenance; from whence we may conclude, they are not Poysonous; and besides *Rondeletius* his *Icon* agrees exactly with his own Description, whereas it neither agrees with my Description nor my Figure. From all which I think 'tis very plain, *Rondeletius* his *Physalus*, and the *Scolopendra Marina* I Described, are quite different Species of Animals.

But I confess Mr. *Dale* was thus far in the Right, tho' he seems not to have known it himself, that the *Scolopendra Marina* I mention, has been taken notice of by others, before I spoke of it; for upon further Enquiry, since my Writing that Account, I meet in the

Acta Medica & Philosophica Hafniensia, of *Thomas Bartholine*, Vol. the 3d. pag. 87. the Figure of a *Sea-Insect* found at *Katwick-up-Zee* in *Holland* upon the *Strand*, and Communicated to the Publisher by *Oligerus Jacobus*, who gives it the Name of *Vermis Aureus* vel *Species Erucae Marinæ rarior*; which I am confident is the same with the *Scolopendra Marina è Mare Hibernico*, &c. in the *Philosophical Transactions*; tho' *Bartholine's* Figure is Faulty, and the Description short, false, and imperfect.

And I am likewise apt to think, that *Ulysses Aldrovandus* in his *Lib. 5. De Insectis* Cap. 15. pag. 636. design'd our *Scolopendra* by his first Figure in that Chapter, where he calls it *Scolopendra Marina lato corpore subcastaneo velut pedibus innumeris longiusculis aurei Coloris*, and says no more of it; but his *Icon* is much worse than *Bartholine's*, and requires some strength of *Phanfy*, to guess whether or no our *Scolopendra* is meant by it. And though it has been taken notice of before, yet it may in some sense pass for a *Non-Descriptor*, as I once thought it, the Accounts we have had hitherto of it, being so very *Lame* and *Imperfect*.

VI. *An Abstract of an Account of Five pair of Muscles, which serve for different Motions of the Head, on the first and Second Vertebra of the Neck; and of Two Ligaments, one of which fastens the Head to the First Vertebra, and the other fastens the First to the Second. To which is annexed the History of an Uncommon Appearance of a Humane Skull. By M. Dupre, Surgeon, and first Ayde-Major to the Hotel-Dieu in Paris: With Remarks by William Cowper.*

THIS small Tract was lately Printed in *French*, and sent from the Author to Dr. *Lister*, who Communicated it to me. The Author seems to put a Value on it, and expresses his Surprise, that such obvious Organs should escape the Observation of Anatomists: He hopes these Discoveries will excite a noble Emulation in those of his Profession, which was his principal Motive to Address them to the Surgeons of the *Hotel Dieu*.

‘ Just at the Root of the Transverse Process of the
 ‘ first *Vertebra* of the Neck (says he) arises on each
 ‘ side a Muscle that is four Lines (one third of an Inch)
 ‘ broad, and running obliquely inward, is Implanted
 ‘ to a small superficial oval *Sinus*, seated on the fore-
 ‘ part of the *Processus Styloides*; and this he calls *Ren-
 gorgeur Oblique*, or the oblique Bridler of the Head;
 and has express’d it, in his first Figure.

This

This pair of Muscles I have described in my *Myotomica Reformatata*, pag. 126. Printed in the Year 1694. where I have given them the Name of *Recti interni minores*, because they incline to a right Position, lying under the *Recti Majores*, and are Antagonists to the *Recti minores* on the back part. They may be call'd from their use *Annuentes*, because they nod the Head directly forward; one of them is express'd *in situ*, in my last mentioned Treatise, Fig. III. i, and in my Appendix to the Anatomy of Humane Bodies, Fig. 8. H. and Fig. 25. i.

' On the Transverse Process (says he) of the first
' *Vertebra* of the Neck there arises a thick fleshy Mus-
' cle, of about a Finger in breadth, which is insert-
' ed after a Perpendicular Ascent below the *Processus*
' *Styloides*, between the Mammillary Process and that;
' This he calls *Rengorgeur droit*, or the streight Bridler
' of the Head.

Both this and the former pair of Muscles I discovered in a Humane Body Thirteen years since; and about that time shewed them to Dr. *Brown*, in the presence of my Honoured Friend Capt. *Wine*: But in examining the Original Writers on the Muscles, I soon found this latter Pair were partly mentioned by *Oribasius* after *Galien*, and well enough described by *Fallopius* in these words: *Ultimo in loco notandi sunt Musculi duo admodum parvi qui à processu transverso primæ Vertebrae orti valde graciles ascendunt ad Caput, & in illud Inseruntur prope Mammillarem processum.* These are described and Figured in the above-mentioned Tract, p. 127. Fig. 3. k.

The Third pair of Muscles mentioned by M. *Dupre*, by him call'd *Rengorgeur posterieur*, seems no ways to differ (by his Description) from those commonly treat- ed of by Authors, called *Obliqui superiores*.

The Fourth pair he mentions seem to be parts of the *Recti Minores*; ' These (he says) are Auxiliaries to the greater and lesser Oblique Muscles; which I cannot but think a mistake, since those Muscles are employed in differing motions of the Head, on the first and second *Vertebra*; and therefore one pair of Muscles can't be the Assistant of both. He well observes, this Third and Fourth Pair of Muscles are not found in all Subjects; I guess he means distinct from the *Recti minores*. It is certain if we are allowed to multiply Muscles from their appearance in various Subjects, we shall never arrive to a perfect *Myology*: It being common to find Distinct Muscles in some Bodies which are not so in others, as has been frequently observed in the *Rhomboides*, *Psoas*, *Elevator Scapulae*, and many more.

' The last pair of Muscles mentioned by our Author arise from the midst of the Transverse Processes of the Second *Vertebra*, and are small, short Muscles inserted to the Roots beneath the Transverse Processes of the First *Vertebra*. These he calls the Flexors of the first *Vertebra* on the Second, from their use.

Having lately an opportunity of Examining these parts in a Boy; tho' much Emaciated, I could discover fleshy Fibres that resembled such Muscles, and that not only between the Transverse Processes of the First and Second *Vertebra*, but the two next also; and I am apt to think, the next to them in like manner; but my time would not give me leave to prosecute the Enquiry. However I can hardly persuade my self that those Muscles can bend the first *Vertebra* on the Second; the difficulty of which Motion in these *Vertebrae*, will be very manifest to any that will be pleased to examine their manner of Articulation: Since it appears that the two flat Processes of those *Vertebrae* are applied to each other in a Horizontal

tal manner, and are therefore only fitted for turning to either side, by means of the *Axis* or Tooth-like Process of the Second *Vertebra*. These Muscles I am inclin'd to think are Auxiliaries to the *Obliqui Inferiores*, but being very small are only employed in shaking the Head; either of them acting may draw the Transverse Process of the first *Vertebra*, to a Perpendicular with the Second; as when we express Sorrow by shaking the Head. The Muscles placed between the Transverse Processes of the other *Vertebrae* of the Neck, are Employed in drawing the Superior *Vertebrae* laterally.

The Motion of the Head on the first *Vertebra* is so manifest from the manner of its Articulation, that I cannot but admire, how most of the late Anatomists (as M. Dupre takes notice) should say it was only mov'd on the Second.

'The First of the Two Ligaments, mentioned by M. Dupre, is placed, he says, between the first and second *Vertebra*, in their middle and Foreparts; which does in no respect seem to differ from that described by Galen, Vesalius, and almost all Writers on the Subject; the like being found between the fore-parts of the rest of the *Vertebrae*.

'The Second Ligament (he says) is an Inch long, and of the bigness of a Goose-Quill, and is fastned above to the middle of the Elongation of the Occipital-bone, and the upper, middle, and anterior part of the first *Vertebra*: He adds, It is observable, when this Ligament is wanting, the *Aponeurosis* which fastens the Occipital-bone to the *Vertebra*, is Stronger and Thicker in that part. In this likewise I see no such Disagreement from the Description given by most Writers of the Ligaments of this part, as deserves the Title of a new Discovery; it being very obvious, that the middle of the

the

the fore-part of that Ligament is much thicker than any other part of it.

The First Figure of M. Dupre Represents the lower part of the Occipital-Bone, together with the Three upper *Vertebrae* of the Neck, viewed on the Foreside.

- A. *The Mammillary Process.*
2. *The Elongation of the Occipital-bone.*
3. *The hole in the Occipital-bone thro' which the spinal Marrow descends.*
4. *The first Vertebra of the Neck.*
5. *The Second*
6. *The Third*
7. *The Muscle which he calls Rengorgeur posterieur, or the Posterior Muscle which Bridles the Head. This I take to be part of the Obliquus superior, as will appear by comparing his Description with that in my Myotom. Reform. p. 120. Fig. III. b.*
8. *The Muscle call'd Rengorgeur droit (by Dupre) or the streight Muscle which Bridles the Head: This I have called Rectus Lateralis from its Position; It is described by Falloppius, and express'd in the last mentioned Figure at k.*
9. *The Muscle he calls Rengorgeur oblique, or the Oblique Bridling Muscle: This I have called Annuans, and Rectus internus minor, ibid. p. 126. Fig. III. i. Both this and the former Muscles are also Figur'd in my Appendix to The Anatomy of Humane Bodies, Fig. 8. and Fig. 25.*
10. *The Muscle which he calls the Flexor of the First Vertebra on the Second.*
11. *A Ligament whose upper part is fastned to the middle of the Elongation of the Occipital-bone, and the*

the other Extream of it, to the upper part of the first Vertebra; which seems to be part of that described and figured by Vesalius, Lib. II. Cap. XXX.

12. *The other short Ligament which is commonly observed between the Foreparts of all the rest of the Vertebrae.*

The Second Figure of M. Dupre Represents part of the Occipital-bone, together with the two first Vertebrae of the Neck, view'd from behind.

1. *The Interior part of the Occipital bone.*
12. *The Musculi recti minores.*
3. *The Fourth pair of Muscles mentioned by Dupre, which he calls the Auxiliary to the greater and lesser Oblique Muscles: These I take to be parts of the last mentioned Recti.*
4. *The First and Second Vertebra of the Neck.*
- A. *The Mammiform Process.*

These Figures being very ill done, I thought it would not be amiss to add Two Figures of the same Bones in the like Position, done after the Life; not only for the better Explanation of the above-mentioned Muscles, but some others also, which M. Dupre may perchance find in Dissecting these Parts, and take to be new Discoveries also.

Fig. II.

Represents part of the External Surface of the Basis of the Skull, together with the Foreparts of all the Vertebrae of the Neck. N. B. The prick'd Lines denoting the Progress of the Muscles on the Bones.

A. A, &c.

- A, A, &c. Part of the *Basis* of the *Cranium*.
- B B, The Two Mammiform Processes.
- C C, The *Processus Styloides*.
- D, The Elongation of the Occipital-bone.
- E, Part of the *Foramen*, by which the Spinal Marrow descends.
- a a, Parts of the Two Condyliform Processes of the Occipital-bone, which are received by the first *Vertebra*.
- 1, 2, 3, &c. The Foreparts of the Seven *Vertebra* of the Neck.
- b, b, The Transverse Processes of the first *Vertebra*.
- c, c, Their Perforations, through which the Trunks of the Vertebral Veins and Arteries pass.
- d, d, The Transverse Processes of the Second *Vertebra*.
- e, f, g, h, i, The rest of the Transverse Processes of the *Vertebrae* of the Neck.
- k, k, Parts of the Oblique Ascending and Descending Processes behind the Transverse.
- l, l, &c. The *Foramina* between the *Vertebrae* for the Egress of Nerves from the spinal Marrow.
- F F... The *Musculi Annuantes*, by M. Dupre called *Rengorgeur oblique*.
- G G... The *Recti Laterales* by him called *Rengorgeur droit*.
- H H... The Muscles, which he says, are the Flexors of the First *Vertebra* on the Second; which I rather think are employed in Shaking the Head, they arising from the Transverse Processes of the Second *Vertebra*, and ascend obliquely forwards to the First.
- I... The *Obliquus Superior* which M. Dupre calls *Rengorgeur posterieur*.

Fig. III.

The hinder Parts of the Bones, represented in the preceding Figure, with prickd Lines, as before.

A the Occipital-bone.

B B, Parts of the Lambdoidal Sutures.

C C, That part of the Occipital-bone where the *Splenius, Complexus*, and the rest of the Muscles of the Head cease to terminate.

D D, The Mammiform Processes.

E E, Parts of the Styliform Processes.

1, 2, 3, &c. The back Parts of all the *Vertebrae* of the Neck.

F F, The *Musculi recti minores*.

G G. . . . The Muscles which M. Duprè says, are the Auxiliaries to the greater and lesser Oblique; which I take to be parts of the last mentioned *Recti minores*, and not found distinct in all Bodies.

H H. . . . The *Recti Laterales*, mentioned by Fallopius.

I I. . . . The small Muscles placed between the Transverse Processes of the First and Second *Vertebra* of the Neck.

z. Another small Muscle like the former, placed between the Second and Third *Vertebra*.

K K, &c. The Four pair of Muscles I call *Interspinales Colli*, which are described in my Book of the Muscles, &c.

An Extract Concerning a Deformed Humane
S K U L L, from the same M. Duprè.

Nicholas Brodes, of Thirty Years of Age, having been Afflicted for the space of Ten Years with an Incessant Head-ach, (which for the last Twelve Months before his Decease had been more violent than formerly, and depriv'd him of his Sight) upon the 15th of *March*, 1697. was received into the *Hotel Dieu*. After his Head was shaved, there appeared a large Tumor, which extended it self over the Hairy Scalp. In the midst of the left Parietal-bone, there was the Pulsation of an Artery, and a small Fluctuation, the rest of the Tumor being exceeding hard. *M. Dupre*, fearing this might be an Aneurism, was unwilling to open the Tumor, till he was constrained to it, by the importunate Intreaties of the Patient, who chose rather the Hazard of his Life, than any longer to endure so exquisite a Torment. As soon as an Aperture was made, there issu'd out a quantity of thick concreted Blood, which wet the Bolsters at every Dressing. The Second day he felt a hard Body with his Probe, loose in the Flesh, which being taken out, appeared to be a small Fragment of a Bone Exfoliated, resembling a small Comb-brush. Upon the Fourth day the Patient dyed.

In Dissecting the Head, the Tumified part of the Skull appeared to arise more than an Inch above the sound Bone. The whole Swelling of the *Cranium* was made up of several Substances, not unlike little Horns, or innumerable small hollow Cones, with their points downwards; besides a great number of Bony Fibres, streight, stiff, and pointed, resembling the Teasels used
by

by Cloth-workers. In the next place there were several Holes, some of which Perforated the Skull, others not. There was no distinction of the Sutures. The *Meninges* were Mortified and Confounded together, and in part adhered to the Bony Excrescencies of the Left Parietal-Bone; nevertheless the Brain was found and entire. The inequalities of the inner Surface of the *Cranium*, resembled melted Metal poured down from a considerable height, on a light moving Sand; or the inside of a Grotto, in which the Stones jet out in an irregular manner. The whole Left side had lost its natural Figure; and the Right had only a few Impressions, made by the beating of the Arteries of the *Dura Mater*.

It is not unlikely (*he adds*) this might proceed from some Pocky Matter, but in an exact search of the Body no appearance of any such Distemper could be found. *M. Duprè* therefore imagines, the Blood Vessels of the *Diploe* might possibly be burst by some accidental blow on the Head, or eroded by some Acidities of the Humors, and the Blood be extravasated in its Cells; this stagnating, and by degrees arriving to a very high degree of Corruption; he thinks it is not much to be admired, that the more ponderous part (by its great Acidity) should dissolve the contiguous bone, and after it has penetrated that, by eroding such nice and sensible Membranes, as the *Pericranium* and *Dura Mater*, cause exquisite pains.

To explain the Irregularities of the Skull he premises, that its upper Plate is composed of *Strata* of Bony Fibres, lying Paralel to each other, and of an Arched Figure. Now when the Volatile Acid sublimes, (*says he*) and dissolves one end of the Bony Fibre, it must by its Elasticity spring up and become erect on the other. If more of these happen to have those ends which remain on the

Cranium around one point, they form the small Cones above-noted, by means of a viscid Matter which Cements them together, and fills up their Interstices: On the contrary, if they start separately they form a Capillary Appearance.

Mr. Cowper's Remarks.

What weight these Reasons may have with an Intelligent Reader, I shall not pretend to decide.

Excrescences not unlike this of the Skull, have been observed in most other Bones of the Body (the *Os Petrosum*, *Incus*, *Malleus*, *Stapes*, &c. not excepted) and the Disease is commonly called *Spina Ventosa*. It is remarkable, that the Bones of Children and young Bodies (especially their Appendages) are more subject to the like Accidents, than those in Years; by reason their *Fibrille* are much softer and apt to extend, whereby that part of the Bone it self grows Tumid, and frequently becomes Carious; and this probably might give occasion for Imposing the Name of *Pedarthroace* on that Disease, which is vulgarly call'd, *The Joint-Evil*. When the Cartilages on the extremities of Bones in their Articulations are eroded (and their Appendages thus Diseas'd) the Bony Fibres sometimes Germinate and Unite both Bones, in such a manner, that they afterwards appear to be one continued one, as I have seen in the Hip and Thigh-bone, and again in the Thigh-bone the *Tibia* and *Patella*, and frequently in the *Ossa Tarfi*, *Metatarsi*, and Bones of the Toes; many Instances of which are mentioned by Writers, in the *Vertebrae* and other Bones. This Union of Bones at their Articulations, may also happen through a defect of the Mucilage.

The Germination of Bony Fibres, after any Peccant Matter has destroy'd some of them, and relaxt others, is no more surprizing, than the Flethy Inequalities we commonly meet with in hollow Ulcers, of the softer Parts, as in the Membranes, Muscles, Glands, &c. Besides the Inequalities on the Surfaces of Bones thus affected, and their being very much distended, I have frequently seen divers large holes in them; (besides those for the Transit of the Blood-Vessels) some of which have pass'd quite through them: The like has been observed in both Tables of the Skull, as M. Dupre has taken notice, where part of the Bone has been dissolved into an *Ichorous* Matter, which sometimes has happened, and the External Teguments not been injured; of both these Cases I have mentioned Examples in the 93d Table, and in my Introduction to the Anatomy of Humane Bodies lately published.

VII. *An Anatomical Account of a Child's Head,
Born without a Brain in October last, 1698.
By Mons. Buffiere.*

A French Woman living at *Dung-hill*, of a good Complexion, and in perfect Health during all the time of her being with Child, was then brought to Bed of a Boy, as big and tall as a Child can be in that Age, well shap'd in his Body, and Limbs very sound, without the least mark of Corruption, except that his Eyes did look as if they had been placed at the top of the Forehead; the Skull was unequal, the skin

whereof,

whereof, though full of Hair, was a little redder than the rest of the Body.

The Midwife said, the Child came alive out of the *Uterus*; but tho' we cannot trust such Report, yet, 'tis certain, the Mother assureth, that she felt him stirring very often, but chiefly an Hour before she was taken ill for her Delivery, he was so troublesome to her by his Motion, that she could find no ease and quiet, but by her Husbands keeping his Hands fast upon her Belly, who affirmeth he felt plainly the Child's motions; and indeed the good Condition of this Child's Body, is methinks, sufficient enough to prove, that he was alive in the Belly of his Mother.

I was sent for to open this Child's Head, and here is what was found in it.

The Skin which did cover the Skull being taken off, the *Coronalis-bone* did appear lying flat upon the *Sphenoïdes-bone*, which was the Cause the Eyes did look, as if they had been at the top of the Forehead,

The *Squammosa* part of the Temporal Bones was wanting, there being but the *Os Petrosum*, which was in its natural place, and in which the Organs of the sense of hearing were in the ordinary Order.

There was no Parietal Bones, nor any thing equivalent, which likely was the Cause that the Coronal Bone, was set upon the Sphenoïdes.

Of the Occipital Bone, there was but the Basis which joineth to the Sphenoïdes, in the middle whereof was the great hole, through which the *Medulla oblongata* commonly passeth, all the upper part of this Bone being wanting, without any mark of having been corroded or gnawn, the edges of which were very smooth.

All the upper part of the Bones of the Skull being wanting; the Skin had no other support but its basis, which was the reason why the top of the Head was very unequal and rough.

No Brain at all was found, nor any mark in the whole extent of the Skull, that there had been any, there being no space left between the Basis of the Skull and the Skin to contain it; there was no *Dura mater* neither, the Bones being covered only with a very thin Membrane.

Neither the *Carotides*, nor the *Vertebræ* Arteries did penetrate the Skull, but by small Twigs, spread in the thin Membrane.

I did take off the Three upper *Vertebræ*'s of the Neck, before I could find the *Medulla Spinalis*, the beginning of it being under the Fourth *Vertebra*, like a small stump wrap'd up in the *Dura mater*; the *Medulla* was very sound, and not bigger than it is in other Bodies of that Age; all the Nerves which parted from it were in their Natural Order.

The Eyes were well shap'd, and all the Parts belonging to them, every one of their Muscles were furnished with the ordinary Nerves, the 3d, 4th, 5th, and 6th pair, and the Optick were in their natural Situation.

All these Nerves did terminate themselves in the holes of the Skull, through which they commonly pass, they did reach no further, nor had any Communication with any other.

All the Parts of the Face were natural, with their Muscles and Nerves; the Tongue was very fresh, and doubtless had performed the Deglutition to make the Child swallow the *Colliquamentum*, of which there was a good quantity in his Stomach.

The

The *Larinx*, and all the parts of the Throat were as the rest of the Body, in a good and natural Condition as can be.

I leave to others to explain how this Child could live, and move so long, without Brain.

I keep the Bones of that Skull in my House, where any Body may have a view of it, to satisfy their Curiosity, when they please.

VIII. Part of a Letter from *Monf. Geoffroy, F. R. S.*

Dated Paris, March 7. 1699 N. S. to *Dr. Sloane*, giving an Account of the New Regulations of the Royal Academy of Sciences, at Paris.

I Shall here give you an Account of the great Splendour that the *Academie des Sciences* has Received by the Regulations, Incouragement, and Orders, *Monf. L'abbe Bignon* has obtained to it from the King. That *Academy* is now compos'd of Ten honorary *Academicians*, which are chosen Learned and Eminent Gentlemen; of Eight Strangers associates, which are distinguished by their Learning; Twenty Pensioners Fellows, Twenty Eleves, and Twelve French Associates; out of the honorary *Academicians*, two are Elected every Year, one for President, the other for Vice-President; only Twenty Pensioners have every Year 1500 French Livres; and after the Death of one Pensioner, the Academy will propose to the King Three *Persons* Associates, or Eleves, or sometimes others; and his Majesty will call one of the Three for Pensioner.

Here is the Catalogue of the *Academicians*, the Names of honorary and Strangers Associates, who are disposed by order of Reception; but the others are distributed into Classes, into which the Academy is divided.

Academicians

Academicians 70.

Honoraires 10.

Affociés Etrangers 8.

President, *M. L'abbé Bignon*
 2 Prefid. *M. Le Marquis de L'hopital*
M. Le Chevalier Regnaut
M. De Maleseux
Le R. P. Sebastien, Carme
Le R. P. Malbranche de L'oratoire
Le R. P. Gouye Jesuite
M. L'abbé de Louvois
M. Fagon 1^{er} Medicin du Roy
M. De Vauban.

M. Leibnitz
M. Tschirnbaus
M. Guillelminy
M. Bernouilly a Basle
M. Bernouilli a Groningue
M. Hartsoeker
M. Romer
M. Newton.

Claffes 6.	Pensionnaires 20.	Elevès 20.	Affociés Francois 12.
Geometres	<i>M. L'abbé Galois</i> <i>M. De la hire</i> <i>M. Roole</i>	<i>M. Chevalier</i> <i>M. Lieutaud</i> <i>M. —</i>	<i>M. Maraldi</i> <i>M. Regis</i>
Astronomes	<i>M. Cassini</i> <i>M. Le feure</i> <i>M. Varignon</i> <i>M. Desbillettes</i>	<i>M. —</i> <i>M. Amontons</i> <i>M. Carre</i> <i>M. Parent</i>	<i>M. Cassini le fils</i> <i>M. De la hire le fils.</i> <i>M. De Chazelles</i>
Mecaniciens	<i>M. Geaugeon</i> <i>M. Daleme</i> <i>M. Du hamel</i>	<i>M. De Seine</i> <i>M. —</i> <i>M. De Litre</i>	<i>M. De Lagny.</i> <i>M. Tawory</i>
Anatomiftes	<i>M. Du Verney</i> <i>M. Merrie</i> <i>M. Bourdelin</i>	<i>M. Du Verney son frere</i> <i>M. Poupert</i> <i>M. Thuillier</i>	<i>M. Bourdelin le fils.</i> <i>M. L'anglade</i>
Chymiftes	<i>M. Homberg</i> <i>M. Boulduc</i> <i>M. Dodart</i>	<i>M. Geoffroy</i> <i>M. Boulduc le fils</i> <i>M. Burlette</i>	<i>M. L'Emery.</i> <i>M. Morin de Tou- lon.</i>
Botaniftes	<i>M. Marchand</i> <i>M. Tournefort</i> <i>M. De Fontenelle</i>	<i>M. Reneaume</i> <i>M. Berger</i> <i>M. Simon</i>	<i>M. Morin de St. Victor.</i>
Secrétaire	<i>M. De Fontenelle</i>	<i>M. Simon</i>	
Treforier	<i>M. Couplet</i>	<i>M. Couplet le fils</i>	

IX. An Account of a BOOK.

The Natural History of the Chalybeat and Purging Waters of England, with their particular Essays and Uses, &c. with Observations on the Bath Waters in Somersetshire. By Benj. Allen, Med. Bac. Printed for S. Smith and B. Walford, at the Prince's Arms in St. Paul's Church-yard. 1699.

THIS Treatise consists of an Account of the Original and Principles of the Chalybeat and Purging Waters of *England*, the Essays of the Particular Waters, and a Register of the Virtues and Properties of them. This the Author Recommends as a Work never yet done; from the Necessity of knowing the Qualities and Properties, of any Subject, and nicely stating the Cases they are proper in, but especially of this Subject of so general Use and extraordinary Virtue; and urgeth the Discovery of so great variety in the Waters and their Salts, as amount to essential Differences among those reputed of the same species, and which are used promiscuously, this he proves to answer Observation; and to the neglect of which Proprieties, he proves the want of Success to be much owing, as well as to the ignorance of their proper Place, and full extent of their Virtues. In the Chalybeats he discovers chiefly Four
forts

forts ; The Light, the Heavy Acid that takes only a Red with Gall, and does not retain it ; the Atramentous, that retain considerably the Colour, and those that have so great a share of the Salt of the Earth, as hindred their retaining the Colour they take with Gall, to all which he Assigns distinct Virtues. Particularly, the Light Waters he appropriates to Obstructions of the more remote and finer Passages of the Glands, &c. and the Heavy Acid to the Astringing and stopping Fluxes of Blood ; in the Virtues of the last the Author considers the Apoplexy distinctly, which he makes to proceed from a Vice of the Glandular Ducts, and not from any Obstruction in the Blood-Vessels ; evincing, *as he thinks*, that no Obstruction of them, or of the Brain, nor compression of the Brain can effect it ; and corrects the Notion of the continued Course of the Animal Spirits, to be the continuer or our Machin ; but the Spring of the Brain correspondent to and kept up by the Air, which he makes the use of Respiration, and which he argues to be destroyed in this Disease, by admission of Air with the Blood which breaks in, and that this Distemper is Cured by these Waters on that score ; what concurs to the Production of this Disease (which is to be regarded) whence it becomes so frequent ; this he makes to be cold received into the *Cortex Cerebri*, and affecting the *Succus Nutritius*, and mortifies it ; that it is so, the History he gives of the Diseases of the Seasons, he thinks, sufficiently evince : First from a general Course of the Diseases of the last Years, in which he proves the Cause to be the same ; and then chiefly, that upon the removing of the Matter from the Brain, it appears in rheumatick flatulent Tumors in the part where it settles, and which readily return to produce another fit : in all which he approves *Dr. Coles* use of the Glandular Secretion, and the

the Cause, which he assigns to be Cold ; only more nearly explains the reason and nature of it, the matter of which this Author supposeth to be more minute, than the common gross parts that affect us, and that the Great Frost did by no means introduce it, but helped to increase and urge it ; and this complication of Causes he considers in the Cure.

The *Purging Waters* he detects the Principles of, which hath been the Work of our greatest Men, and fruitless hitherto. And in the *Essays of the Waters*, observes so great variety of the Salts of them, and in the Nature of the Waters, in proportion to their differences : The Author in short, examines them, and offers their *Essays* to view ; besides some of the Waters which he thus proves to be the same with the fam'd ones of *Scarborow* and *Knarshorow* ; he offers some not known, and some not used at least before, which regards Diseases not Cured by the others.

LONDON: Printed for Sam. Smith, and Benj. Walford,
Printers to the Royal Society, at the *Prince's Arms*
in *St. Paul's Church-yard*. 1699.



Fig:III.

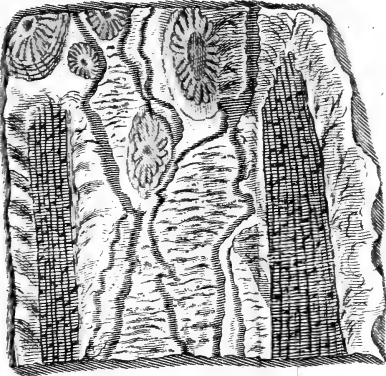


Fig:III.

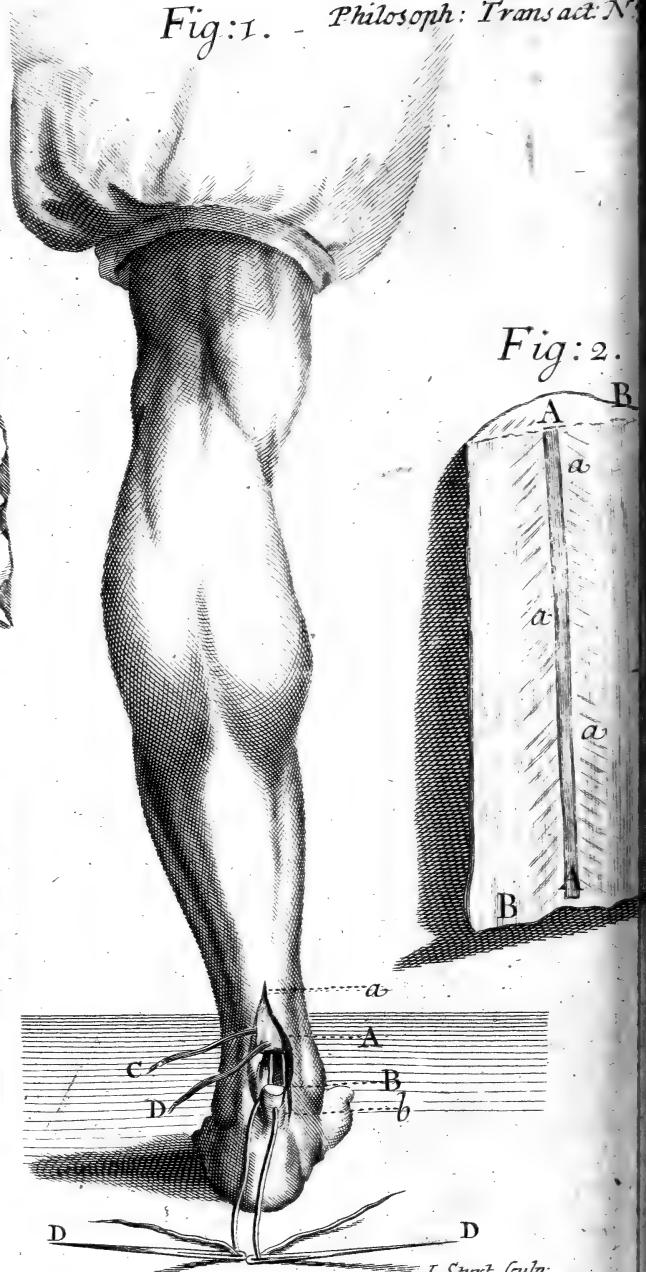
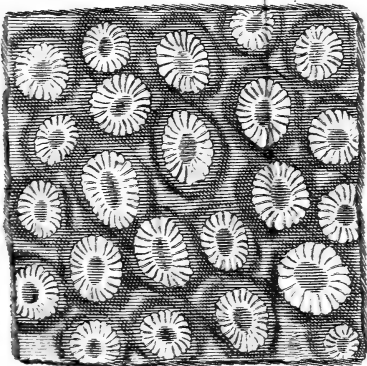
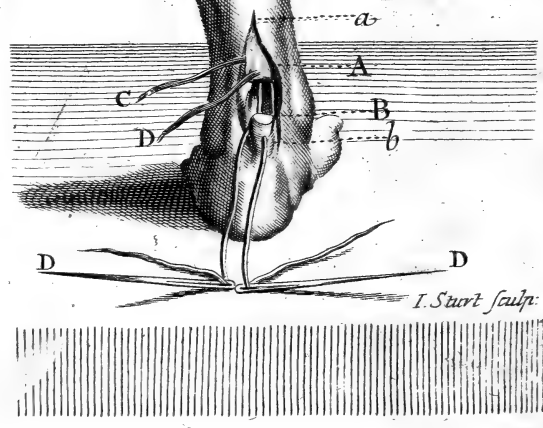


Fig:2.



PHILOSOPHICAL TRANSACTIONS.

For the Month of May, 1699.

The CONTENTS.

- I. *An Observation concerning a very odd kind of Dropsy, or Swellings in one of the Ovaries of a Woman, by Hans Sloane, M. D.*
- II. *An account of Stitching the great Tendon, between the Calf of the Leg and Heel, with its Union and Cure, after an entire Division of it, with Remarks: Read at a Meeting of the Royal Society. By Mr. William Cowper, F.R.S.*
- III. *A Discourse of the Operation of a Blister when it Cures a Fever, made at a Meeting of the Royal Society. By William Cockburn, M.D. of Col. Phys. & F. R. S.*
- Y IV. of

IV. *Of the Nature of Silk, as it is made in Piedmont, Communicated by William Aglionby, Esq; F. R. S.* V. *Two Propositions desired to be Answered.* VI. *Part of a Letter from Mr. Lluid, to Dr. Tancred Robinson, F. R. S. Concerning a Figured Stone found in Wales: With a Note on it, By Hans Sloane, M D.*

- I. *An Observation concerning a very odd kind of Dropsy, or Swellings in one of the Ovaries of a Woman, by Hans Sloane, M. D.*

MRS. Browne, Aged about Twenty nine, of a Sanguine Complexion, had been Married about Four Years, in which time she had had one Child: her Belly swell'd, and she thought she was with Child; she had often great Hysterick Fits, something like those of an Epilepsy, lying in her Fit sometimes without sense or Motion, at other times with great Screaming and idle talk. These, with proper Remedies, were removed at several times with difficulty. Coming to be about six Months gone with Child (as she thought) she began to have some doubt whether it were so or not, because she had her *Catamenia* very regularly: I was of Opinion she was not with Child, and would have treated her with Steel, and Purgers of Water, as Hydropically disposed Bodies require; but she fancying she felt the
the

the Child stir, put a stop to that Course, and went on expecting the good Hour, having prepared all things for the Child to be Born, and herself during her Lying-in. She delayed the proposed Method, for three or four Months beyond Nine, thinking she had counted wrong; but at last she was perswaded to Medicines, and underwent a very strict Course, as for Hydropick People; her Legs did not swell nor pit, her Belly was unequal, and the Swelling more of the Right-side, so that the Navel was thrust over to the other, or left side. She had also resolving Plaisters applied to her Belly, but all in vain, excepting that with much Anxiety, Gripes, and Trouble, so much Water might be evacuated, as to bring down her Belly three or four Inches; she then consulted other Physicians and Quacks, but in vain; and finding her Breathing very difficult, and reduced to a very narrow compass, she hearkened to a Tapping, or a *Paracentesis*, which was proposed by some as what would be the means of her Recovery. This was after a suitable Prognostick resolved on, and performed at several times, by discharging great quantities, of first a limpid thick Serum, as whites of Eggs, insipid and coagulable into the like Substance by heat; it came afterwards to the Colour and Consistence of thin Honey, and Coagulated on Evaporation. In some time she fell into a Fever, with a great Thrush, Hickups, and in about Nine days dyed. Out of whose Body, when Dissected after Death, was discharged some Buckets of the same Watery Substance that had been discharged by the *Paracentesis*; part of this was floating in the *Abdomen*, but far the greater voided out of great and thick Bags, some of which were as large as the Stomach, others smaller, many of them rotted to pieces, and all of them in the right Ovary or Testicle: the *Uterus, Tuba Fallopiana,*

piana, and every thing else being found, bating the *Omentum* which was quite consumed; what was very strange was, that several Bags of the larger size, in this Ovary, contained others smaller within them; and those who were larger, were filled with a Mellaginous Liquor; those smaller with one like Whites of Eggs. Here and there between were Apostems, which were but small, and filled with yellow Matter. The Gall-Bladder was full of several Triangular yellow Stones. She was very lean all over her Body, and never had her Legs swell or pit; nor the noise of Water on her stirring in Bed, till some small time before the *Paracentesis*, when she fell into so great an *Orthopnea*, that she could not, unless erect, Breathe.

II *An Account of Stitching the Great Tendon, between the Calf of the Leg and Heel, with its Union and Cure, after an entire Division of it, with Remarks : Read at a Meeting of the Royal Society. By Mr. William Cowper, F.R.S.*

ON the First Day of *February* last I was called to *Thomas Wheatly*, a Carpenter, Aged Thirty Years, who had totally divided the Great Tendon of the *Musculi Gasterocnemii* of the Left Leg, about Three Fingers Breadth above the *Os Calcis*. I found the upper part of the Tendon withdrawn from the Inferior at least Two Inches. I not being provided with Needles large enough for the Operation I design'd, I was obliged to step home to fetch them; and in my return I called on *Mr. Gooddiar*, an Experienced Surgeon, who was present, and assisted me in the following Operation.

The Applications being prepared, and Two or Three large Needles, with strong Silk in them well Waxed, I was first obliged to divide the external Teguments, *Fig. 1. a, b.* to come at the ends of the divided Tendon, *AB ib.* This done, the first Needle (*C*) I passed thorow the Body of the Tendon (*A*) about half an Inch above its divided Extremity. The second Needle (*D*) was thrust through this upper part of the Tendon, a little under the former, least the two Threads (or Silks) should meet each other at their decussation, in the middle of the Tendon. Afterwards both these Needles were passed thorow the lower part of the divided Tendon, as express in the last mentioned Figure *C. D.* The

Foot being held extended, the two ends of the Tendon were applied to each other, by the Assistance of the Ligatures (C. D.) which were so tyed, as to keep the divided parts close together, whilst the Foot remained in this Posture. After the four ends of these Ligatures were cut off I found it was necessary to bring the sides of the divided Skin nearer each other with one single Stitch, a little above the Suture of the Tendon. This done, a Pledget of Lint dipt in Balsam of Turpentine was laid on the Wounds, and another large Pledget of Flax, arm'd with *Linimentum è Gummi Elemi* over it. After the Application of common Bandages, Bolsters, &c. I found it was necessary to place a thick piece of Past-board, of a convenient Arched Figure, on the Fore-parts of the Foot and Leg, to keep the part Inflected, and prevent any motion of it, which might break out the Stitches in the Tendon. He complained very much in passing the Needles through the upper part of the divided Tendon; tho' its middle and internal part at the division, was scarce sensible of the touch of my Finger. He had no pain in passing the Needles through the lower part of the Tendon. After Fourteen Ounces of Blood was taken from his Arm, I left him on his Bed. Six Hours after (which was about Eight at Night) I found his Pulse somewhat quicker then before: He then took an Ounce of *Syrup. de Meconio*. The next Morning I found him in no ill Condition: He told me he had got some Sleep that Night, but was often awakened with twitchings in the Calf of the Wounded Leg. The third day after the Operation, I dress'd the Wound with the same Applications as before; only using a Fomentation, made of a Decoction of Wormwood, Sage, Rosemary, Bay-Leaves, &c. On the fourth Day after the Operation, I found the Applications on the Wound very wet with a serous Humor, commonly called a Glee.

On

On the Sixth Day the matter became somewhat thicker, and the Skin being a little distended about the Wound, I was obliged to divide the last mentioned Stitch, to admit of the free Discharge of the Pus, which on the two succeeding Days became much thicker than before, and the Gleet consequently lessened.

About this time the two ends of the Tendon were not a little dilated, and a white Slough appeared on it, towards the upper part of the Wound; on which, instead of the Balsam of Turpentine, I applied Tincture of *Myrrh*. Not many Days after, this Slough came off, and the two ends of the Tendon were over-spread with a Fungous Flesh, by which I was assured, that its Blood Vessels and Nutritive Tubes, were not compressed by the two first Ligatures. Afterwards I made use of drier Applications than before; sometimes using Lint only, and at other times *Pulvis Terebinthinæ*. About Ten days After the Operation, I found one of two Ligatures in the Tendon hanging loose, which I divided and drew out. Two or three Days after, I found the other Ligature loose also, which in like manner I removed. The Part all this while being kept Inflected by the Past-board above-mentioned.

I was often obliged to apply gentle *Escharoticks*, or lessen the *Fungus* on the Tendon. In less than Thirty Days after the Operation he went abroad very Lame-ly. And not many Days after, he told me he had walkt round *St. James's Park*; nor did any ill Consequence follow, tho' he employed himself daily in some fitting Work of his Trade; he still recovering more and more Use of his Foot; insomuch, that on the 26th of *March* following (which was within Eight Weeks after the Operation) he walkt from his Habitation in *Witch-street* without *Temple-bar*, to *Greenwich*, to see a large Whale that lay then on the Shore, and returned in a

few Hours. He has now recovered all the Motions of his Foot, and shews very little Lameness in Walking, and is not in the least incommoded in working at his Trade.

If it should be thought, I have been tedious in reciting so many particulars of this Case, it may be some excuse to have it known, that the Uncommonness of the Stitching of Tendons in general, and the Rarity of this Instance in particular, might make it necessary not to omit any Circumstance, since many Accurate Writers of the Operations of Surgery, either pass by this of Stitching of Tendons, or disapprove of it; and others describe the Practice of it, very different from what I have here Represented.

R E M A R K S.

Among all the Authors I have consulted on this Occasion, I can meet but with a single Instance of the like Case, which is barely mentioned by *Veslingius*, one of the most Accurate Anatomists of his time, who has express'd his great surprize at the Success.

It is a Common Opinion, That Stitching divided Tendons is hazardous, if not impracticable; nor has this Conjecture been without many Favourers of it among Chirurgical Writers; Tho' the Works of *Ambrose Parey* justly exact our esteem (particularly for recommending that incomparable Practice of tying the ends of Arteries, after the Amputations of Limbs, to restrain the Flux of Blood; and strenuously asserting it against his peevish Adversary, * *Bartholomæus Perdulcis*; which Practice has been but lately revived among us with Success :) I say, notwithstanding this Author has so well deserved from Mankind, yet I ought not to pass by what he has said in his Tenth Book, Ch. 36. where he tells us, 'Some Surgeons have been so bold ' as to sew together the ends of the Tendons of the ' Ham and other Joynts, when they have been quite
Cut

* Lib. 7.
C. 8.

• Cut asunder. But I durst never Attempt it, says he,
 • for fear of Pain, Convulsions, and the like horrid
 • Symptoms. (To this he adds) For the Wounds of that
 • large Tendon: which is composed of the Three Mus-
 • cles of the Calf of the Leg, and goes to the Heel,
 • I have observ'd when it hath been Cut with a Sword,
 • that the Wounds have been long and hard to Cure;
 • and besides, when at the last they have been healed;
 • so soon as the Patient hath got out of his Bed, and en-
 • deavoured to go, they have grown ill, and broke
 • open again.

I had once an opportunity of observing the like in a
 Wound of this Tendon, which nevertheless ought not
 to discourage Surgeons from Stitching it, when it is en-
 tirely divided, as the preceding Instance will Evince.

Hippocrates seems to favour the Opinion, That
 Nerves or Tendons would not grow together when en-
 tirely divided; nor does he any where (that I can find)
 speak of Stitching them.

De Morb.
 L. 1. m.
 pag. 450.

Tho' Galen does not propose the future of divided
 Tendons, yet * Guido pretends he tacitly Acknowledges
 that Practice, in saying, † They are Cured as other Ulcers
 and Wounds are, i.e. Guido adds, *Quod alia Ulcera san-
 tur, ut serventur partes adductæ.*

* Tract. 3.
 Doct. 1.
 Cap. 4.
 † Meth.
 med. C. 3.

Avicen says, *Si autem dirumpatur in latitudine Ner-
 vus tunc necessarium est suere ipsum, & si non, non conglu-
 tinatur.* The like Opinion with Avicen is Gul. e Salice-
 to Lib. 2. C. 9. Rogerius, L. 3. C. 13. Lanfrancus, L. 2.
 C. 9. Doct. 3. C. 3. & in Chirurgia parva, C. 4. Nicolaus
 Florentinus speaks of the Suture of Tendons, and so does
 Brunus, L. 1. C. 5.

Fen. 4. T.
 4. Cap. 2.

Guido Contends for this Operation, and Answers the
 Objections those make, who say these parts will not
 grow together again by the first Intention, and must
 therefore be supplied with a Foreign Substance, which
 will

Handwritten notes in the right margin, including references to 'Vig. 23' and other medical terms.

will break the continuity of the Pores, and obstruct the Passages of the Spirits. *Vidi* (says he) & *audivi in multis Nervos & Tendines incisos, & eos ita restauratos Sutura, & aliis auxiliis, ut postea incredibile videretur ipsos fuisse incisos.*

Macius Aurelius Severinus also pleads for stitching of Tendons: Here I must not omit taking notice of a Misrepresentation this Author makes in citing a Passage from *Ambrose Parey*, where he only acquaints us of a Tin-case, or Thumb-stall he caused to be made, to keep the Thumb Erect, after its extending Tendons were completely divided; Nor does *Parey* say, those Tendons were afterwards joyned together again, as *Severinus* represents. *Petrus de Marchettis*, Obs. LXIII. takes Notice of this Mistake of *Severinus*, and Censures him for promoting this Practice of Stitching of Tendons.

Felix Wurtz assures us from his own Experience, and the Practice of Others, that Tendons totally divided will unite again, by stitching them together.

Epist. xv.

The Learned and Ingenuous *Joannes Vessingius*, in an Epistle to *Fabricius Hildanus* (where he cites divers Inconsistencies out of *Galen*, concerning Wounds of the Tendons) produces an Instance not unlike this I have related, *Vidi* (says he) *in parentis mei amanuense Othono Lofero Tendinem à Gasterocnemio & Soleo Musculis conflatum, paulo supra Calcis os dissectum, suturis aliquot à Chirurgo junctum.* (To this he adds) *In Arabe item cui acinace Tendo à Tibiæ Extensoribus constitutus transversim sub Patellâ genu Vulneratus, similem in modum à Tunitario Chirurgo adducebatur: Detestabar hominum audaciam, sed felix successus & vix notabile à peracta curatione detrimentum, timoris mei vanitatem arguebant.*

Mon. Brenaise, is said to be the Reviver of the Practice of Stitching divided Tendons. The † *Miscellanea Curiosa*, and *Mon. Verduc*, give us differing Accounts of his way of operating; the manner mentioned by the First seems not Practicable; nor is *Verduc's* without Perplexity, and scarce intelligible.

† An. 13.
Ob. 121.

Mon. Vanguion in his Chirurgical Operations (lately Published in *English*) follows the Account *Monf. Verduc* has given of *Monf. Brenaise's* manner; in which they both agree, that one end of the divided Tendon must be drawn over the other, which could not have been done in the present Instance; nor do I believe it is necessary in other Cases; or that so many Compresses they speak of, should be useful in the Sutures of Tendons; concerning which their Writings may be consulted.

Besides these, there are other Writers of Chirurgical Operations in *French*, who pretend to give an Account of the manner of Stitching of Tendons, and seem to acquiesce in *M. Brenaise's* Method.

Nuck in his Chirurgical Operations, describes this amongst the rest, in these words: 'Thus I pass (*says he*) a strong Waxed Thread through the extremities of the divided Tendon. This done, by the Assistance of a Compress of Cork or Leather, the ends of the Tendon may be drawn to each other, and the Ligature will be firmer; nor can there be such Hazard of the Laceration of their ends, as in tying them without a Compress; he not saying any thing of either end of the Tendon being brought over the other.

Tho' the Authority of so many Writers would have prevail'd with me in some measure, to have an Opinion of the Success of such an Attempt; yet the Contradictions of Others, of no less Note, would have left me
dubious,

dubious, had I not some time since seen large Blood-Vessels in the Tendon of a Horse's Leg; which at that time Convinced me, that Tendons, as well as Bones, and other Parts, would Unite, tho' they were quite divided, in case the Neighbouring Parts remain entire; if their two Extrems could be Artificially applied to each other, without Compressing all or the greatest part of their Blood-Vessels. This distribution of the Blood-Vessels, is exprest in the annexed Figure 2. where one Trunk (*A A*) with its Branches (*a a*) to the *Fibrilla* of the Tendon (*B B*) is exprest: whether it was a Vein or an Artery, I could not discover in that Subject, but in all probability, both those Vessels have the like Disposition in such large Tendons. I am enclined to think the like Distribution of Blood-Vessels is not to be found in the Tendon, which was divided in this present Instance; but that its Blood-Vessels pass into it and back again at its internal side, next the Muscles of the Toes and *Tarsus*; which ought to be taken Notice of by the Operator in the like Case, and that he does not free it of its Fat and Membranes next those Muscles, lest its Communication with the Blood-Vessels be destroyed.

III. *A DISCOURSE of the Operation of a Blister when it Cures a Fever, made at a Meeting of the Royal Society, by William Cockburn, M.D. of the Col. of Phys. in Lond. and F.R.S.*

IN Pursuance of an Order of this Society, I shall Endeavor to Entertain you with a reasonable Account, *How the Raising of a Blister may Cure a Fever, and its most terrible Symptom the Delirium, and that in Six, Eight, or Ten Hours.*

This I chuse to do towards the Improvement of my own Profession; and to mind some malicious People, that we are not wholly imployed within these Doors, in the Describing the Features and Dresses of Flies; but in discovering too, how they may Benefit, and Hurt Mankind; which is the ultimate end of all our Study.

When I first resolv'd to make this the Subject of my Discourse, I design'd to be more full, and to have extended it to an Enquiry, about the Power these Instruments had to make a Wound, in what Manner, and for what Reasons such a Wound was made, and produced such effects: But the Subject proved endless; and I can assure you by much too long for this place; tho' most Authors have gone it over slightly enough.

It is not necessary to give you a List of these Simples that have been found to make a Blister; since that is as useles to you, as it is Foreign to my purpose. Neither is it profitable, in our present Business, to lay before you the common and visible effects of laying on a Blister: For I may believe, that there is hardly one

n this Kingdom, who has liv'd so long as the youngest Man now in this Room, that has not had either one himself, or seen it on a Friend. He has seen a Plaister, the great Ingredient whereof are *Cantharides*, laid on a fleshy part, and to have forced up the Scarf-Skin with a Liqueur, that Oosed and Issued out from within the Sphere of Activity of that Plaister; and if we consult the most of Physick-Books, the account is no better, but sometimes worse.

Turn over a famous Author, where he writes of our present Subject, and he tells you, that there is a very great Analogy between the Operation and Blistering by Fire, and the known Instruments for making of a Vesicating Plaister, and then adds, That *particulæ igneæ haud vehementer nimis applicatæ cuticulam absque continui Solutione penetrantes cutim ipsam ubi vasorum Sanguiferorum, Nervorum, fibrarumque nervearum extremitates terminantur subeunt; ibidemque has à positione sua alterantes, varie contorquent, & totius texturæ cutaneæ conformationem pervertunt: in tantum, ut è vasis omnibus summe irritatis, humor aqueus particulis igneis imbutus, & propterea tum à sanguine, tum à succo nerveo rejectus, in magna copia expuitur: Lympha isthæc, quia cuticulam pertransire nequit, eam à Cute separat, atque in molem vesicularem attollit: è qua demum sponte, aut occasione-liter disrupta effluit.* Then he more particularly adds this concerning the Raising of a Blister with *Cantharides*, viz. *Ubi primo in Spiritus, & dein horum affectione in humores & partes solidas agunt.* Afterwards, *Quod autem illa primo in Spiritus agunt inde constat, quod in defunctis vim nullam exerunt: etiam in languidis malum omen est, &c.*

This is an Author of the First Form, and I doubt not but that these his words prove sufficiently what I alledged: that little or nothing has been said more particularly

ticularly then any one may observe every day ; supposing only that he thinks that our Flesh thus covered at any time, with a Blister, is made up of many and divers Vessels, out of which the Discharged Water may come : And not to be Nice with our Author, I must observe that he falls into as great errors, as can be imagined, when he pretends to see more than the most common and ordinary Person. He says that the parts of Fire, and consequently those of a Blistering Instrument, make their way without a *solutio continui* ; that they attack the ends of all the Vessels, or the extremities of all the Vessels ; and to be more particular he tells us, that they, first of all, affect the Spirits. Now I say he tells us all this, because he does not endeavour to prove any one but the last ; and that, I think, he had better left unproved too. It looks a little oddly that all this should be done, merely by entering the Pores, and yet it is not that he seems to hint ; tho' I cannot well imagine how he did apprehend it to be done : But that they should attack the extremities of the Vessels, and even the Spirits first, is a vast Contradiction to the Circular Motion of the Blood, and to the way of making a Blister : We shall find unanswerable Difficulties, not only in the Circulation of the Blood, but that the Blood should move at all ; if once we are able to prove that Vessels have ends, or that they terminate in any manner of way but in themselves.

It cannot so much as be brought as an excuse for this Author, that by the extremities of the Vessels he may intend the Vessels of the extremities : this is by no means proper in this place, if his words could bear it. The reason, indeed, he brings for the parts of a Blister first beginning with the Spirits, is the most wonderful thing in the whole matter, even more than Blistering it self ; because, says he, they are of no effect

with dead People. *Good God!* Should this Author have pronounced all the most probable things imaginable upon this our Subject; could any one, be perswaded after this, that he had made any discovery at all? Take a Lancet, and Lett Blood of a Dead Man if you can; Is the Consequence that you never could, because now you bring no Blood? Is it to be supposed, that the stagnating Blood should come out at the invisible emissaries that are made by a Blister? Is it to be thought, that there can be any *Inflexion*, any *Compression* in the Vessels of a Dead Person? And are not all these the evident and necessary Conditions for making a Blister? How is it then reasonable to think to raise a Blister on any one that is dead: or of what weight can a Consequence be, that is founded on such an Experiment.

I have made this necessary Digression to put mind you how slightly this matter is treated of among us; and to convince you that it is not only hard to speak up to the worth of our Subject, and with that Particularness that both the thing and you do require; but that it demands a longer time than can be well allowed to a Discourse of this kind. You will be still more satisfied of the Truth of this, when I tell you, That I should have thought my self obliged

To prove and determine the Cause of the Motion of these Parts of *Cantharides* that Blister, not only by giving a hint what they are, but with how much force they are brought from the Blistering Plaister and driven into our Skin, Vessels, &c.

I could have satisfied you about the Nature of the Emissaries they make; how, and from whence the separated Liquor is brought between the Skin and

and Scarf-Skin: That nothing more is necessary, besides the making of these small Wounds, for the discharging of this watery Substance by a common Blister.

That the Vessels are indifferently attacked and broke upon by these wounding parts; and tho' the Veins are more apt to be affected, yet

That no Discharge is made from them; or that they do not contribute to any of that Liquor, we see gathered between the Skin and Scarf-Skin: and *Lastly,*

I should give a reason why this Watery Substance should be denied a Passage in the Scarf-Skin, or in a very small and inconsiderable quantity; notwithstanding that these wounding Particles do pass through *both* the Skins and all the Vessels, and for that reason the Wounds may be supposed to be of equal bigness, and equally capable to transmit the Liquors.

Do but think then that I had insisted on Vescication, in general, or that I had prov'd every one of these particularly, as I can do. What had I done for time, and Patience, to you my Hearers, in a Discourse about a Blister? Any one, but your selves, should be ready to believe, that either there can be nothing of that Consequence in the thing; and that they wou'd rather throw away Medicine altogether, at least Blisters out of Physick, than to be troubled with a Discourse so long, that it is more painful than a Blister it self.

I must beg leave to tell you, at this time, that I have employed Microscopes to look on the Fly, and its Powder; to see if I could discover any sharp Instruments, Swords, Daggers, or the like sort of Armiture, in these Warlike and Wounding Creatures. The Fly became a
very

very Delightful, but too large a Survey for me ; and the Pouder begot nothing for my Sight, but a dark Cloud ; and whatsoever else I found, I could meet with no Arms ; which makes me think that if they have any, as needs they must, they are concealed, and are to be discovered in another way. Wherefore, I retir'd with my *Cantharides*, and turn'd half a Pound of them into a Retort, that I might try their temper that way. *Wonderful !* there my Enquiry was fully satisfied : There came over with the least Sand-heat and in a very short time, vast quantities of Bodies so very small, that I was not able to discern their shape. This convinced me, that these Particles were very many, and might have an indefinite determination ; since they were so undiscernibly divided, by so weak an Agent, yet with so great force : And therefore, that all the World will grant that they can make a Wound ; and when the force is known, their Power will be found to be of a large extent, which is all that I am concerned with at this time : Insomuch, that I should be perswaded not to name the Process, but that I know that it will please you to discover what I met with in my Tryals on this Animal ; since nobody has given any tolerable account of them : All the Authors have suppos'd their parts to be very fixed, very acid, and very corrosive ; Doctor *Grew* alone has found that they are *Alcaline* ; but he will place them among the last and weakest of that Tribe : tho' I hope that the following Account shall be more Instructive.

I retired then with my *Cantharides*, and to the purpose I told you before ; only, it is very remarkable, that though I proceeded in the usual way, on the like Occasions, the whole Operation was performed very soon, and so hastily, that very little *Salt* stuck to the neck of the *Retort*, and the volatil *Salt* shot in most delightful Crystals in the Receiver. Of the whole Eight

Ounces

Ounces of *Cantharides*, there were only two Ounces and five Drams left as a *Caput mortuum* in the Retort: When the Liquor came to be purified, the smallest heat brought it over suddainly, *Oyl, Salt, and Spirit*; so that they could not be parted till, by a repeated Operation, with Brick-dust. I mix'd the Spirit with *Salt of Wormwood, Spirit of Harts-horn, and Sal Armoniack*; but it did not *Ferment*, contrary to the Expectation of most Authors: Then I turn'd it over upon *Spirit of Vitriol*, where it did *Ferment* very strongly, and yet better with *Spirit of Nitre*; with which also I did mix the Spirits of *Sal Armoniack* and *Hartshorn*; but they neither fermented so long, nor with so great an *ebullition*; from whence it is evident, that it is not only *alkaline*, but a great deal more than any one of these I have now mentioned.

Since I began this Enquiry, I met with a Book call'd, *A Compleat Course of Chimistry*, in which the Author supposes that the Parts of *Cantharides* are very fix'd and very Corrosive; and to try what that Animal gives, he mixes *Spirit of Wine and Nitre*: a very strange way to try the Qualities of any simple; and makes a Conclusion which my mentioned Experiments prove to be very false, and very unnatural. But he had an end to serve, and would put upon the World a very unsafe Medicine.

Yet, since he has brought us on that Subject, and we are now among *Cantharides*; Creatures that have set all the Physick in this Town in a *Combustion, or Ferment* (to use the universal and common word) to leave the thing quite untoucht, would be to acquiesce in a greater indifferency than really there is; and yet you see that it is not directly to my purpose: and therefore to take just measures and oblige both; I shall give some hints, and that only to state the Case, which is more than has
been

been done in the whole Controversy, and leave them to dispute in close Quarters, and not to Skirmish so much at random as Mankind is apt to do; which proceeds from nothing more than a greater Love to *Dispute* than to *Know*; and I hope that these hints shall be such, as, if us'd as the Topicks in the Controversy, will soon put an end to it, among *thinking* and *sober* People. And first I would observe, that the great Arguments that have been us'd, are a few Instances of a far greater number of Authors that have spoke to this Subject: Next, these Arguments are very often the Flourishes that Authors make in delivering of things, which is a prodigious Fault; for when Truth is not spoke in as few and express Terms as is possible, it gives great occasion to mistake: This is not evident in this case only, but in every thing of the same sort; and we see what the Church, what the Christian Religion has suffered in this way; and Thirdly, that there is no opinion so absurd, that has not a Voucher and a Patron some where, or at some time: And Fourthly, what Consideration Historical Proof bears to that of a *present Fact* or *Reason*.

Well then; this is the next thing that is challenged, *That we may see Cantharides, which have been reputed poison, now Corrected, and are not only innocent, but prodigious Instruments of Health.*

For the clearing of this; first settle *what a Poison is*; and next, since Death, or no Circulation of the Blood, is its Consequence, we must find as many kinds of Poisons as there are ways of stopping the Blood's Motion; which is either, by its own *rarefaction* to a degree, its Coagulation, or lastly, by *letting it out* in such a quantity, that the remaining part gives not Animal Actions; and as *all* or *any* of these may be *sudden*, or do produce their effects in *time*; we shall have *evident Poisoning*; or *Poisoning*

soning for a time ; of which we have many Histories. Again, it may be askt, of which of all those *Cantharides* are ; and of all I believe they may be found entirely, or most especially of the third sort.

Then we shall be led naturally into the next Stage, which is to be satisfied, if they be corrected ; or in plain English, if they have left their wounding Power, and this is the Fact, of which we may inform our selves, by applying a Plaister of *Cantharides* so corrected, to a place exposed to Air ; and this will settle the Fact of Correction, and in Circumstances much to the advantage of the Correcting side ; because, there the Skin and Vessels are much harder, than those to be met with within the Body ; and if they Blister then ; much more when internally given. The possibility of their being corrected, and of their becoming useful may not be doubted of ; but then it is our reason, in this way, that must be judge. Add to all this the common Observation, that a common Blister sometimes makes Bloody Urine, and compute what quantities enter the Plaister ; and then what quantities of small parts may be sent from them that are thus mixed : Next calculate what probable distribution may be made of these parts to the Kidnies ; and then you'll find that *Parts* that are nearer, and as susceptible must be wounded too, and produce all the ill effects that are supposed and commonly seen. But if all this can happen by so small a quantity of the Pouder that goes to the Plaister, and is confined by the other viscid Ingredients of it : What ? what can be the Consequence of this Pouder when it is taken Inwardly, and in Substance ? But it is Corrected ; and we are told with Camphir. The most unfit correcter so far as I can expect in reason, or even imagine : but still our reason may be frail, and so it may and really is

so, to a great degree: But then to help it in the way I have already propos'd, I had two Blisters each of them with *Cantharides*; and one of them with as much *Camp*phir as *Cantharides*: I say, I had two Plaisters apply'd after this manner, and for the reasons I just now mention'd. Behold what was the event! what found we next Morning: We, I mean Mr. *Brookes* an Apothecary who made them, and my self; we found that Blister wherein the *Cantharides* were mixt, to have quite as good effects as the other where there was none. What's the Consequence: that is already determin'd, *viz.* That if *Cantharides* said to be Corrected make a Blister when apply'd to any external part of the Body; that they are to be thought, not to be Corrected: which is the case in hand. But to leave these Particulars to be spoke to at greater length, by those who are Concerned; I proceed to prove the way of a Blisters Working when it Cures a Delirium and a Fever, as I at *First* Propos'd.

The present Enquiry is plainly this astonishing Phænomenon that is so often observed, that the Delirium and the Fever are almost quite defeated by applying a Blister; and in the space of Six, Eight, or Ten Hours.

The most sensible, and the most visible effects of applying a Blister, every one of us that are Physicians or not, observe to be nothing else but the bringing a great quantity of watry Substance between the Skin and Scarf-Skin, and that by applying to the part thus Blistered, a Plaister made with *Cantharides*; or the like Substances, that Experience has taught us that they can Blister: And therefore, since I have shewed you the many Particulars that any one that is to speak to Blistering, in general, is oblig'd, by the Rules of plainness

ness to insist upon, and that they should swell this Discourse beyond the Bounds of this place; I shall only suppose,

1. That there are very mobile, or Volatil Parts in *Cantharides*, &c. that can be determin'd into our Flesh, with a force sufficient to make their way thorow the sides of any Vessels that are in the lines of their direction, so long and in that proportion that their impress'd motion does continue.
2. That all sorts of fluid Bodies contain'd in the Cavities and Channels of these Vessels may be transmitted, according to the Conditions of Separation of fluid Bodies running in Vessels of that sort, and the wideness of the emissaries made by wounding Particles of *Cantharides*, or any such like blistering Substance.

Next I should proceed to make some Suppositions, from the Nature of a Fever, and a Delirium, that look more particularly to, and may contribute in the discussing the difficulty of our present Subject: But because all my Learned Hearers may not have applied themselves so very much to this kind of Natural Philosophy, and that I may not be too uneasy to them by not being understood: it seems to be very necessary to hint some general things about them, that they may be better able to judge in the Performance.

FEVERS in respect of time, either remain after the same manner from the first sickening, till the sick Person is freed of his Disease, nor not: if the first, they are call'd Contin'd Fevers; but if the sick Person continues evidently in a sickly way, and yet has great Reliefs, and almost free of his Illness, the Fever is said to Intermit,

termit, or that it is Intermitting. Now that, whatsoever a Fever may be, there can be no Fever but of one of those two sorts is most evident, tho' the *first* we shall have respect to most especially in our present Discourse.

Again, since Physicians not only discover other Diseases, but Fevers too, by the Pulse, and any Body, as well as a Physician, is apt to say my Pulse beats very quick, I am in a Fever. The quickness of the Pulse, in every common understanding, is the fault of the Pulse; and the Pulse cannot be so but by the Faultiness of the Blood, either in quantity, quality or its Motion: Neither can it offend either in quantity or in quality, but it affects its Motion; and since there are no Symptoms that appear in any time of a Fever, either before it, at the time, or after it, but what necessarily depend on this faulty Motion. This observable defect of its Motion, is the most evident, sensible Rule of a Fever, both to Physicians and every Body else, and is not only a sign of, but is a Fever it self. And therefore give me leave to

Suppose 3^{dly}, That a Fever is an universally heightened Circulation of the Blood, and that a Delirium, *b. e.* that unconnected, incoherent and ridiculous way of imagination and expressing our selves in a Fever, is entirely the effect of this greater Motion, whose discoverer is a quick Pulse, and in the way I have explain'd it, in the 47 Page of the first part of my Book of Seaficknesses.

These things being supposed, the question has quite another Face: which might be stated this way: *How wounding by Cantharides makes our Pulse not so quick,* and consequently our Blood to have a more slow and natural motion; our cited Author will have this great effect, with all its Circumstances to proceed from the
 pain

pain that is, sometimes, made in the time the Blister is a making. Others, that some of the Particles of the *Cantbarides* that mix with the Blood, do induce this quiet, by a peculiar sort of fermentation they make in the Blood.

I think the naming of these Opinions, is enough to show how unsatisfying Accounts we have of them. That pain very often brings a Fever, is his own, and the Opinion of all the World. And I think, if it is to be imagin'd, that so constant a Cause can produce an effect so unlike that which does most commonly attend it; we should have had a better Account of the Accident; and since that is not done, the falsity, and precarious putting on our understanding is too evident to require any further Consideration.

The other is as precarious, and quite as unsatisfying, tho' not so false, if the matter was well accommodated and made the Subject of our Understanding. All the World is full of Fermenting, and every thing is said to Ferment; and yet what Fermentation is, and what necessity there is for it in our Bodies especially, these Fermenting People, that talk so much of it, have not yet so much as told us. That by Fermentation, Bodies change their motion, in its *degree, direction, &c.* is most certain: and really here is a most considerable alteration in the Blood's Motion, as we are inform'd by our Pulse; and therefore it might be supposed that it did Ferment. But then it should have been a most considerable and useful Enquiry, to know how the particulars of *Cantharides* do Ferment, and the ways of affection to make this great Change. I have shown in another place, that there is no such thing as a Chymical Fermentation in our Blood, and that from hints of an eminent Member of this Society, and perhaps the greatest Chymist that ever Liv'd: and now the sequel of my
Discourse

Discourse will prove, that this great Change is made without any Fermentation, or any kind of Fermentation, in the most tolerable and sober sense.

I do not name a third Opinion from the quantity of *Lympha* that is now separated from the Blood, because most of our Modern Physicians do acknowledge, that that is a weak cause for so great an effect; and it shall appear, by and by, that whatsoever so great a Discharge might perform in the same way we consider other evacuations; that yet it cannot account for the Cure, in so short a time, no more than they. So here are Considerations taken from the solid Parts, by making Pain of some Benefit; from the Liquors in the Vessels, by Fermentation, and the Liquors out of the Vessels, by the discharged *Lympha*: and yet not one of them to answer the Phænomenon, even supposing they were spoke to the best advantage. Here seems to be all the exactness imaginable, and even nothing left. Let us state the question again. *A Delirium which is the effect of this quick Pulse, which is Cur'd by the Wounds of Cantharides, or a Blister.*

The Pulse is nothing but the side of an Artery that is distended, by a certain quantity of Blood that is determined thorow its Cavity, by a certain motion at every time the Heart is Contracted, and that touches and beats up our finger when we lay it on a place where we may be sensible of this affection in the Artery. We say this Pulse is more frequent, not so much that it beats oftner than any other Bodies, but that it beats quicker in the same Person when he is said to have a Fever, than before, when he was reputed to be in perfect Health; so that a Physician is oblig'd to know the natural Pulse of every Person, before he can judge by the Pulse, that any one is Sick. And how that may be done, I have show'd at length, in a Book some time ago. Howsoever,
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in this our Case, the *Pulse* is quicker, and there is no Pulse, but when the Heart is contracted; and the Heart being a Muscle and contracted at every Pulse: The Heart is either the chief or only Cause that determines this Liquor, that distends and stretches the sides of Arteries and makes a Pulse; or a very extraordinary measure of such distentions: But as I said it has the greatest share in propelling the Blood round the whole Body, in respect of the help of the Arteries, which they are supposed to give by their restitution, after their extraordinary Distention. Be it how it will, both their actions are by Contraction; (tho' afterwards I take no notice of that of the Arteries) and no Contraction in Muscles was ever supposed by any sober Man to be perform'd, but by an Influx of Spirits into the Fibres of the Muscles so contracted. So that now our question changes thus, *How wounding by Cantharides makes the Contraction of our Heart weaker.*

The Contraction of Muscles, and Consequently of the Heart, being by the Spirits that flow into them, as I have said before. Therefore whatsoever weakens the Contraction of any Muscle; suppose the Heart, must either be such a thing that can hinder the Separation of these Spirits; or intercept them in their Channel of Conveyance to that Muscle; after they are separated.

The Spirits are known, by Anatomical Experiments, to be separated from the Blood in the Brain: now, whatsoever hinders the separation of the Spirits from the Blood must either hinder that Rarefaction of the Blood, that comes by being broke down into small parts, and makes them Spirits in their proper place, or the Blood of that fineness, that is necessary for it to be perspired, *b. e.* a Body that affects the Blood so, as not to separate Spirits, must be of a Nature to make its Parts more compact

in their Contract ; to have their Contract with a greater *Nifus* , and consequently to have its Parts less separable.

The next way is by affecting its Motion, so that it discharges great quantities out of the Blood ; by these means the quantity of the Blood being lesser, it gives fewer Spirits, when it is broke down ; and is not so capable to be so Comminuted, because of the parts of Blood not pressing so much one upon the other in the whole Course and Time of Circulation.

Or Thirdly, by some means that affect the Parts that transmit these Spirits, so that now no Spirits can be separated, or in a smaller quantity.

If we apply the wounding by *Cantharides*, or its effects, to all these ways, we shall find that in the first Consideration, the Lympha separated in a Blister is nothing at all Concern'd, and that the stupendous effect might possibly be produced, without any such discharge : but if you go further, and suppose the *Cantharides* got into the Mass of the Blood, without any gathering of Waters, you cannot suppose that the parts of *Cantharides* that are so *subtil*, so *alkalin*, and which, by other Experiments, make the *Blood* so *fluid*, can be any great Enemies to the Rarefaction of the Blood, which makes Spirits, and fits them to be separated ; or any considerable instrument in lessening the Rarefaction, which is requisite and absolutely necessary, by the first Condition. Neither are they in their Nature fit Instruments for the third ; besides, that we find no signs and no marks of such an Interruption, either in the Brain or any where else.

The Second Condition for hindering so great a Preparation, and so great a Separation of Spirits, is the effect of all Evacuations : so that, by the by, *Evacuation* is the great Indication for the Cure of a Fever, and is a great deal

deal more *Evident* than any *supposed Poison*, or *malignity*; *supposed to be discharged*, by *supposed Alexipharmicks*, that are their *supposed Antidotes*: yet this effect by an *Evacuation* is granted, and by the way of working will be found unable to discuss all the *Phænomena*, in *doing* it in so *short* a time. It is certainly true of the discharge of *Lympha*, by a *Blister*, what is said of *Evacuations* of other kinds, and in a proper *Proportion* what is said of the *Evacuation* by *Perspiration*; which is ten times the whole natural *Evacuations*. It is observable to this purpose what I said, *p.* 108. of the fore-mentioned *Book*, when I spoke about the vast quantity of *Perspiration* in a natural and unprovok'd way. *Licet sit maximum, hoc modo, liquorum dispendium: imprimè tamen utilis est secretio hæc ad valitudinem conservandam. Si enim corpus nostrum porosum non esset, ac partes de corpore dicto non dimitteret modo; febricitare nos semper oporteret: quum, enim, calor sanguinis ab ejus motu, calorque per motum productus ab attritione partium calorem comprehendentium pendeat; quæ per motum divulsæ & à contactu abstractæ calori libertatem permittunt, &c.* But this *Contact*, this condition of motion being chang'd, there is a lesser *Nisus*, a lesser *Separation* and distribution of small parts to the *Heart*; as we desire. But I say, this is granted to be the effect of *Time*, of a longer time than in the state of our *Proposition*; and whosoever is able to look particularly into the *Progression*; he will be further convinced.

Thus we have seen, by looking into these *Conditions* as nearly as this place will allow, that the *Cantharides* cannot *condense* the *Blood*, or stop that *Rarefaction*, and that *Contrition* that dispose to the *Separation* of *Spirits* in their proper place; or, which is the same thing, that they do not prevent a more *frequent Contraction* of the

Heart, or a *quick Pulse*; as we were obliged to inquire. The Third is evident; and so should the Second by a little Proof, if it were not granted beforehand, and may be easily understood, by what I did say.

In all this, I have not supposed or assum'd any thing but what is granted as self-evident, among Physicians; tho' the proving of this in a more rigorous way should be still more satisfying, tho' perhaps less pleasing. Howsoever, I hope that the thing has all the possible Proof it is capable of. But since a Blister does not hinder the *preparing and separating of Spirits*; either in respect of the *Liquor, out of which* they are separated, or the place by which they are separated. And both Spirits are *separated from the Blood*, and transmitted thorow the *Glands of the Brain*, into the *Nerves*, and by consequence the *Heart* still retains its *frequent and violent Contraction*, notwithstanding of a Blister; and in despite of all these wounds, we have a quicker Pulse than naturally, or we have a *Fever*.

Let us once more enquire, if a Blister that makes small Wounds, and Cures a Fever, in a short time, can produce this its effect in the only way we have left us; and that is by wounding that *Channel* that carries those *Spirits*, that *Contract the Heart*, give us a *quick Pulse*, and a *Fever*, with all its Attendants, Delirium, &c.

If this supposition is allowed of, no doubt but that any the *least quantity* of Animal Spirits let out, by such Wounds in a very little time, will proportionably weaken the Heart's *Contraction*, and give us a *slower Pulse*; which is all we want; and which is more, this slower Contraction, which is known by our slower Pulse, determining the whole circulating Blood with less force, the *parts of Blood* do not *comminute* themselves so much as
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when the motion was more rapid ; and, by consequence, there is not such a *Disposition* for *separating* small parts in the Brain, that afterwards they may be derived thro' the *Nerves* into the *Heart*. But more over, the lesser Motion continuing, for some little time, or *two* or *three Minutes*, in a *Velocity* something like our *natural* Motion : all the *Secretions*, which are performed in such like degrees of *Velocity*, will again begin to be done as before ; and that this must be is evident ; because I have already prov'd, that the different velocities of the Blood's Motion did make the *variety* of *Secretions*, whether the *Passages* or *Pores* were uniform, or of irregular and various *Figures*.

And but just now we saw it, evidently, that evacuations were the genuin ways of Curing Fevers, &c. tho' their way was not answerable to every part of this difficulty.

Here is a notable Discovery ; if we can put little *Emissaries* on the Nerve that is more especially concern'd in the *Heart's* Contraction, we shall hinder any *Preparation* in the Blood for *Separating* so great a number of *Spirits* ; which is one great requisite : Nay, we shall make *Secretions* of that sort, and in that way, as in time of Health ; and if they be but *Secretions*, the contriting Parts, and those to be broke down, shall have no such a close Contact, and therefore that extraordinary quantity of *Spirits* shall not be *prepar'd* in the Blood ; and if they are not prepar'd, they cannot be *separated* from it : or a *moderate quantity* of animal *Spirits* shall be convey'd into the muscular *Fibres* of the *Heart* : or again, which is the same thing, its *contraction* shall be *natural*, or very like, &c.

But more wonderful, all this may be done, or begin to be done in two or three Minutes ; and therefore our Proposition may be, That *wounding* by *Cantharides* may

cure a Delirium not only in Six, Eight, or Ten Hours, but in One, Two, or Three Minutes, which is very astonishing.

If I had explain'd Vefication in general, you might have seen, that the wounding Parts might have reached their Stage in a quarter of an Hour ; and that is all I suppose, more than the Three Minutes, just now assign'd. But how shall we wound their Conveying Nerves, how shall we apply a Blister, that its Parts may affect, is now the great and only question that remains. To do this, you must bring into your Memory, what you have seen in Dissections : That this *eighth pair* of Nerves, which serves for the Heart's Contraction, has its rise from the *Sides* of the *Medulla Oblongata* behind the *Processus Annularis*, by several Threads which joyn together, and go out by the same hole that the *Sinus Laterales* discharge themselves into the *Jugulars*. And since the Union by the *Atlas*, is not so firm and compact as in the other *Vertebrae* : it is evident, that there is no extraordinary hindrance, why some of these wounding Parts may not come at that Nerve. But if you reflect again, that this Nerve, or considerable Branches of it, run superficially enough on the neck ; and by consequence, gives us less difficulty to apprehend how *some of them* are wounded, and to understand how these miraculous effects do happen, and are produced. Or, it is easy to understand how the *small parts* of *Cantharides* can wound the *eighth pair*, or by wounding its *Branches* derive from the *Nerve* it self, and lessen the *Motion* of its *Liquor* ; or 'tis not hard to apprehend how wounding by *Cantharides* hinders the *disposition* of *Separating* Spirits, and *intercepts* them in their way to the *Heart* ; how they make its *weaker Contraction*, and a *slower Pulse*. Or, again, it is evident, how the *small Emissaries* made in this way
can

can Cure a *Fever*, and a *Delirium* in a *shorter* time than is supposed in the Proposition, as I intended to show.

But to prevent our malicious Enemies, that confess we talk like Men of Wit ; but nothing for the use of Man, or Practise ; Oh! the great Power and Prerogative of a defect of Understanding : Is it not *Reason* that guides that *Experience* they pretend to ? Is it not certain, that there can be no Experience without a suitable use of Reason to *Collect* Circumstances ? or why did a great Man complain of *Experientia* being *Fallax* ? Is not this an unreasonable task to be put to defend good sense ? Good Sense will defend its own cause with People of Sense ; but where are they ? How small a number are they to the gross of Mankind ? Will not a common Almanack-maker persuade the most of the World, that he can fore-tell an Eclipse better than such an one ; who, perhaps Calculated these Tables from whence he has his Prediction ? And what I say of him may be instanced in every thing else. But, I say, to let them see, that tho' this Discourse has more of Humane Frailty than any thing said among you ; I'll let them see, that the necessary Corollaries from this Discourse are very Practicable ; and could let them see, that most of their Positions are most inconsistent, not only with what I have said, but even with what they say themselves.

First, If I had spoke to Vesication in general, I should have shown you, that not only the Operation of a Blister is great and sudden, but of mighty Consequence.

I should have made it evident, how Blisters may *de- rive*, *rouze* People that are *stupid*, as well as depress too great an *Agility* of Spirits.

I should have shown you how they make *Stranguries* ; and how, that tho' they do all this and much more, yet ; by dissipating of vast quantities of Spirits, and by great Discharges of Humidity, they may and really do such Mischief, that can neither be avoided nor repaired by all our *Medicines*, or *Pearled Draughts*.

But to come nearer our purpose ; 'tis most evident, that if the Wounding of this Nerve or a Branch, be so absolutely necessary for Curing a Delirium and a Fever, that whatsoever *Mischief* the applying vast Numbers of Blisters over all the Body may do ; yet the main end is neglected, if you forget a large one *high* on the *Nop* of the Neck. *Secondly*, That if there is no Vesication after the laying on a strong Plaister, it necessarily establishes a new and prodigious Hardness in the Skin and Vessels, a thickning of the Blood for a further total stop ; but nothing of the Blisters chusing to grapple first with the Spirits.

Many Inferences of that sort may be made, but I have already, I'm afraid tried Patience too far.

IV. *Of the Nature of SILK, as it is made in Piedmont. Communicated by William Aglionby, Esq; F.R.S.*

Silk, which is the Spittle of a Worm, hath its good or bad Quality from the Nourishment the Worm receives either from a good or bad Leaf; Therefore the chief Dependance is on a happy Spring, proving both sweet and pleasant; exempt from too much Rain, which commonly rot the Leaves; from Southerly Winds, which burst the Worms; and from strong Northerly Winds, whose piercing cold spoils the Leaf, giving it an ill Quality. All these unseasonable Weathers are very pernicious to these little Animals, which every one observe with great Attention, and follow more or less the Indications; from whence they draw the Consequences by the Product, in Quantity and Quality.

When the Spring proves delightful and sweet, the Worm feeding on a good and tender leaf, free from the Prejudices of an unkind Season, (which sometimes spoil the Leaf, by giving it a rough, gross, and heavy Nature) then one may expect a profitable Harvest; and in such Years 'tis best to make a good Provision, for Silk will then find good Sale when most Abundance, and the Buyer meets with that of a good Substance, which the advantagious Season very much contributes to; but not knowing how long it may last, about Midsummer (or St. John's Tide) they begin to draw the Silk from its *Cocoon*, to see what it yields, and judge of its increase or scarcity, as well as the estimate of its goodness and perfections, those most desirable are, *viz.* That it proves clean, light, and strong.

Great

Great Use may be made of these Observations, and no less Advantages to be drawn from them, provided the Management be with Study to improve them; for it requires a particular Care to hatch the Eggs, as also tenderness and great caution must be used, even till the Silk be ready to be drawn off.

In case the Season should not prove plentiful, then they buy as fast as they can old Silk, and keep as much as they can of the other, for the best Fabricks, that so they may not be obliged to hazard all their good, at the Price of the worst, which is commonly practised. But if the Season promises a great and satisfactory Harvest, they take the new, and put it apart for the best Fabricker, not despising the old, but only laying it aside, till proof be made whether the new be better or not.

*Some Observations to know the best Silk,
or Organcine.*

The Goodness of Silk is distinguished by its lightness, as the most Essential Quality, which every Body knows carries a considerable Profit along with it, when bought by weight, and sold by the Yard or Aune. It is to be noted, that the *Organcine* is Super-fine, it being the best sort, and N^o: That the two threads are equal in fineness, that is to say, both alike in smoothness, thickness and length, for the thread of the first twist: For the second, it matters not whether the single thread be strong, before the two are joined, unless to see whether the first twist prove well. It is necessary the Silk be clean; the Straw colour is commonly the lightest, and the White the heaviest of all. It is likewise convenient, that the Skeans be even and all of an equality, which shews they were wrought together; otherwise
with

with great reason one may suspect that it is refuse Silk, and cannot be equally drawn out and spun, for one Thread will be shorter than the other, which is Labour and Loss. It will be also requisite to search the Bale more than once, and take from out of the Parcels a Skean to make an Essay; for unless one buys that which one knows by tryal, there is a hazard of being Cheated, and so, for one sort, have another.

To make an Estimate of Silk by Essay, and to know its Lightness.

Fix the Essay upon one eighth of a *Portée* hand of Silk, of 110 Aunes of *Lyons* in length, and see what it makes of Aunes by the Eighth part; the Skean which is of 80 Threads, must be multiplied by 110 Aunes of *Lyons*, which is the length of 110 Aunes, from which Number must be deducted one eighth; as for Example, 110 by 80 makes 8800, the eighth part of which is 1100, which is the eight part of a *Portée*: Now to calculate what these 1100 Aunes weigh, which is the eighth part of a *Portée*, or of 110 Aunes of *Lyons*. It will be proper to take a Skean out of the Parcels which you take from out of the Bale, which you judge may contain at least 1100 Aunes, to make the one eighth part of a *Portée*, which *Portée* must be divided on two Bobbins, half on each, then fix the two Bobbins on the *Cantre* (Beam, and from thence pass it through the (*Combe*) *hourdissoir*; viz. 550 from the Two Bobbins will make 1100, which will be one eighth part of what you desire to know; this done, you cut off your Silk, and carry it to be put on the *Hourdissoir*: Then weigh it, and Multiply the weight by eight,

it will weigh just as much as a *Portée* of 110 *Aunes* of *Lyons*, which is the general Rule for Calculating, when they draw the Silk out: By this means one may learn to adjust the weight. There are Silks of *Piedmont* which are very light and clean, and to be preferred before any, in Sale; The *Portée* of Silk of the lightest, weighs near twenty four Penny-weight to twenty five and twenty six Penny-weights the *Portée*; others twenty seven and twenty eight, which Weight may be dispensed with, on condition the other Qualities be as good, to wit, well wrought, Even, Fine, and Clean: But above these Weights they cannot be, unless they abate of their Profit, proportionable to what they want in lightness.

V. Two Propositions desir'd to be Answered in a Year and half, by any Person; if they are not in that time, the Proposer promises he will do it himself.

QUum à præparationibus ac solutionibus Chymicis, varias, secunda corpora, subeant mutationes; de viis brevioribus, simplicioribus, ac magis naturalibus sollicitus indagant homines; præter alias invenitur quod

Dato nascente Vegetabili quolibet à nascendi modo, ejusdem cohærendi nîsus, seu partium ejusdem mobilitas ac immobilitas, determinari possunt.

Quæ

Quæ propter rogamus, quoslibet Botanicæ, Medicinæ, Philosophiæ, &c. Studiosos Methodum hujusmodi Propositionis invenire.

Rogamus etiam, an esse possit signum aliquod, & quidnam sit illud, quod ex anatomiâ, ac cadaverum Dissectionibus certo poterit indicare quemlibet ob assumptum Opium interemptum fuisse ?

VI. Part of a Letter from Mr. Llwid to Dr. Tancred Robinson, F. R. S. concerning a Figured Stone found in Wales; with a Note on it, by Hans Sloane, M. D.

I Here send you the Representation of a Limestone-Marble, we have lately Discovered in this Country, when Polish'd. We have Plenty of it; but few pieces exceed Six, Nine, or Twelve Inches Diameter; for 'tis only a sort of *Alcyonium*, incorporated in several small blocks of the Lime-stone; whereof the first Figure represents a piece polish'd Perpendicularly, and the other Horizontally. I would intreat you to Discourse some Stone-Cutter, and to advise me what Uses it might seem proper for, &c. 'Tis (to me) more Beautiful than the *Florentine Marble*; but much more hard and substantial. I should be glad of a Line or two about it.

Vide Fig. 3. & 4.

The.

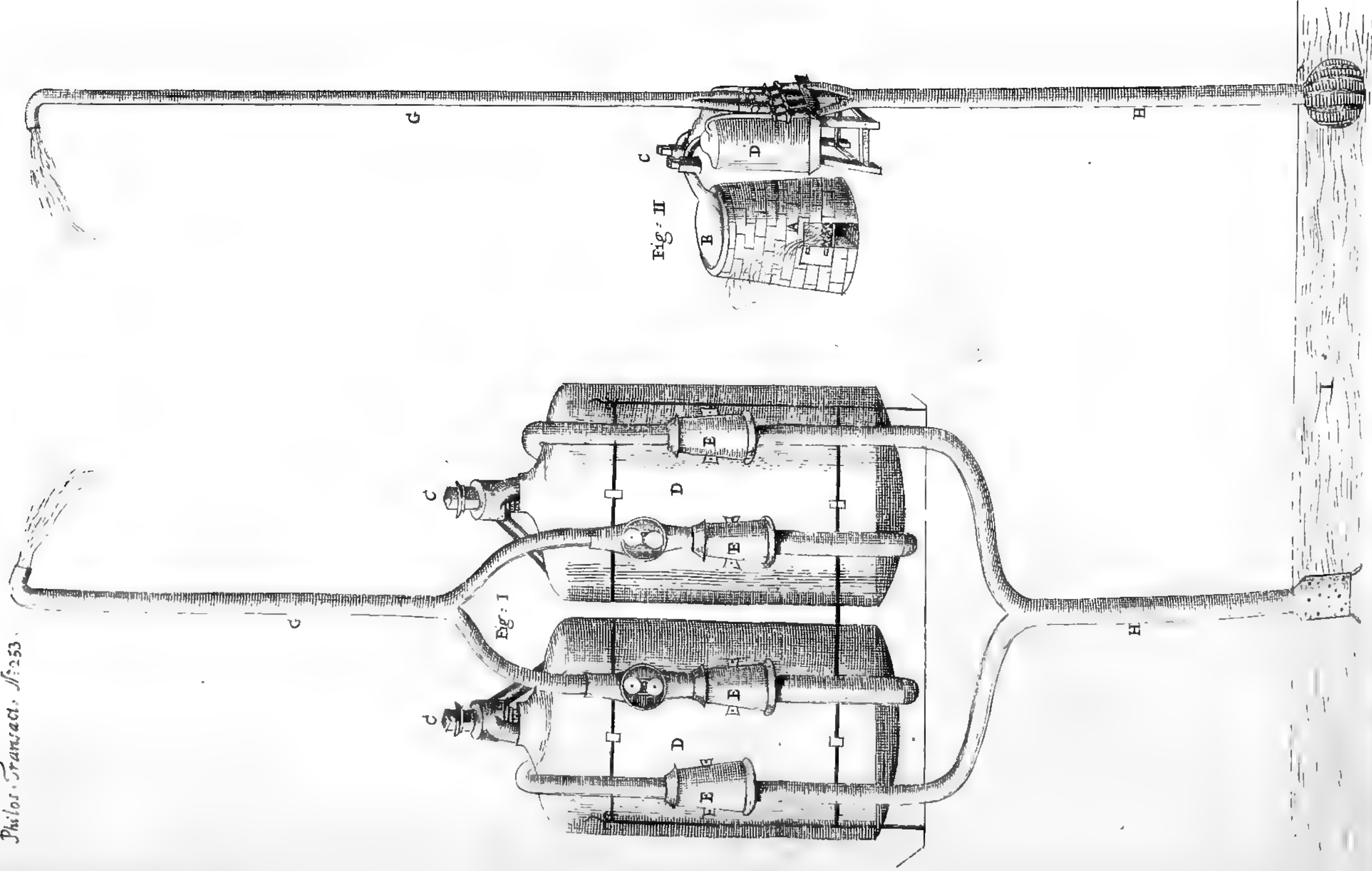
The N O T E.

This Stone is a sort of Coral, and the Lapidis Astroidis five Stellaris primum genus Boet. de Boadt, or Astroides Worm, Mus. It grows in the Seas adjoining to Jamaica. It is frequently found fossil in England. I have some of it found here, that will Polish as well as Agat, which was many Years since found out by Mr. Beaumont There are many other things growing in the Seas about Jamaica, and not to be found in these parts, which are frequently dug up in the Inland parts of England, and elsewber, near to which places they do not naturally grow.

LONDON: Printed for *Sam. Smith, and Benj. Walford,* Printers to the Royal Society, at the *Prince's Arms* in *St. Paul's Church-yard.* 1699.



Philos. Transact. S:253



PHILOSOPHICAL TRANSACTIONS.

For the Month of June, 1699.

The CONTENTS.

- I. *Part of Two Letters of May the 22th, and June the 12th, 1699. from Sir Charles Holt, to Dr Shadwell, Concerning a Disease caused by Swallowing Stones; with Remarks on the same, by Hans Sloane, M. D.* II. *Some Thoughts and Experiments Concerning Vegetation, by John Woodward, M. D. of the College of Physicians, & R. S. & Professor of Physick in Gresham-College.* III. *An Account of Mr. Savery's Engine, for Raising Water by the help of Fire.*

I. *Part of Two Letters of May the 22th and June the 12th, 1699. from Sir Charles Holt to Dr. Shadwell, Concerning a Disease caused by Swallowing Stones; with Remarks on the same, by Hans Sloane, M. D.*

TIS now about Two Months or more since one *Tho. Gobfill*, of *Shelden* near *Coleshill* in *Warwickshire*, (a Lean, Spare Man aged about 26 or 27.) came to me and gave me the following Account of himself: *viz.* That about Three Years ago, he was extremely troubled with the Wind, which put him to great Torture: and one day making his Complaint to an old Woman in the Neighbourhood, she advised him to swallow Stones, *viz.* round white Pebbles: upon the next return of a Fit, he observed her Directions; and the Stones passing easily through him, he found great Relief by his new Medicine, of which he was very proud; and repeated it as often, as he had occasion with the same happy Success. After some Months, he being seized with a violent Fit of this Spleen Wind (as he call'd it) he immediately apply'd himself to his old Remedy, and swallowed his usual number of Stones (which as I remember was Nine) but they not passing, he repeated the Dose; and so continued taking of them 'till he had taken above 200. He had these Stones in him above two years and a half, when he first came to me, and then complained, that his Appetite was gone, that he could digest nothing, but threw up every thing he eat; I was then going abroad, and had not time to make a more particular Enquiry, but from this Relation I imagin'd, that the Stones by their Weight and pressure might have distended the Coats of the Stomach, and form'd themselves a *Bed in fundo Ventriculi*. But the next time I saw him, I found I was mistaken; for upon

on Examining his Belly I found the Stones lay almost as low as the *Os Pubis*, and thrusting my Fingers just about that Bone, so that the lower part of the *Abdomen* might lie on my hand, I could with the Motion of my hand shake them, and make them rattle, as if they had been in a Bag. When I had made this Discovery, I caused a Ladder to be set against a Wall, and hung him by the Hams on the inside of the Ladder with his Head directly perpendicular to the ground. Whilst he was in this Posture, he told me the Stones were got up to his Stomach; but being set upon his Feet, after a very small time we could plainly hear the Stones drop successively one after another, and so distinctly, that they might be counted.

If his Body be not Laxative, he Vomits all he eats or drinks; to prevent which he commonly keeps it open with Whey. As he lies in Bed the Stones will sometimes get up (as he express it) almost to his Heart, and give him great Disturbance; at which times he is forced to get upon his Knees, or to stand upright, and then he can hear them drop as is before-mentioned; and at such times he has counted an hundred and odd; some times more, sometimes less, but always above an hundred.

He is now so disabled by these Stones that he cannot Work, but in pain; and when he attempts it, he finds the same Night and the next day, a great foreness in the bottom of his Belly, and voids large quantities of Blood by Stool.

Before I saw him, he had been under the hands of several Quacks: some had Vomited him with *Stibium*, and Purg'd him, others Purg'd and Glister'd him; but all the forcing Medicines they made use of, could never bring one Stone from him.

He now eats tolerably well, but complained when I saw him last (which was *Friday* the 5th of *June*) that the Stones grew more troublesome to him every day than other. II

Not

Not long since my worthy and ingenious Friend, the Learned Dr. *Fowke*, making me a visit, I shew'd him this Man, and he was pleas'd nicely to examine his Case, and told me he had never heard, or met with in Books, any thing like it.

This day (*June 12.*) I saw *Gobfill*; he looks better than he did when I left the Country. Dr. *Davies* was with me, and examined all the Particulars herein mentioned.

The REMARKS.

There are many People who are of Opinion, that the Swallowing Stones or Pebbles is very beneficial to the Health, by helping the Stomach to digest their Food. The reason of this, I suppose, is because they see Birds Languish, unless they swallow Gravel or small Stones. I have been consulted by some upon this occasion, but was always against this practice in Men: because the Stomachs (or Gizzards) of Birds (they wanting Teeth to grind their Food) is made very strong, Muscular, and defended in the inside with a Coat, by the help of which, and these Stones, their Victuals are ground. Now the Stomach of Men being different, 'tis not reasonable to think they should be of use to them. I knew one Mr. Kingsmill, who used to swallow for many Years (if I remember right) Nine at a time, once every day, without any injury. He at my desire, swallowed some before me, those he swallowed were near as large as Walnuts. He told me he found they pass'd, and had no inconvenience by them, though he had used them many Years; and bought them by the Peck, having them taken up some-where in Kent. He only chose such as were roundish and smooth. He died afterwards suddenly.

As Remedies which have been found helpful to other Animals may be sometimes beneficial to Man, yet the instance here related shows great Consideration should be had of them.

II. *Some Thoughts and Experiments Concerning Vegetation.* By John Woodward, M. D. of the College of Physicians, & R. S. & Professor of Physick in Gresham-College.

THE *Ancients* generally intituled the *Earth* to the Production of the *Animals, Vegetables, and other Bodies* upon and about it: and for that reason 'twas that they gave it so frequently the Epithets of *Parent* and *Mother* *. They were of opinion that it furnished forth the *Matter* whereof *those Bodies* consist: and received it all back again at their Dissolution for the Composition of *others*. Even those who asserted *four Elements*, supposed that the *Earth* was the *Matter* that Constituted those *Bodies*: and that *Water* and the *rest*, served only for the *Conveyance* and *Distribution* of that *Matter*, in order to the *forming* and *composition* of them. 'Tis true, *Thales*, a Philosopher of the first rank in those early Ages, has been thought to have Sentiments very different from these; but that without just Grounds; as I think I have sufficiently proved in another Paper, which I am ready to produce.

But tho' *Antiquity* thus gave its *Vote* for *Terrestrial Matter*, several of the *Moderns*, and some of very great Name too, both *here* and *abroad*, have gone quite Counter, and given *theirs* in behalf of *Water*. The dignity of the *Persons* that have espoused it, as well as their number, renders this Doctrine very considerable, and well worth our enquiring into. The great restorer of *Philosophy* in this last Age, my Lord *Bacon*, is of opinion, *That for Nourishment* of *Vegetables, the Water* is almost all in all: and that the *Earth* doth but keep the *Plant* upright, and save it from over heat, and over cold †. Others

* Terra Patrens. Ἡ γῆ μήτρη καὶ μήτηρ.
Terra Mater.

† Nat. Hist. Cent. 5. § 411.

to be the only *Principle* or Ingredient of all natural things. They suppose that, by I cannot tell what Process of Nature, Water is *transmuted* into *Stones*, into *Plants*, and, in brief, all other Substances whatever. *Helmont* || particularly, and his *Followers*, are very positive in this: and offer some *Experiments* to render it credible. Nay a very *extraordinary Person* of our own *Nation* * tries those *Experiments* over again: and discovers a great Propensity to the same Thoughts and Opinion they had; declaring for this *Transmutation of Water* into *Plants* and *other Bodies*, tho' with great *Modesty* and *Deference*, which was his usual manner.

The *Experiments* they insist upon are chiefly *two*; the *first* is, that *Mint* and several *other Plants* prosper and thrive very greatly in *Water*. The *other* is this; they take a certain quantity of *Earth*, and *bake* it in an *Oven*; then they weigh it, and put it into an *Earthen Pot*. Having well water'd this *Earth*, they make choice of some fit *Plant*, which, being first carefully *weigh'd*, they *set* in it. There they let it grow, continuing to *Water* it for some time, 'till 'tis much advanced in *bigness*. Then they take it up; and tho' the *Bulk* and *Weight* of the *Plant* be much greater than when *first set*, yet upon *Baking* the *Earth*, and *weighing* it, as at first, they find it little or not at all *diminished* in *weight*; and therefore conclude 'tis not the *Earth* but *Water* that nourishes and is *turn'd* into the Substance of the *Plant*.

I must confess I cannot see how *this Experiment* can ever be made with the *nicety* and *justness* that is requisite, in order to *Build* upon it so much as *these Gentlemen* do. 'Tis hard to weigh *Earth* in that *quantity*, or *Plants* of the *size* of those they mention, with any great *exactness*: or to *bake* the *Earth* with that *Accuracy*, as to reduce it *twice* to just the *same Dryness*. But I may wave all this; for tho' the *Experiment* be never so easily

sily practicable; and all the Accidents of it exactly as they set forth, yet nothing like what they *infer* can possibly be concluded from it; unless *Water*, which they so plentifully bestow upon the *Plant* in *this Experiment*, be *pure homogeneous*, and not charged with any *terrestrial Mixture*; for if it be, the *Plant* after all may owe its *growth* and *increase* intirely to *that*.

Some *Waters* are indeed so very *clear* and *transparent*, that one would not easily suspect any *terrestrial Matter* were latent in them: but they may be *highly saturated* with such *Matter*, tho' the *Eye* be not presently able to descry or discern it. 'Tis true, *Earth* is an *opaque Body*; but it may be so far dissolved, reduced to so extreme small *Particles*, and these so *diffused* through the *watery Mass*, as not sensibly to impede *vision*, or render the *Water* much the less *diaphanous*. *Silver* is an *Opake*, and indeed a very *dense Body*; and yet, if perfectly dissolved in *Sp. of Nitre*, or *Aqua Fortis*, that is *rectified* and thorowly *fine*, it does not *darken* the *Menstruum*, or render it less *pellucid* than before.*. And other *Instances* there are, that oftentimes *great quantities* of *Opake Matter* are sustain'd in *Fluids*, without considerably striking the *Eye*, or being perceived by it. So that were there *Water* any where found so *pure*, that the quickest *Eye* could discover in it no *terrestrial intermixture*; that would be far short of a *Proof*, that in reality there was *none*.

But after all, even the *clearest Water* is very far from being *pure* and wholly *defecate*, in any part of the *World*, that I can learn. For *Ours* here, I have had an Opportunity of Examining it over a good part of *England*; and cannot say I ever met with any, that, however *fresh* and *newly* taken out of the *Spring*, did not exhibit, even

* Provided the *Silver* be pure and absolutely refin'd: For the least admixture of *Copper* will produce a blue Tincture in the *Menstruum*; as that of some other *Bodies*, one different.

to the naked Eye, *great numbers* of exceeding small *terrestrial Particles* disseminated through all parts of it. *Thicker* and *crasser* Water exhibits them in still greater *Plenty*.

These are of two general kinds. The one a *vegetable terrestrial Matter*, consisting of very different *Corpuscles*; some whereof are proper for the formation and increment of *one sort* of *Plant*, and some of *another*: as also some for the nourishment of *one part* of the *same Plant*, and some of *another*. The *other kind* of *Particles* sustain'd in *Water* are of a *Mineral Nature*. These likewise are of *different sorts*. In some Springs we find *Common Salt*, in others *Vitriol*, in others *Alum*, *Nitre*, *Sparr*, *Ochre*, &c. may frequently *several* of these, or other *Minerals*, all in the *same Springs*; the *Water* as it drains and passes thorow the *Strata* of *Stone*, *Earth*, and the like, *taking up* and *bearing* along such loose *Mineral Corpuscles*, as it meets with in the pores and interstices of those *Strata*, and bringing them on with it quite to the *Spring*. *All Water* whatever is much charged with the *Vegetable Matter*, this being *fine*, *light*, and *easily moveable*. For the *Mineral*, the *Water* of *Springs* contains more of it than that of *Rivers*, especially when at *distance* from their *Sources*: and that of *Rivers* more than the *Water* that falls in *Rain*. This I have learn'd from several *Tryals*, which I must not give *Account* of here; my *Drift* in this place being only to evince the *existence* of *terrestrial Matter* in *Water*.

Any one who desires *further satisfaction* in this, may easily obtain it, if he only put *Water* into a clear *Glass Viol*, stopping it close, to keep *Dust* and other exterior *Matter* out, and letting it stand, without stirring it for some *Days*. He'll then find a considerable *Quantity* of *terrestrial Matter* in the *Water*, however pure and free it might appear when first put into the *Viol*. He'll
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in a very short time observe, as I have frequently done, the *Corpuscles* that were at first, while the *Water* was agitated and kept in *Motion*, separate, and hardly visible*, by degrees, as the *Water* permits, by its becoming more *still* and at *rest*, *assembling* and *combining* together; by that means forming somewhat *larger* and more *conspicuous Moleculæ*. Afterwards he may behold *these* joining and *fixing* each to other, by that means forming large thin *Masses*, appearing like *Nubeculæ*; or *Clouds* in the *Water*; which grow more *thick* and *opaque*, by the continual appulse and *accretion* of *fresh Matter*. If the said *Matter* be chiefly of the *Vegetable* kind, 'twill be *sustained* in the *Water*: and discover at length a *green colour*; becoming still more and more of that *Colour*, I mean an higher and more saturate *Green*, as the *Matter* thickens and encreases. That this *matter* inclines so much to that *Colour*, is the less strange, since we see so large a share of it, when constituting *Vegetables*, wearing the *same Colour* in *them*. But if there be any considerable quantity of meer *Mineral Matter* in the *Water*, *this*, being of a greater *specifick gravity* than the *Vegetable*, as the *Particles* of it *unite* and *combine* in such *Number*, till they form a *Molecula*, the impetus of whose *Gravity* surpasses *that* of the *Resistance* of the *Water*, subsides a great deal of it to the *bottom*. Nor does it only fall down *itself*, but, frequently entangling with the *Vegetable Nubeculæ*, forces *them* down along with it.

The reason why *Bodies*, when *dissolved* and reduced to extreme *small parts*, are sustain'd in *Liquors* that are of less *specifick Gravity* than those *Bodies* are, hath been pointed at by a late *ingenious Member* of this *Society* †. He is indeed far from having adjusted all the *Momenta* of this affair; however it must be admitted, that, in the *dividing* or *solution* of *Bodies*, their *Surfaces* do not decrease in the *same Proportion* that their *Bulk* does.

Now

* To say nothing of those that were not discernible.

† Mr. W. Molineux, *Philos. Trans.* No. 181.

Now the *Gravity* of a *Body* which is the *Cause* of its *sinking* or tendency downwards, is commensurate to its *Bulk*: but the *Resistance* that the *Liquor* makes is proportion'd, not to the *Bulk*, but to the extent of the *surface* of the *Body* immerfed in it. Whence 'tis plain, a *Body* may be fo far divided, that its *Parts* may be fustain'd in a *Fluid*, whose *Specifick Gravity* is *lefs* than that of the faid *Body*. Nay, 'tis matter of *Fact* that they frequently are fo: and we daily fee *Menstrua* supporting the *Parts* of *Metalls*, and other *Bodies*, that are of fix, ten, nay almost twenty times the *Spec. Grav.* of those *Menstrua*. And as the *Parts* of *Bodies* when *divided* are thus *supported* in a *Fluid*: So when they *occur* and *unite* again, they must *finck* of *Course*, and *fall* to the *Bottom*.

Upon the whole, 'tis palpable and beyond reasonable *Contest*, that *Water* contains in it a very confiderable *Quantity* of *terrestrial Matter*. Now the *Question* is to which of *theſe*, the *Water*, or the *Earthy Matter* fustain'd in it, *Vegetables* owe their *Growth* and *Augment*. For deciding of which I conceive the following *Experiments* may afford ſome *Light*: And I can fafely ſay they were made with due *Care* and *Exactneſs*.

Anno 1691.

I choſe ſeveral *Glaſs Viols*, that were all, as near as poſſible, of the *ſame ſhape* and *bigneſs*. After I had put what *Water* I thought fit into every one of them, and taken an *Account* of the *weight* of it, I ſtrain'd and ty'd over the *Orifice* of each *Viol*, a piece of *Parchment*, having an *hole* in the middle of it, large enough to admit the *Stem* of the *Plant* I deſign'd to ſet in the *Viol*, without *conſining* or *ſtraightning* it ſo as to impede its *Growth*

Growth. My intention in *this*, was to prevent the enclosed *Water* from *Evaporating*, or ascending any other way than only thorow the *Plant* to be set therein. Then I made choice of several Sprigs of *Mint*, and other *Plants*, that were, as near as I could possibly judge, alike *fresh*, *sound*, and *lively*. Having taken the *weight* of *each*, I placed it in a *Viol*, ordered as above: and as the *Plant* imbibed and drew off the *Water*, I took care to add more of the same from time to time, keeping an *Account* of the *weight* of all I *added*. Each of the *Glasses* were, for better *distinction*; and the more easy keeping a *Register* of all *Circumstances*, noted with a different *Mark* or *Letter*, *A*, *B*, *C*, &c. and all set in a *Row* in the same *Window*, in such manner that all might partake alike of *Air*, *Light*, and *Sun*. Thus they continued from *July* the *Twentieth*, to *October* the *Fifth*, which was just *Seventy Seven Days*. Then I took them out, weigh'd the *Water* in each *Viol*, and the *Plant* likewise, adding to its *Weight* that of all the *Leaves* that had *fallen off* during the time it stood thus. And *Lastly*, I computed how much each *Plant* had *gain'd*: and how much *Water* was *spent* upon it. The *Particulars* are as follows.

A. Common

A. Common Spear-Mint, set in Spring-Water. The Plant weighed, when put in July 20. just 27 Grains: when taken forth, Octob. 5. 42 grains. So that in this space of 77 days, it had gained in weight 15 grains.

The whole quantity of Water expended, during these 77 days, amounted to 2558 gr. Consequently the weight of the Water taken up was $170\frac{2}{3}$ times as much as the Plant had got in weight.

The Wt. of the Plant when first set in Water.	The Wt. of the Pl. when taken again out of the Water.	The Wt. gained by the Plant during the 77 days.	The Wt. of the Water expended upon the Plant.	The Proportion of the Encrease of the Plant to the Expenditure of the Water.
gr. 27	gr. 42	gr. 15	gr. 2558	As 1 to $170\frac{2}{3}$

B. Common Spear-Mint: Rain water. The Mint weigh'd, when put in, gr. $28\frac{1}{4}$; when taken out gr. $45\frac{3}{4}$ having gain'd in 77 days gr. $17\frac{1}{2}$.

The dispendium of the Water gr. 3004 which was $171\frac{2}{3}$ times as much as the Plant had received in weight.

gr. $28\frac{1}{4}$	gr. $45\frac{3}{4}$	gr. $17\frac{1}{2}$	gr. 3004	As 1 to $171\frac{2}{3}$
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C. Common Spear - Mint: Thames Water. The Plant when put in gr. 28. when taken forth, gr. 54. So that in 77 days it had gain'd gr. 26.

The Water expended amounted to gr. 2493. which was $95\frac{3}{5}$ times as much as the additional weight of the Mint.

gr. 28	gr. 54	gr. 26	gr. 2493	As 1 to $95\frac{3}{5}$
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D. Common

D. *Common Solanum, or Nightshade: Spring Water.* The Plant weigh'd, when put in, gr. 49: when taken out 106. having gain'd in 77 days 57 gr.

The Wat. expended during the said Time was 3708 gr. which was $65\frac{3}{57}$ times as much as the augment of the Plant.

This specimen had several Buds upon it, when first set in the Wat. These in some days, became fair Flowers, which were at length succeeded by Berries.

The Wt. of the Plant when first set in Water.	The Wt. of the Pl. when taken again out of the Water.	The Wt. gained by the Plant during the 77 days.	The Wt. of the Water expended upon the Plant.	The Proportion of the Encrease of the Plant to the Expendence of the Water.
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gr.	gr.	gr.	gr.	As
49	106	57	3708	1 to $65\frac{3}{57}$

E. *Lathyris seu Cataputia Gerb: Spring Water.* It weigh'd, when put in, gr. 98. when taken forth, gr. 101 $\frac{1}{2}$. The additional weight for this whole 77 days being but gr. 3 $\frac{1}{2}$.

The quantity of Wat. spent upon it during that time, gr. 2501. which is 714 $\frac{4}{7}$ times as much as the Plant was augmented.

gr.	gr.	gr.	gr.	As
98	101 $\frac{1}{2}$	3 $\frac{1}{2}$	2501	1 to 714 $\frac{4}{7}$

Several other Plants were try'd, that did *not thrive in Water*, or succeed any better than the *Cataputia* foregoing: But 'tis besides my purpose to give a particular *Account* of them here.

F, G. *These Two Viols* were fill'd, the former (F) with *Rain*, the other with *Spring Water*, at the same time as those above-mentioned were: and stood as long as they did. But they had neither of them any Plant;

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my Design in these being only to inform my self, whether any *Water exhaled* out of the *Glasses*, otherwise than *thorow* the *Bodies* of the *Plants*. The *Orifices* of these *Two Glasses* were cover'd with *Parchment*; each piece of it being perforated with an hole of the same bigness with *those* of the *Viols* above. In this I suspended a bit of *Stick* about the thickness of the *Stem* of one of the aforesaid *Plants*, but not reaching down to the *Surface* of the included *Water*. I put them in thus, that the *Water* in *these* might not have more scope to evaporate than *that* in the other *Viols*. Thus they stood the whole 77 days in the same *Window* with the rest; when, upon Examination, I found *none* of the *Water* in these *wasted* or *gone off*. Tho' I observed, both in *these*, and the *rest*, especially after *hot Weather*, small *drops* of *Water*, not unlike *Dew*, adhering to the *insides* of the *Glasses*, that part of them I mean that was above the *Surface* of the enclosed *Water*.

The *Water* in these two *Glasses* that had *no Plants* in them, at the end of the *Experiment*, exhibited a *larger* quantity of *terrestrial Matter* than *that* in any of *those* that had the *Plants* in them *did*. The *Sediment* at the bottom of the *Viols* was *greater*: and the *Nubeculae* diffus'd through the *Body* of the *Water* *thicker*. And of *that* which was in the *others*, some of it proceeded from certain small *Leaves* that had fallen from that part of the *Stems* of the *Plants* that was within the *Water*, wherein they *rotted* and *dissolved*. The *terrestrial Matter* in the *rain Water* was *finer* than that in the *spring Water*.

Anno 1692.

The *Glasses* made use of in *this*, were of the same sort with those, in the *former Experiment*: and cover'd over with Parchment in like manner. The *Plants* here were all *Spear mint*: the most kindly, fresh, sprightly Shoots I could choose. The *Water*, and the *Plants*, were weigh'd as above: and the *Viols* set, in a Line, in a *South-Window*; where they stood from *June 2d*, to *July 28*. which was just 56 days.

H. *Hyde-Parke Conduit Water*, alone. The *Mint* weighed, when put in, 127 gr: when taken out, 255 gr. The whole quantity of *Water* expended upon this *Plant* amounted to 14190 gr.

This was all along a very kindly *Plant*: and had run up to above two foot in *height*. It had shot but one considerable *collateral branch*: but had sent forth many and long *Rootes*, from which sprung very numerous tho' small, and short lesser *Fibres*. These lesser *Roots* came out of the larger on two opposite sides, for the most part; so that each *Root*, with it's *Fibrille*, appeared not unlike a small *Feather*. To these *Fibrille* adher'd pretty much *terrestrial Matter*. In the *Water* which was at last thick and turbid, was a *green substance* resembling a fine thin *Conserva*.

The Wt. of the Plant when first set in Water.	The Wt. of the Plant when taken again out of the Water.	The Wt. gained by the Plant during the 56 days.	The Wt. of the Water expended upon the Plant.	The Proportion of the Encrease of the Plant to the Expendence of the Water.
gr. 127	gr. 255	gr. 128	gr. 14190	As 1 to 110 $\frac{110}{128}$

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I. The

I. The *same Water*, alone. The *Mint* weigh'd, when put in, 110 gr: when taken out, 249. Water expended, 13140 gr.

This Plant was as *kindly* as the former, but had shot no collateral Branches. Its *Roots*, the *Water*, and the *green Substance*, all much as in the former.

The Wt. of the Plant when first set in Water.	The Wt. of the Pl. when taken again out of the Water.	The Wt. gained by the Plant during the 56 days.	The Wt. of the Water expended upon the Plant.	The Proportion of the Encrease of the Plant to the Expence of the Water.
gr. 110	gr. 249	gr. 139	gr. 13140	As 1 to 94 $\frac{7}{8}$

K. *Hyde-Park Conduit-Water* in which was dissolved an Ounce and half of *Common Garden Earib*. The *Mint* weigh'd, when put in, 76 gr: when taken out 244 gr. Water expended, gr. 10731.

This Plant, tho' it had the Misfortune to be annoyed with many small *Insects* that happened to fix upon it, yet had shot very considerable collat. *Branches*: and at least as many *Roots* as either that in H. or I; which had a *much greater* quantity of *terrestrial Matter* adhering to the extremities of them. The *same green Substance* here, that was in the two preceding.

gr.	gr.	gr.	gr.	As
76	244	168	10731	1 to 63 $\frac{14}{17}$

L. *Hyde-*

L. *Hyde-Park Water*, with the same quantity of *Garden Mould* as in the former. The *Mint* weigh'd, when put in, 92 gr. when taken out 376 gr. The Water expended, 14950 gr.

This Plant was far more *flourishing* than any of the Precedent: had several very considerable collateral *Branches*: and very numerous *Roots*, to which *terrestrial Matter* adhered very copiously.

The *Earth* in both these *Glasses* was very sensibly and considerably *wasted*, and less than when first put in. The same sort of *green Substance* here as in those above.

M. *Hyde-Park Water*, *distilled* off with a gentle *Still*. The *Mint* weigh'd, when put in, 114 gr. when taken out, 155. The Water expended, 8803 gr.

This Plant was pretty kindly: had 2 small collat. *Branches*, and several *Roots*, tho' not so many as that in H or I, but as much *terrestrial Matter* adhering to them as those had. The Water was pretty *thick*; having very numerous small *terrestrial Particles* swimming in it, and some *Sediment* at the bottom of the *Glass*. This *Glass* had none of the *green Matter* above-mentioned, in it.

The Wt. of the Plant when first set in Water.	The Wt. of the Pl. when taken again out of the Water.	The Wt. gained by the Plant during the 56 days.	The Wt. of the Water expended upon the Plant.	The Proportion of the Encrease of the Plant to the Expendence of the Water.
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gr.	gr.	gr.	gr.	As
92	376	284	14950	1 to 52 $\frac{182}{284}$

gr.	gr.	gr.	gr.	As
114	155	41	8803	1 to 214 $\frac{29}{41}$

N. The *residue of the Water* which remain'd in the *Still* after that in M. was distilled off. It was very *turbid*, and as high-coloured (reddish) as ordinary *Beer*. The *Mint* weigh'd, when put in, 81 gr. when taken out, 175 gr. Water expended, 4344 gr. This *Plant* was very lively: and had sent out six collateral *Branches*, and several *Roots*.

The Wt. of the Plant when first set in Water.	The Wt. of the Pl. when taken again out of the Water.	The Wt. gained by the Plant during the 56 days.	The Wt. of the Water expended upon the Plant.	The Proportion of the Increase of the Plant to the Expendence of the Water.
gr. 81	gr. 175	gr. 94	gr. 4344	As 1 to 46 $\frac{20}{94}$

O. *Hyde-Park Conduit-Water*, in which was dissolved a Drachm of *Nitre*. The *Mint* set in this suddenly began to *wither* and *decay*; and *dyed* in a few Days. As likewise did two more *Sprigs*, that were set in it, successively. In another Glass I dissolved an Ounce of good Garden *Mould*, and a Drachm of *Nitre*: and in a third half an Ounce of *Wood-Ashes*, and a Drachm of *Nitre*; but the *Plants* in *these* succeeded no better than in the *former*. In *other Glasses* I dissolved several *other sorts of Earths, Clays, Marles, and variety of Manures, &c.* I set *Mint* in *distilled Mint-Water*; and other *Experiments* I made, of several kinds, in order to get light and information what *hastened or retarded, promoted or impeded Vegetation*; but these do not belong to the *Head* I am now upon.

P. *Hyde Parke Conduit Water*. In this I fixed a *Glass-Tube* about ten Inches long, the *Bore* about one sixth of an Inch in Diameter, fill'd with very fine and white *Sand*, which I kept from falling down out of the *Tube* into the *Viol*, by tying a thin piece of *Silk* over that end of the *Tube* that was downwards. Upon immersion of the lower end of it into the Water, *this* by little and little *ascended* quite to the upper Orifice of the *Tube*.
And

And yet, in all the fifty six days which it stood thus, a very inconsiderable quantity of *Water* had gone off, viz. scarcely Twenty Grains; tho' the *Sand* continued moist up to the top till the very last. The *Water* had imparted a *green Tincture* to the *Sand*, quite to the very top of the *Tube*. And, in the *Viol*, it had precipitated a *greenish Sediment*, mixt with *black*. To the bottom and sides of the *Tube*, as far as 'twas immers'd in the *Water*, adher'd pretty much of the *green Substance* described above. Other like *Tubes* I fill'd with *Cotton*, *Lint*, *Pith of Elder*, and several other porous *Vegetable Substances*; setting some of them in *clear Water*: Others in *Water* tinged with *Saffron*, *Cockinele*, &c. And several other *Trials* were made, in order to give a *Mechanical Representation* of the *Motion* and *Distribution* of the *Juices* in *Plants*: and of some other *Phenomena* observable in *Vegetation*, which I shall not give the particulars of here, as being not of Use to my present *Design*.

Q, R, S, &c. Several *Plants* set in *Viols*, ordered in like manner as those above, in *October*, and the following *colder Months*. These throve not near so much: nor did the *Water* ascend in nigh the quantity, it did in the *botter Seasons*, in which the before recited *Trials* were made.

Some Reflections upon the foregoing Experiments.

1. In *Plants* of the same kind, the less they are in Bulk, the smaller the Quantity of the *Fluid Mass* in which they are set is drawn off; the *Dispendium* of it, where the *Mass* is of equal thickness, being pretty nearly proportioned to the Bulk of the *Plant*. Thus that in the *Glass* Mark'd A, which weigh'd only 27 gr. drew off
but

but 2558 grains of the *Fluid*: and that in B, which weigh'd only $28\frac{1}{4}$, took up but 3004 gr. whereas that in H, which weigh'd 127 grains, spent 14190 gr. of the *Liquid Mass*.

The *Water* seems to ascend up the *Vessels* of *Plants* in much the same manner as up a *Filtre*: and 'tis no great wonder that a *larger Filtre* should draw off *more Water* than a lesser: or that a *Plant* that has *more* and *larger Vessels* should take up a *greater share* of the *Fluid*, in which 'tis set, than one that has *fewer* and *smaller* ones can. Nor do I Note *this* as a thing very considerable in it self, but chiefly in regard to what I am about to offer *beneath*: And that it may be seen that, in my *other Collations* of *Things*, I made *due Allowance* for this *Difference*.

2. *The much greatest part* of the *Fluid Mass* that is thus drawn off and convey'd into the *Plants*, does not settle or abide there: but passes through the *Pores* of them, and exhales up into the *Atmosphere*. That the *Water* in these *Experiments*, ascended only through the *Vessels* of the *Plants* is certain. The *Glasses* F and G, that had *no Plants* in them, tho' disposed of in like manner as the rest, remain'd, at the End of the *Experiment*, as at first: and none of the *Water* was gone off. And that the greatest part of it flies off from the *Plant* into the *Atmosphere*, is as certain. The least *proportion* of the *Water* expended was to the *Augment* of the *Plant*, as 46 or 50 to 1. And in some the weight of the *Water* drawn off was 100, 200, nay, in one above 700 times as much as the *Plant* had received of *Addition*.

This so continual an *Emission* and *Detachment* of *Water*, in so great *Plenty* from the *Parts* of *Plants*, affords us a manifest reason why *Countries* that abound with *Trees* and the *larger Vegetables* especially, should be very

very obnoxious to *Damps*, great *Humidity* in the *Air*, and more frequent Rains, than *others* that are more open and free. The great *Moisture* in the *Air*, was a mighty inconvenience and *annoyance* to those who first settled in *America*; which at that time was much over-grown with *Woods* and *Groves*. But as *these* were burnt and destroyed, to make way for *Habitation* and *Culture* of the *Earth*, the *Air* mended and cleared up apace: changing into a Temper much more *dry* and *serene* than before.

Not does this *Humidity* go off *pure* and *alone*; but usually bears forth with it many *parts* of the *same Nature* with *those* whereof the *Plant*, through which it passes, consists. The *Crasser* indeed are not so easily borne up into the *Atmosphère*: but are usually deposited on the *Surface* of the *Flowers*, *Leaves*, and other *Parts* of the *Plants*. Hence come our *Manna's*, our *Honies*, and other *Gummous Exsudations* of *Vegetables*. But the *finer* and *lighter Parts* are with greater ease sent up into the *Atmosphère*. Thence they are conveyed to our *Organs* of *Smell*, by the *Air* we draw in *Respiration*: and are *pleasant* or *offensive*, *beneficent* or *injurious* to us, according to the *Nature* of the *Plants* from whence they arise. And since *these* owe their *Rise* to the *Water* that ascends out of the *Earth* through the *Bodies* of *Plants*, we cannot be far to seek for the *Cause* why *they* are more *numerous* in the *Air*, and we find a greater quantity of *Odours* exhaling from *Vegetables*, in *warm*, *humid seasons*, than in any others whatever.

3. *A great part of the terrestrial Matter that is mixt with the Water, ascends up into the Plant as well as the Water.* There was much more terrestrial Matter at the end of the Experiment, in the *Water* of the Glasses F and G, that had *no Plants* in them, than in those

H h

that

that had *Plants*. The *Garden-Mould* dissolved in the *Glasses K* and *L* was considerably *diminished*, and *carried off*. Nay the *terrestrial* and *Vegetable Matter* was borne up in the *Tubes* filled with *Sand*, *Cotton*, &c. in that *quantity* as to be *evident* even to *sense*. And the *Bodies* in the *Cavities* of the other *Tubes* ~~tr~~ had their lower *Ends* immers'd in *Water* wherein *Saffron*, *Cochinele*, &c. had been infused, were *tinged* with *Yellow*, *Purple*, &c.

If I may be permitted to look abroad a while, towards our *Shores* and *Parts* within the *Verge* of the *Sea*, these will present us with a large scene of *Plants* that, along with the *Vegetable*, take up into them *meer mineral Matter* also in great *abundance*. Such are our *Sea-Purslains*, the several sorts of *Alga's*, of *Sampires*, and other *Marine Plants*. These contain *common Sea-Salt*, which is all one with the *Fossil*, in such *Plenty*, as not only to be plainly distinguish'd on the *Palate*, but may be drawn forth of them in *considerable quantity*. Nay, there want not *those* who affirm there are *Plants* found that will yield *Nitre*, and other *mineral Salts*; of which indeed I am not so far satisfied that I can depend on the *Thing*, and therefore give this only as an *Hint* for *Enquiry*.

To go on with the *Vegetable Matter*, how apt and how much disposed this, being so very *fine* and *light*, is to *attend Water* in all its *Motions*, and *follow* it into each of its *Recesses*, is manifest, not only from the *Instances* above alledg'd, but many others. *Percolate* it with all the *Care* imaginable: *Filter* it with never so many *Filtrations*, yet some *terrestrial Matter* will remain. 'Tis true the *Fluid* will be *thinner* every time than other, and more disingaged of the said *Matter*: but never *wholly free and clear*. I have filter'd *Water* thorow several *Sheets* of *thick Paper*: and, after that, through very *close fine Cloth* twelve times *doubled*. Nay, I have
done

done this over and over; and yet a considerable quantity of this *Matter* discover'd it self in the *Water* after all. Now if it thus pass *Interstices* that are so very *small* and *fine* along with the *Water*, 'tis the less strange it should attend it in its passage through the *Ducts* and *Vessels* of *Plants*. 'Tis true, *filtering* and *distilling* of *Water* intercepts and makes it quit some of the *Earthy Matter* it was before impregnated withal: but then that which continues with the *Water* after this, is *fine* and *light*; and such consequently as is in a peculiar manner fit for the *Growth* and *Nourishment* of *Vegetables*. And this is the Case of *Rain Water*. The quantity of *terrestrial Matter* it bears up into the *Atmosphere* is not great. But that which it does bear up, is mainly of that *light* kind of *Vegetable Matter*; and that too perfectly *dissolved*, and reduced to single *Corpuscles*, all fit to enter the *Tubules* and *Vessels* of *Plants*. On which Account 'tis that *this Water* is so very *fertile* and *prolifique*.

The reason why in *this Proposition* I say only a *great part* of the *terrestrial Matter* that is mix'd with the *Water*, ascends up with it into the *Plant*, is, because *all of it* cannot. The *mineral Matter* is a great deal of it not only *gross* and *ponderous*, but *scabrous* and *inflexible*: and so not disposed to enter the *Pores* of the *Roots*. And a great many of the *simple Vegetable Particles* by degrees *unite*, and form some of them *small Clods* or *Molecules*; such as those mentioned in H, K, and L, sticking to the extremities of the *Roots* of those *Plants*. Others of them *intangle* in a *looser manner*: and form the *Nubeculæ*, and *green Bodies* so commonly observed in *stagnant Water*. These, when thus *conjoyn'd*, are *too big* to enter the *Pores*, or ascend up the *Vessels* of *Plants*, which *singly* they might have done. They who are conversant in *Agriculture* will easily subscribe to *this*. They are well aware that, be their *Earth* never so *rich*, so *good*, and

so fit for the Production of *Corn* or other *Vegetables*, little will come of it, unless the *Parts* of it be *separated* and *loose*. 'Tis on this Account they bestow the Pains they do in *Culture* of it: in *Digging*, *Plowing*, *Harrowing*, and *Breaking* of the *Clodded Lumps* of Earth. 'Tis the same way that *Sea-Salt*, *Nitre*, and other *Salts* promote *Vegetation*. I am sorry I cannot subscribe to the *Opinion* of those *Learned Gentlemen* who imagine *Nitre* to be *essential* to *Plants*: and that nothing in the *Vegetable Kingdom* is transacted without it. By all the *Tryals* I have been able to make, the thing is *quite otherwise*: and when contiguous to the *Plant* it rather destroys than nourishes it. But this, *Nitre* and other *Salts* certainly do: they *loosen* the *Earth*, and *separate* the *concreted Parts* of it; by that means fitting and disposing them to be *assumed* by the *Water*, and *carried up* into the *Seed* or *Plant*, for its *Formation* and *Augment*. There's no Man but must observe how apt all *sorts* of *Salts* are to be wrought upon by *Moisture*: how easily they *liqueate* and *run* with it; and when these are *drawn off*, and have *deserted* the *Lumps* wherewith they were incorporated, *those* must *moulder* immediately, and fall *asunder* of Course. The hardest *Stone* we meet with, if it happen, as frequently it does, to have any sort of *Salt* intermixt with the *Sand* of which it consists, upon being expos'd to an *humid Air*, in a short time dissolves and crumbles all to pieces: and much more will *clodded Earth* or *Clay*, which is not of near so *compact* and *solid* a *Constitution* as *Stone* is. The same way likewise is *Lime* serviceable in *this Affair*. The *Husbandmen* say of it, that it does not *fatten*, but only *Mellowes* the *Ground*. By which they mean, that it does not contain any thing in it self that is of the same *Nature* with the *Vegetable Mould*, or afford any *Matter* fit for the *formation* of *Plants*: but merely *softens* and *relaxes* the

Earth;

Earth; by that means rendering it more capable of *entering* the *Seeds* and *Vegetables* set in it, in order to their *Nourishment*, than otherwise it would have been. The *Properties* of *Lime* are well known: and how apt 'tis to be put into *ferment* and *commotion* by *Water*. Nor can such *Commotion* ever happen when *Lime* is mix'd with *Earth*, however *hard* and *clodded* that may be, without *opening* and *loosening* of it.

4. *The Plant is more or less nourish'd and augmented in proportion as the Water in which it stands contains a greater or smaller quantity of proper terrestrial Matter in it.* The Truth of this Proposition is so eminently discernible through the *whole Process* of these *Tryals*, that I think no *doubt* can be made of it. The *Mint* in the *Glass C.* was of much the same *Bulk* and *Weight* with those in *A.* and *B.* But the *Water*, in which *that* was, being *River Water*, which was apparently stored more copiously with *terrestrial Matter* than the *Spring* or *Rain Water*, wherein *they* stood, were; it had *thriven* to almost *double the Bulk* that either of them had; and with a *less Expence* of *Water* too. So likewise the *Mint* in *L.* in whose *Water* was dissolved a small quantity of good *Garden Mould*, tho' it had the disadvantage † to be *less* when first set than either of the *Mints* in *H.* or *I.* whose *Water* was the very same with this in *L.* but had none of that *Earth* mix'd with it; yet, in a short time the *Plant* not only *overtook*, but much *out-stripp'd* those, and at the end of the *Experiment* was very considerably *bigger* and *heavier* than either of them. In like manner the *Mint* in *N.* tho' *less* at the beginning than *that* in *M.* being set in that *thick, turbid, feculent Water*, that remained behind, after *that*, wherein *M.* was placed, was *Still'd off*; had in fine more than *doubled* its *original weight* and *bulk*: and received above *twice* the *additional Encrease*.

† Confer.
Prop. 1. supra.

crease that that in M. which stood in the thinner desill'd Water, had done. And, which is not less considerable, had not drawn off half the Quantity of Water that that had.

Why, in the beginning of this Article, I limit the Proportion of the *Augment of the Plant to the Quantity of proper terrestrial Matter in the Water*, is, because *all, even the Vegetable Matter, to say nothing of the Mineral, is not proper for the Nourishment of every Plant.* There may be, and doubtless are, *some Parts in different Species of Plants*, that may be much alike, and so owe their supply to the same *common Matter*: but 'tis plain *all cannot.* And there are *other Parts so differing*, that 'tis no ways credible they should be form'd all out of the *same sort of Corpuscles.* So far from it, that there want not good Indications, as we shall see by and by, that *every Kind of Vegetable requires a peculiar and specifick Matter for its Formation and Nourishment.* Yea, *each Part of the same Vegetable does so*: and there are very many and *different Ingredients* go to the *Composition of the same individual Plant.* If therefore the *Soil*, wherein any *Vegetable or Seed* is planted, contains *all or most of these Ingredients*, and those in due quantity, 'twill *grow and thrive* there: otherwise 'twill *not.* If there be not as many *sorts of Corpuscles* as are requisite for the *Constitution of the main and more essential Parts of the Plant*, 'twill *not prosper* at all. If there be *these*, and not in sufficient *Plenty*, 'twill *starve*, and never arrive to its natural *Stature.* Or if there be any the *less necessary and essential Corpuscles* wanting, there will be some *Failure in the Plant*: 'twill be defective in *Taste*, in *Smell*, in *Colour*, or some other way. But tho' a *Traect of Land* may happen not to contain *Matter proper for the Constitution of some one peculiar kind of Plant*: yet it may for several *others*, and those much *differing*

fering amongst themselves. The *vegetative Particles* are *commixt* and blended in the *Earth*, with all the *diversity* and *variety*, as well as all the *uncertainty* conceivable. I have given some *Intimations* of this *elsewhere* †, and shall not repeat them *here*: but hope in *due time* to put them into a much *better light* than that they there stand in.

† *Nat. Hist.*
Earth, p.
228. & seq.

It is not possible to imagine how *one, uniform, homogeneous Matter*, having its *Principles* or *Original Parts* all of the *same Substance, Constitution, Magnitude, Figure*, and *Gravity*, should ever constitute *Bodies* so egregiously *unlike*, in all *those respects* as *Vegetables* of *different kinds* are: nay even as the *different Parts* of the *same Vegetable*. That *one* should carry a *Resinous*, another a *Milky*, a third a *Yellow*, a fourth a *Red Juice*, in its *Veins*: one afford a *Fragrant*, another an *offensive smell*: one be *sweet* to the *Taste*, another *bitter, acid, acerb, austere*, &c. that one should be *nourishing*, another *poisonous*, one *purging*, another *astringent*: in brief, that there should be that vast *difference* in them in their several *Constitutions, Makes, Properties, and Effects*, and yet all arise from the very *same sort of Matter*, would be very *strange*. And, to Note that by the by, this *Argument* makes *equally strong* against *those* who suppose *meer Water* the *Matter* out of which all *Bodies* are *form'd*.

The *Cataputia* in the *Glass E.* received but very little *Encrease*, only three grains and an half all the while it stood, tho' 2501 grains of *Water* were spent upon it. I will not say the reason was because *that Water* did not contain in it *Matter* fit and *proper* for the *Nourishment* of that *peculiar* and *remarkable Plant*. No, it may be the *Water* was not a *proper Medium* for it to grow in: and we know there are very *many Plants* that will *not thrive* in it. Too much of that *Liquor*, in some *Plants*,
may

may probably hurry the *terrestrial Matter* thorow their *Vessels* too fast for them to *arrest* and lay hold of it. Be that as it will, 'tis most certain there are *peculiar Soils* that suit *particular Plants*. In *England*, *Cherries* are observed to succeed best in *Kent*: *Apples* in *Herefordshire*: *Saffron* in *Cambridgeshire*: *Woad* in two or three of our *Midland Counties*: and *Teazles* in *Somersetshire*. This is an *Observation* that hath held in *all Parts*, and indeed in *all Ages* of the *World*. The most *ancient Writers* of

Husbandry * took Notice of it: and are not wanting in their *Rules* for making choice of *Soils* suited to the *nature* of each kind of *Vegetable* they thought *valuable* or *worth propagating*.

* Vid. Varro-
nem, Collumel-
lam, & reli-
quos Rei Rusti-
cæ Scriptores.

But, which is a further *Proof* of what I am here endeavouring to advance, that *Soil* that is *once proper* and fit for the *Production* of some one sort of *Vegetable* does not ever continue to be so. No, in *Tract* of *time* it loses that *Property*: but *sooner* in *some Lands*, and *later* in *others*. This is what all who are conversant in these things know very well. If *Wheat*, for Example, be sown upon a *Tract* of *Land* that is proper for that *Grain*, the *first Crop* will succeed very well: and perhaps the *second*, and the *third*, as long as the *Ground* is in *Heart*, as the *Farmers* speak. But in a *few Years* 'twill produce *no more*, if sowed with *that Corn*. Some *other Grain* indeed it may, as *Barley*. And after *this* has been sown *so often* that the *Land* can bring forth *no more* of the same; it may afterwards yield good *Oats*: and perhaps *Pease* after them. At length 'twill become *Barren*; the *Vegetative Matter*, that at first it abounded withal, being *educed* forth of it by those *successive Crops*, and most of it *born off*. Each sort of *Grain* takes forth *that peculiar Matter* that is *proper* for *its own Nourishment*. First the *Wheat* draws off *those Particles* that suit the *Body* of *that Plant*; the rest lying all *quiet* and *undisturbed*

undisturbed the while. And when the *Earth* has yielded up all them, *those* that are *proper* for *Barly*, a *different Grain*, remain *still behind*, 'till the successive *Crops* of *that Corn* fetch *them* forth too. And so the *Oats*, and *Pease*, in their *Turn*; 'till in fine all is *carried off*, and the *Earth* in great Measure *drain'd* of *that sort* of *Matter*.

After all which, *that very Tract* of *Land* may be brought to *produce* another *Series* of the *same Vegetables*: but never 'till 'tis *supplied* with a new *Fund* of *Matter*, of like *sort* with *that* it at first *contain'd*. This *supply* is made *several ways*. By the *Grounds lying fallow* for some time, 'till the *Rain* has pour'd down a *fresh stock* upon it. Or by the *Tiller's Care* in *Manuring* of it. And for further *Evidence* that *this supply* is in reality of *like sort*, we need only reflect a while upon those *Manures* that are found by constant *Experience* best to promote *Vegetation*, and the *fruitfulness* of the *Earth*. These are chiefly either *Parts* of *Vegetables*, or of *Animals*; which indeed either derive their own *Nourishment* immediately from *Vegetable Bodies*, or from other *Animals* that do so. In *particular*, the *Blood*, *Urine*, and *Excrements* of *Animals*: *Shavings* of *Horns* and of *Hoofs*: *Hair*, *Wool*, *Feathers*: *calcin'd Shells*: *Lees* of *Wine*, and of *Beer*: *Ashes* of all sorts of *Vegetable Bodies*: *Leaves*, *Straw*, *Roots*, and *Stubble*, turn'd into the *Earth* by *Plowing* or otherwise, to *rot* and *dissolve* there; *these* I say are our best *Manures*, and, being *Vegetable Substances*, when refunded *back again* into the *Earth*, serve for the *formation* of *other like Bodies*.

Not wholly to *Confine* our *Thoughts* to the *Fields*, let us look a while into our *Gardens*; where we shall meet with still further *Confirmations* of the same thing. The *Trees*, *Shrubs*, and *Herbs* *Cultivated* in *these*, after they have *continued* in one *Station* till they have *derived*

thence the greater Part of the *Matter fit* for their *Augment*, will *decay* and *degenerate*, unless either *fresh Earth*, or some *fit Manure*, be applied unto them. 'Tis true, they may *maintain* themselves *there* for some time by sending forth *Roots* further and further to a *great extent* all round, to fetch in *more remote Provision*; but at last all will fail: and they must either have a *fresh supply* brought to them, or they *themselves* be *removed* and *transplanted* to some Place *better furnished* with *Matter* for their *Subsistence*. And accordingly *Gardeners* observe that *Plants* that have *stood a great while* in a *Place*, have *longer Roots* than usual; part of which they *cut off* when they *transplant* them to a *fresh Soil*, as now not of any further *use* to them. All these *Instances*, to pass over a great many *others* that might be alledged, point forth a *Particular terrestrial Matter*, and not *Water*, for the *Subject* to which *Plants* owe their *increase*. Were it *Water only*, there would be no need of *Manures*: or of *transplanting* them from place to place. The *Rain* falls in all *Places* alike: in *this Field* and in *that* indifferently: in *one side* of an *Orchard* or *Garden* as well as *another*. Nor could there be any reason why a *Tract* of *Land* should yield *Wheat* one *Year* and not the next; since the *Rain* showers down *alike* in *each*. But I am sensible I have carried on *this Article* to too great a *length*: which yet on so *ample* and *extensive* a *Subject* 'twas not easy to avoid.

5. *Vegetables* are not form'd of *Water*: but of a certain peculiar *Terrestrial Matter*. It hath been shewn, that there is a *considerable Quantity* of this *Matter* contain'd both in *Rain*, *Spring*, and *River Water*: that the much greatest part of the *fluid Mass* that ascends up into *Plants* does not *settle* or *abide* there, but passes through the *Pores* of them and *exhales* up into the *Atmosphere*:
that

that a *great part* of the *terrestrial Matter*, mixt with the *Water*, *passes up* into the *Plant* along with it : and that the *Plant* is more or *less augmented* in proportion as the *Water* contains a *greater or smaller Quantity* of that *Matter*. From all which we may very reasonably infer, that *Earth, and not Water, is the Matter that constitutes Vegetables*. The *Plant* in E. drew up into it 2501 grains of the *Fluid Mass*: and yet had received but gr. 3 and a half of *Encrease* from all that. The *Mint* in L. tho' it had at first the disadvantage to be much less than that in I. yet being set in *Water* wherewith *Earth* was *plentifully* mix'd, and *that* in I. *only in Water* without any such *additional Earth*, it had vastly outgrown the other, weighing at last 145 gr. more than *that* did, and so having gain'd above twice as much as *that* had. In like manner *that* in K, tho' 'twas a great deal less when put in than *that* in I, and also was *impair'd* and *offended* by *Insects*, yet being Planted in *Water* wherein *Earth* was *dissolved*, whereas the *Water* in which I. stood had *none*, it not only *over-took* but considerably *surpass'd* the *other*; weighing at last 29 gr. more than *that* in I, and yet had not expended *so much Water* at *that* by above 2400 gr. The *Plant* in N, tho' at first a great deal less than that in M, yet being set in the *foul crass Water* that was left in the *Still*, after *that* in which M was set was drawn off, in Conclusion had *gain'd* in weight *above double* what that in the *finer and thinner Water* had. The *Proportion* of the *Augment* of *that Plant* that *throve most* was, to the *Fluid Mass* spent upon it, but as 1 to 46. In *others* 'twas but as 1 to 60, 100, 200: nay in the *Cataputia* 'twas but as 1 to 714. The *Mint* in B took up 39 gr. of *Water a day*, one day with another; which was much more than the *whole weight* of the *Plant* originally: and yet with all *this* it *gain'd* not one fourth of a grain a day in *weight*. Nay *that*

in H took up 253 gr. a day of the *Fluid*, which was near *twice* as much as its *original Weight*, it weighing, when first set in the *Water* but 127 gr. And after all, the *daily encrease* of the *Plant* was no more than gr. $2\frac{1}{3}$.

6. *Spring and Rain water contain pretty near an equal Charge of Vegetable Matter : River-water more than either of them.* The *Plants* in the *Glasses* A. B. and C, were at first of much the *same size and weight*. At the *End* of the *Experiment* the *Mint* in A had gain'd 15 gr. out of 2558 gr. of *Spring-water*; that in B gr. 17 and an half, out of 3004 gr. of *Rain-water*: but that in C had got 26 gr. out of only 2493 gr. of *River-water*. I do not found this *Proposition* solely upon *these Tryals*; having made *some more*, which I do not relate here, that agree well enough with these. So that the *Proportions* here delivered will hold for the *main*; but a *strict and just Comparison* is hardly to be expected. So far from it, that I make no doubt but the *Water* that falls in *rain*, at *some times*, contains a *greater share* of *terrestrial Matter* than that which falls at others. A more *powerful and intense Heat* must needs hurry up a *larger quantity* of that *Matter* along with the *humid Vapors* that form *rain*, than one more feeble and remiss ever possibly can. The *Water* of one *Spring* may flow forth with an *higher Charge* of this *Matter* than that of another; this depending partly upon the *quickness* of the *Ebullition*. of the *Water*: and partly upon the *Quantity* of that *Matter* latent in the *Strata* through which the *Fluid* passes, and the *greater or less laxity* of those *Strata*. For the same Reason the *Water* of one *River* may abound with it more than that of another. Nay the *same River*, when much agitated and in commotion, must bear up more of it, than when it moves with less rapidity and violence.

That

That there is a *great quantity* of this *Matter* in *Rivers*: and that it *contributes* vastly to the *ordinary fertility* of the *Earth*, we have an illustrious Instance in the *Nile*, the *Ganges*, and *other Rivers* that *yearly overflow* the neighbouring *Plains*. Their *Banks* shew the *fairest* and *largest Crops* of any in the *whole World*. They are even *loaded* with the *multitude* of their *Productions*: and those who have not seen them will hardly be induced to believe the mighty *Returns* those *Tracts* make in comparison of *others* that have not the *Benefit* of like *Inundations*.

7. *Water* serves only for a *Vehicle* to the *terrestrial Matter* which forms *Vegetables*: and does not itself make any addition unto them. Where the *proper terrestrial Matter* is wanting, the *Plant* is not augmented tho' never so much *Water* ascend into it. The *Cataputia* in E took up *more Water* than the *Mint* in C, and yet had grown but very *little*, having received only three grains and an half of *additional weight*: whereas the other had received no *less* than twenty-six grains. The *Mint* in I was planted in the same sort of *Water* as that in K was; only the *latter* had *Earth* dissolved in the *Water*; and yet *that* drew off 13140 gr. of the *Water*, gaining itself no more than 139 gr. in weight: whereas the other took up *but* 10731 gr. of *Water*, and was *augmented* 168 gr. in weight. Consequently *that* spent 2409 gr. more of the *Water* than *this* in K did, and yet was not so much encreased in *Weight* as *this* by 29 gr. The *Mint* in M stood in the very *same kind* of *Water* as that in N did. But, the *Water* in M having *much less* terrestrial Matter in it than *that* in N had, the *Plant* bore up 8803 gr. of it, *gaining itself* only 41 gr. the while: whereas that in N drew off *no more than* 4344 gr. and yet was augmented 94 gr. So that it spent 4459 gr.

of

of *Water* more than *that* did: and yet was not *itself* so much encreas'd in weight as *that* was by 53 gr. This is both a very *fair* and a very *conclusive* Instance: on which Account 'tis that I make oftner use of it. Indeed they are *all* so: and to add any thing further on *this Head* will not be needful.

'Tis evident therefore *Water* is not the *Matter* that composes *Vegetable Bodies*. 'Tis only the *Agent* that conveys that *Matter* to them: that *introduces* and *distributes* it to their several *Parts* for their *Nourishment*. That *Matter* is sluggish and *inactive*: and would lye eternally confin'd to its *Beds of Earth*, without ever *advancing up* into *Plants*, did not *Water* or some like *Instrument*, fetch it *forth* and carry it unto them. That therefore there is that plentiful *Provision* and vast *Abundance* of it supplied to *all Parts* of the *Earth* is a mark of a *natural Providence* superintending over the *Globe* we inhabit: and ordaining a due dispensation of that *Fluid*, without the *Ministry* of which the Noble *succession* of *Bodies* we behold, *Animals*, *Vegetables*, and *Minerals* would be all at a stand*. But to keep to *Plants*; 'tis manifest *Water*, as well on this, as upon the other *Hypothesis*, is absolutely necessary in the *Affair of Vegetation*: and it will not *succeed* without it. *Which* indeed gave occasion to the *Opinion* that *Water* *it self* nourished, and was *changed* into *Vegetable Bodies*. They saw, tho' *these* were planted in a *Soil* never so *rich*, so *happy*, so *advantageous*, nothing came of it unless there was *Water* too in considerable quantity. And it must be allowed *Vegetables* will not *come on* or *prosper* where *that* is wanting: But yet what *those Gentlemen* inferr'd *thence* was not, we see, well grounded.

This *Fluid* is capacitated for the *Office* here assign'd it several ways. By the *Figure* of its *Parts*; which, as appears from many *Experiments*, is exactly and mathematically

* *Conf. Nat. Hist. Earth*, p. 47. & seq. uti & p. 128, &c.

matically *Spherical*; their *surfaces* being perfectly *polite*, and without any the least *inequalities*. 'Tis evident, *Corpuscles* of such a *Figure* are *easily susceptible* of *Motion*, yea far above any others whatever: and consequently the most capable of *moving* and *conveying* other *Matter* that is not so *active* and *voluble*. Then the *Intervalls* of *Bodies* of that *Figure* are, with respect to their *Bulk*, of all others the *largest*: and so the most fitted to *receive* and *entertain* foreign *Matter* in them. Besides, as far as the *Tryals* hitherto made inform us, the *Constituent Corpuscles* of *Water* are each singly consider'd *absolutely solid*: and do not yield to the greatest *external Force*. This secures their *Figure* against any *Alteration*: and the *Intervalls* of the *Corpuscles* must be always alike. By the *latter* 'twill be ever disposed to *receive Matter* into it: and by the *former*, when once *received*, to *bear* it on along with it. *Water* is further capacitated to be a *Vehicle* to this *Matter*, by the *tenuity* and *fineness* of the *Corpuscles* of which it *consists*. We hardly know any *Fluid* in all *Nature*, except *Fire*, whose *constituent Parts* are so exceeding *subtil* and *small* as those of *Water* are. They'll pass *Pores* and *Interstices* that neither *Air* nor any other *Fluid* will. This enables them to enter the *finest Tubes* and *Vessels* of *Plants*, and to introduce the *terrestrial Matter*, conveying it to all *Parts* of them; whilst each, by means of *Organs* 'tis endowed with for the purpose, *intercepts* and *assumes* into it self such *Particles* as are suitable to its own *Nature*, letting the *rest* pass on through the *common Ducts*: Nay we have almost every where *Mechanical Instances* of much the *same Tenor*. 'Tis obvious to every one how *easily* and *suddenly* *Humidity*, or the *Corpuscles* of *Water* sustained in the *Air*, pervade and *insinuate* themselves into *Cords*, however tightly twisted: into *Leather*, *Parcbment*, *Vegetable Bodies*, *Wood*, and the like. This it is that

that fits them for *Hygrometers*: and to *measure* and determine the different *quantities* of *Moisture* in the *Air*, in different *Places* and *Seasons*. How freely *Water* *passes* and carries with it *terrestrial Matter*, through *Filters*, *Colatures*, *Distillations*, &c. hath been intimated already.

8, *Water* is not capable of performing this Office to *Plants*, unless assisted by a due *Quantity* of *Heat*: and this must concur or *Vegetation* will not succeed. The *Plants* that were set in the *Glasses* Q. R. S. &c. in *October* and the following *colder Months*, had not near the *quantity* of *Water* sent up into them, or so great an additional *Encrease* by much as those that were set in *June*, *July*, and the *hotter*. 'Tis plain *Water* has no power of moving it self: or rising to the vast height it does in the more *tall* and *lofty Plants*. So far from this, that it does not appear from any *Discovery* yet made, that even its own *Fluidity* consists in the *intestine Motion* of its *Parts*; whatever some otherwise very *Learned* and *Knowing Persons* may have thought. There's no need of any thing more, for *solving* all the *Phænomena* of *Fluidity*, than such a *Figure* and *Disposition* of the *Parts*, as *Water* has. *Corpuscles* of that *make*, and that are all *absolutely Spherical*, must stand so very *tickle* and *nicely* upon each other, as to be susceptible of every *impression*: and, tho' not perpetually in *Motion*, yet must be ever *ready* and *liable* to be put into it, by any the *slightest Force* imaginable. It is true, the *Parts* of *Fire* or *Heat* are not capable of moving themselves any more than those of *Water*: but they are more *subtil*, *light*, and *active*, than those are, and so more *easily* put into *Motion*. In fine, 'tis evident and matter of *Fact* that *Heat* does operate upon and move the *Water*, in order to its carrying on the *Work* of *Vegetation*: but how 'tis agitated it self,

self, and *where* the *Motion* first begins, this is no fit *Place* to enquire.

That the Concourse of *Heat* in this *Work* is really necessary, appears, not only from the *Experiments* before us, but from *all Nature*: From our *Fields* and *Forests*, our *Gardens* and our *Orchards*. We see in *Autumn*, as the *Sun's Power* grows gradually *less* and *less*, so its effects on *Plants* is *remitted*, and their *Vegetation* slackens by little and little. Its *Failure* is first discernible in *Trees*. These are raised highest above the *Earth*: and require a more *intense Heat* to elevate the *Water*, charged with their *Nourishment*, to the *Tops* and *Extremities* of them. So that for want of *fresh support* and *Nutrimment* they shed their *Leaves*, unless secured by a very *firm* and *hardy Constitution* indeed, as our *ever-greens* are. Next the *Shrubs* part with theirs: and then the *Herbs* and *lower Tribes*; the *Heat* being at length not sufficient to supply even *these*, tho' so near the *Earth*, the *Fund* of their *Nourishment*. As the *Heat* returns the succeeding *Spring*, they all recruit again: and are furnish'd with *fresh supplies* and *verdure*. But first those which are *lowest* and *nearest* the *Earth*, *Herbs*, and they that require a *lesser degree* of *Heat* to raise the *Water* with its *Earthy Charge* into them. Then the *Shrubs* and *higher Vegetables* in their turns: and lastly the *Trees*. As the *Heat* encreases, it grows *too powerful*, and hurries the *Matter* with too great *rapidity* thro' the *finer* and more *tender Plants*. *These* therefore go off, and decay: and others that are more *hardy* and *vigorous*, and require a greater *share* of *Heat*, succeed in their *Order*. By which *Mechanism* *provident Nature* furnishes us with a very various and differing *Entertainment*: and what is *best suited* to each *Season*, all the *Year round*.

* *Conf. Nat. Hist. Earth.*
Pag. 267. & seq.

As the *Heat* of the *several Seasons* affords us a *different Face* of *Things*; so the *several distant Climates* shew *different Scenes* of *Nature*, and *Productions* of the *Earth* *. The *Hotter Countries* yield ordinarily the *largest* and *tallest Trees*: and those too in much greater *variety* than the *colder* ever do. Even those *Plants* which are *common to both*, attain to a much *greater Bulk* in the *Southern* than in the *Northern Climes*. Nay there are some *Regions* so *bleak* and *chill*, that they raise no *Vegetables* at all to any *considerable size*. This we learn from *Groenland*, from *Island*, and other *Places* of like *cold Site* and *Condition*. In these no *Tree* ever appears: and the very *Shrubs* they afford are *few*, *little*, and *low*.

Again, in the *warmer Climates*, and such as do furnish forth *Trees* and the *larger Vegetables*, if there happen a *remission* or *diminution* of the *usual heat*, their *Productions* will be *impeded* and *diminished* in *Proportion*. Our *late Colder Summers* have given us *Proof* enough of this. For tho' the *Heat* we have had was sufficient to raise the *Vegetative Matter* into the *lower Plants*, into our *Corns*, our *Wheat*, *Barley*, *Pease* and the like: and we have had plenty of *Strawberries*, *Rasberries*, *Currans*, *Goosberries*, and the *Fruits* of such other *Vegetables* as are *low* and *near the Earth*: Yea and a moderate store of *Cherries*, *Mulberries*, *Plums*, *Filberts*, and some others that grow at a somewhat greater *Height*; yet our *Apples*, our *Pears*, *Walnuts*, and the *Productions* of the *taller* † *Trees* have been *fewer*, and those not so *kindly*, so *thorowly ripen'd* and brought to that *Perfection* they were in the former more *benign* and *warm Seasons*. Nay even the *lower Fruits* and *Grains* have had some

† The *Dwarf Apple* and *Pear-Trees* have succeeded better. And indeed in *Trees* of the *same Kind*, those that keep *closest* to the *Earth* always produce the *most* and *best* Fruit. For which Reason 'tis that the *Gardiners check* and *restrain* the *Growth* of their better *Fruit-Trees*: and prevent their *running up* to too great a *Height*.

some share in the Common Calamity : and fallen short both in *Number* and *Goodness* of what the *botter* and kinder *Seasons* were wont to shew us. As to our *Grapes*, *Abricots*, *Peaches*, *Nectarins*, and *Figs*, being transplanted hither out of *botter Climes*, 'tis the less wonder we have of late had so general a *Failure* of them.

Nor is it the *Sun*, or the ordinary emission of the *Subterranean heat* only, that promotes *Vegetation* : but any other indifferently, according to its *Power* and *Degree*. This we are taught by our *Stoves*, *Hot Beds*, and the like. All *Heat* is of like kind : and where-ever is the same *Cause*, there will be constantly the same *Effect*. There's a *Procedure* in every *Part* of *Nature*, that is perfectly *regular* and *geometrical*, if we can but find it out : and the further our *Searches* carry us, the more shall we have *Occasion* to *admire* this, and the better 'twill *compensate* our *Industry*.

III. *An Account of Mr Tho. Savery's Engine for raising Water by the help of Fire.*

MR Savery, June 14. 1699. Entertain'd the Royal Society with shewing a small Model of his Engine for raising Water by the help of Fire, which he set to Work before them; the Experiment succeeded according to Expectation, and to their Satisfaction.

The Engine may be understood by the Draughts of it, Where, Fig 1. is the Front of the Engine for Raising Water by Fire.

A the Furnace.

B The Boyler.

C Two Cocks which Convey the Steam by turns, to the Vessels *D*.

D The Vessels which receive the Water from the bottom, in order to discharge it again at the top.

E Valves.

F Cocks which keep up the Water, while the Valves on occasion are Cleans'd.

G The Force Pipe.

H The sucking Pipe.

I The Water.

Fig. 2. the side Prospect of the same Engine.

LONDON: Printed for *Sam. Smith*, and *Benj. Walford* Printers to the Royal Society, at the *Prince's Arms* in *St Paul's Church-yard*. 1699.

PHILOSOPHICAL TRANSACTIONS.

For the Month of July, 1699.

The CONTENTS.

- I. *Part of a Letter wrote by Mr. James Frazer, Minister of Kirkhil, near Invernes, to Doctor Ja. Wallace at Edinburgh, concerning the Lake Nefs, &c.* II. *A short Discourse concerning Concoction: Read at a Meeting of the Royal Society, by Clopton Havers, M. D. Fellow of the Royal Society.* III. *An Account of the Moorish Way of Dressing their Meat (with other Remarks) in West-Barbary from Cape Spartel to Cape de Geer. By Mr. Jezreel Jones.* IV. *An Account of the Third Volume of Dr. Wallis's Opera Mathematica, in Folio; finished and published at Oxford, 1699; the two former Volumes having been published in the Tears 1693 and 1695.*

I. Part of a Letter wrote by Mr. James Frazer,
Minister of Kirkhil, near Invernes, to Ja.
Wallace at Edinburgh, concerning the Lake
Nefs, &c.

THE Lake *Nefs*, though oft mentioned by our Historians as one of the Wonders of *Scotland*, yet they give but an ill Account of it. This Lake, according to our Highland Tradition and Bards, has its Name from one *Nysus* an *Irish* Hero, that fix'd a Colony in *Stratharig*, with *Dornadillo* his Wife. The Promontory, upon which he had his Residence, is to this Day called *Down Dearnill*; and he being the first that ever offered to set out Boat or Barge upon this Lake, it is after him called *Loch-Nefs*. As to its Dimensions, it is twenty four Miles in length, and in most Places two in breadth. In many Parts of this Lake it hath been founded, but no bottom found. One *George Scot*, who built a great Ship here for the *Venetian* Service, tried 500 Fathoms, but all in vain. And when the *English* had their Garrison at *Invernes*, they had a Frigate which usually sailed from one end to another, with Provision, to their Garrison at *Inverlochy*; and one *Orton*, Captain to the Frigate, told me, that he tried a whole Barrel of Plum-line, but found no bottom. The Banks of this Lake ascend high and mountainous, with Woods. The Lake never freezes, which is imputed to the many great Springs and Fountains in it; the only Fish in it is Salmon. This Lake *Nefs* discharges it self in a River of the same Name, six Miles in length, which never freezes, but still smoaks with Frost; and from this Smoak is spread a Fogg over all the adjacent Country. The River runs slow; the Poet gave it this Epithet.

*Nessa flues lente, tamen admirabile dictu
Undas non possit bruma domare tuas.*

Upon

Upon the North side of *Loch Ness* stands the famous Castle of *Urghart* upon a Rock ; the great Ditch round it was for the most part cut out of the Rock, and received the Water of the Lake. This Castle consisted of seven great Towers, and it's said was built by the *Cuminees*, but had its Overthrow by King *Edward* the First of *England* ; and nothing remains now but one Tower to the East.

To the Westward of this Castle, about four Miles up on the side of *Loch-Ness*, stands that great Mountain *Meal-fuor-vouny*, of a round, neat, high Shape ; it will be two Miles of perpendicular height from the Lake. Upon the very top of this Hill there is a Lake of cold fresh Water, about thirty Fathom in length, and six broad, no Course or Stream running to it or from it. The bottom of it cannot be sounded. I went purposely to see it, and with a hundred Fathom of small Line plum'd it, but could find no bottom. It is the No-such Rarity of all this Country ; for Summer and Winter, Spring and Harvest, it is equally full, and never freezes.

There is, due West, from the end of the River of *Ness* an Arm of the Sea called *Beaulie Frith*, six Miles in length and two in breadth. This Bottom sure has been firm Land of old ; for near the middle of it we find long oaken Trees with their whole Roots, some above sixty Foot in length, lying covered with the Sand, which, no doubt, have grown there, and lie flat as they fell ; for further Information, there are three great Heaps of Stones in this Lake, at considerable distance one from the other, these we call *Cairns* in the *Irish*. One of a huge bigness, (in the middle of the *Frith*) at low Water, is accessible ; and we find it has been a Burial-Place by the Urns which are sometimes discovered. As the Sea encroaches and wears the Banks upward, there are long oaken Beams of 20 or 30 Foot long found ; some of these 8, some 12 or 14 Feet under Ground. I see one of them 14 foot long, that carried

ried the mark of the Ax on it, and had several Wimblebores in it. The River of *Beuly*, which falls into this arm of the Sea, near *Lovat*, hath so sunk, that oaken Trees of incredible length, and 16 Foot under Ground, are discovered in the Banks, with degrees of Sand, Gravel, Clay, and Earth above them: And if you remember, when you did me the Favour to see me at my Houfe, when we went to *Beuly*, we found some Oaks, with Coals, and pieces of burnt Timber, as low as 16 Foot, or thereabouts.

There is, due West, from *Beuly*, about 17 Miles, a Forest call'd *Affaruck*, in which there is a Mountain call'd *Glen-in-Tea*; and on the North side, under the Shade of a great sloping Rock, stands a Lake of fresh Water, called *Lochan Wyn*, or *Green Lake*, 18 Foot in diameter, about a Fathom deep. This Lake is always covered with Ice, Summer and Winter.

The next Mountain, North of that, is called *Scüre-in-Lappich*; on the top of it there is a vast heap of white Stones, like Chrystal, each of them bigger than a Man can heave, they will strike fire like Flint, and have the Smell of Sea-wrack. How these were brought there, or heap'd together, or what the nature of the Stone is, I do not know, nor is there any Tradition about them. Upon this Mountain is found also Oyster-Shells in plenty, Scallop and Limpet-Shells, yet 20 Miles from any Sea. Round about this Hill grows the Sea-Pink, in *Irish*, *Teartag*: It has the Taste and Colour of that grows upon our Sea Banks.

The *Pagan* Temples, or High Places of Idolatry, are still very numerous here, upon the River-side of *Narden*; I reckon'd 13 in two Miles; they are orbicular round, and at the West end two high Stones like Pyramids; there is an outward and inward Circle of lesser Stones, and a round Mote in the Centre for Sacrifice. Another sort of them are only of Earth, and a Trench round about, and a Mote in the middle. In many of these, I find a round heap of Stones, and Urns in them. It seems a different Religion afterwards turn'd these Places of Worship into Burial-Places.

A short Discourse concerning Concoction: Read at a Meeting of the Royal Society, May 1699, by Clopton Havers, M. D. Fellow of the Royal Society.

THE Manner in which the Digestion of the Aliment is performed, is a thing not very easie to be understood and explain'd. However, it has not escap'd the Conjectures of some Philosophical Men, who having curiously observ'd the *Phænomena* of Nature, and enquir'd into their Causes, have, amongst other things, endeavour'd to account for this. But their Sentiments about it have been various, and the Hypothesis, by which they have studied to explain it, very different. Some have thought the Concoction of the Food to be a kind of Elixation; and that the grosser and more solid Parts being as it were boiled in the Liquid by the Heat of the Stomach, and the Parts adjacent to it, as the Liver, Spleen, and Omentum, are by a long and continued Elixation first render'd more tender, and then colliquated, and dissolved into minuter Particles, so as to mix more equally with the fluid, and with that to make one Pulpament, or chylous Mass. And *Hippocrates*, tho' he does not plainly call it an Elixation, yet seems to attribute the Concoction of the Food to the Heat of the Stomack, as the Cause of it: *Sect. 4. Libro de salubri victûs ratione.* So where he takes Notice of the voiding of such Fœces as appear to be like the Food that has been eaten, he adds, *Constat enim, Janè ventriculum, ciborum copiam, ut concoquat, calefacere non posse.* And there are other Passages in the same Book, from which we may conclude, that he sup-

pos'd the Heat of the Stomach to be the great Cause of the Digestion of the Food.

There are others that make the Stomach it self to be the great Instrument of Digestion, but in a different manner : And they suppose it to be perform'd by an Attrition, as if the Stomack, by those repeated Motions, which are the necessary Effects of Respiration, when it is distended by the Aliment, did both rub or grind off some minuter Particles from the grosser Parts, and by continually agitating the Mass of Food, make those Parts, which are not contiguous to the Stomack, strike one against another, and break one another in pieces, until they are all attenuated. It is evident enough, that the sides of the Stomack do in Expiration press upon the Contents, so as to oblige, at least some Parts of them, every time the Muscles of the Abdomen are contracted, to move and shift their Places. So in Inspiration, when the Diaphragme and Liver press upon the upper Part of the Stomack, the Aliment must be moved again. So that by these reciprocal Motions, that part of the Food, which is contiguous to the Stomack, and moves in a Line parallel to it, must rub against it : And all the other Parts being moved by such a Compression, as gives them a different Tendency, it is certain they must be continually striking one against another. And for Bread, and such Things as are made of Flower, that will be soften'd and dissolv'd with any common Liquid, that Agitation of the Stomack, which moves them in Respiration, might seem sufficient to break and dissolve them, when they are sufficiently moisten'd with a Fluid. Yet this cannot be thought enough to break and digest Flesh-meat, Fruits, or any other thing that will not be soften'd and dissolv'd in Water, or some such Liquid. But altho' this Motion of the Aliment, caused by Respiration, does not actually digest it, yet it has a great
and

and necessary Use in Concoction, and makes all the grosser Parts, as they are attenuated, mix equally with the Fluid.

Some think that the Bilious Juice ; others, that the Spirits, are chiefly concern'd in this Affair. Galen, in his Book *de Naturalibus Facultatibus*, makes it to be the Effect, not of one, but of several Causes ; as, a Pituitous Juice in the Stomack, the Bile, &c. which appears from what he has said, and the Translator thus render'd : “ *Verum quanto ii (cibi) qui mansi sunt, iis, qui inhæserunt, magis sunt alterati ; tanto etiam his magis ii, qui devorati sunt. Siquidem incomparabilis erit horum alterationis excessus, si & quæ in ventre est Pituita, & Bilis, & Spiritus, & Calor, & tota Ventris substantia, æstimentur.*

Some there are that will have the Food to be dissolv'd by a Menstruum, which is supply'd from the Glands of the Stomack, or some other way : But those that do so far agree in the General, as to think Concoction is perform'd by a Dissolvent, do differ in their Notions of the Nature of the Menstruum : For there are some that suppose it to be an Acid, which does erode the grosser Parts of the Food, and dissolves them in the same manner as Vinegar, Spirit of Vitriol, or any such-like Acid, will dissolve even so solid a Body as Iron. And it cannot be deny'd, but that Oil of Vitriol will dissolve Fleishmeat, and reduce it to a Pulp : But it is not to be suppos'd that the Fibres of the Stomack can admit any such strong and corroding Acid, without something to correct it, but it must be injur'd in its Tone, and labour under great and extraordinary Pains. Neither does such a Menstruum, tho' it will digest some things, seem capable of dissolving so great a Variety of Things as we eat, especially when a great many of them are of a contrary Nature. Some will have the Menstruum to be a

nitro aëreous Spirit, that is, quick, and very penetrating, and included in its proper Vehicle ; which, being in its own Nature apt to penetrate the Mass of the Aliment, does diffuse it self through the Whole, and breaking the Vinculum of the more solid Parts, does dissolve their Compages. By others, it is thought to be some Saline Juice in the Stomack, by which the Parts of the Aliment are divided and dissolved, and those which are fit for Nourishment, are volatiliz'd.

Lastly, There are some others who reject the Opinions I have already mention'd, and suppose the Digestion of the Food to be perform'd by the Benefit of a Ferment, which, when it is mix'd with the Aliment, excites in the Mass an intestine Motion, and the different and contrary Motions or Tendency of the Parts making some kind of Collision, gradually break off Particles from the Grosser, and more solid Parts, till they are so attenuated as to be apt to mix more equally with the Fluid, and with them to make one soft or chylous Substance. But yet there is not amongst them an universal Consent, either about the Nature of this Ferment, or the manner how it is supply'd. For first, some think it to be the Remains of the Food that was last digested ; which, having lain some time in the Stomack, after the rest is carried down into the Intestines, contracts an Acid, or some other Quality, and is so alter'd as to partake of the Nature of a Leaven. And this Leaven being a Part of the Food, which has been already digested, is so soft and liquid as to be capable of mixing with the Aliment, which is next taken into the Stomack, and being agitated with it by the repeated Pressures of the Diaphragme, Liver, and Abdominal Muscles upon the Stomack in Respiration, does diffuse it self through the whole Mass, and being mixed with it, like Leaven, or Yest added to new Wort, &c. puts it into a State of
 Fermentation,

Fermentation, and by this Fermentation, or the Expansion of the Ferment, and the more tenuious Parts, which are first put into Motion by it, those which are more solid, and with which they are intermix'd, are rent, and divided, and so attenuated, as to become a soft and pulpy Matter. And altho' the greatest part of the Food, that is thus broken and concocted, is by the Contraction of the Fibres of the Stomack press'd into the Duodenum, yet they do not contract themselves so as to force out all the Aliment, but leave between the *Rugæ* or Folds, on the inside of the Stomack, a sufficient Quantity to be a Leaven to the next Meal; and so from time to time.

Some have a Notion, That this Ferment, or Principle of Fermentation, is in the Aliment it self; which being a Congeries of Matter, consisting of various Parts of a different Nature, is no sooner enclosed in the Stomack, and digested in the Heat of that, and the adjacent Parts, but the more spirituous and subtil Particles are put into motion both from that Warmth, and the Difference of their Natures, and enter upon a Fermentation. And so by their intestine Commotion, and the Violence they offer to those Parts which oppose the Tendency of any of them, they break and dissolve what is more solid.

Again: Some suppose, that this Ferment is supply'd from the Glands of the Stomack.

And Lastly, Others, and perhaps with much better Reason, contend for the Saliva, and make that to be the Ferment, which serves principally for the Digestion of the Food; which in Mastication being mix'd with our Aliment, is with that carried down into the Stomack, where the Parts of it being put into Motion by kindly and agreeable Heat, they do ferment with, and xagitate first those Parts of the Food which are most apt

apt to ferment with it, and then both conspire to break and dissolve the grosser and more stubborn Parts. And *Galen*, in the Book I have before-mentioned, plainly allows that the Saliva is concern'd in the Business of Concoction, tho' he supposes the Alteration, which is produc'd by this Juice, to be made in the Mouth, as appears from these Words: *Quæ (alteratio) in ore agitur mutat quidem id (nutrimentum) in alteram speciem manifestè, non tamen ad perfectionem transmutat— Qui mansi sunt Cibi primum quidem hæc Pituitâ (oris) imbuuntur, & cum eâ miscentur— Itaque majorem mutationem consecuti sunt, quam ii, qui in vacuis dentium intervallis fuerè impacti.*

Now I have given this short Account of the various Opinions of some Ingenious Men, concerning the Manner how Concoction is perform'd; I come now to propose my own Hypothesis, by which I shall endeavour to explain it.

In order to the more easie and effectual Digestion of the Food, Nature has appointed some Parts for the breaking our Aliment, and reducing whatever is gross into smaller Parts, before it is put upon Digestion: Others to supply the Ferment, by which it is to be dissolv'd and concocted, and which, before it comes to be included in the Stomack, does moisten, and make it more soft, that it may more easily be penetrated and broken by those Parts which serve to divide every Morfel into smaller Pieces, and prevents the Inconvenience and Trouble which would arise from the Nourishment sticking about or between them, when it is dry or viscous.

For the breaking of that part of our Food, which is not liquid, Nature has furnish'd us with Teeth, and those of two sorts: For some are ordain'd to divide and
break

break off smaller Morfels from a larger Mafs ; others are made for the grinding thofe Morfels into much fmaller parts. The Teeth, which ferve to break off Pieces of a convenient Magnitude from a larger Mafs, are of two forts accommodated to the Nature of the Substance which we eat. Thefe are the *Incifores*, and the *Dentes Canini*. If the Substance, which we have to eat, be not hard, but more eafily penetrated and divided, then the *Incifores* are capable of making an Impreffion upon it, and fix'd firmly enough in the Jaws to break off that Part which they take hold of. But if it be more folid, and not eafily penetrated, nor any Piece without Difficulty to be feparated from that Body, whereof it is a Part, then we apply the *Dentes Canini*, or Eye-Teeth to it, which are not fpread, nor have fuch an edge as the *Incifores*, but are fharp and pointed like an Awle, and fo do more readily penetrate a Substance that is hard, and which the *Incifores* can fcarcely make any Impreffion upon. And as the Parts of a more folid Body are commonly with more Difficulty feparated, and there muft be a greater Stress put upon thofe Teeth which pull it into pieces ; fo thefe Teeth are much more firmly fixed in the Jaws than the *Incifores*, tho' they have but one fingle Root. Befides, the Pofition of all thefe Teeth is accommodated to their ufe, as being planted oppofite to the Aperture of the Mouth, fo that they may be conveniently apply'd to the Substance which we have to eat, before it is broken, and when it is too large to be admitted within the Mouth.

The Teeth which do by a Compreffion and Attrition reduce the little Morfels to fmaller parts, are from the manner in which they break the Aliment, called *Dentes Molares*, becaufe they do, like fo many little Mill-ftones, grind the Food between them. And that they might be render'd fit for this purpofe, they are made broad at that

that Extremity, which stands out of the Gums, by which means they retain some Quantity of the Food between them every time the lower Jaw is pulled up and forc'd against the *Maxilla superior*. And as they are broad, so they are formed with Inequalities and Protuberances, and by the motion of the lower Jaw, from one side towards the other, they grind what they have between them into pieces. The Position of these Teeth too is as convenient as that of the *Incisores*, and the *Dentes Canini*: For being design'd to break those pieces of our solid Food, which are taken into the Mouth, and these pieces, when they are compress'd, and moved by the *Dentes Molares*, being apt to fly out of the Mouth, if there were no Contrivance to prevent it, they are placed beyond the Aperture of the Mouth, and opposite to the Cheeks, which keep the Food within that Cavity, and not only so, but press it in between the *Dentes Molares* on one side, as the Tongue does on the other, until they have sufficiently broken and divided it.

At the same time, whilst the *Dentes Molares* are breaking the Food, there flows into the Mouth a salival Juice which mixes with it, and not only serves to moisten it, and to render it more apt and easie to be divided, but seems to be the Ferment, by the Benefit of which the Food is dissolved and digested. And therefore it is intimately mixed with it by the Teeth agitating or stirring them together in mastication.

This Liquor, which we commonly call the Saliva, or Spittle, seems to be a Composition made of two several Juices, very different in their Nature. And therefore the several Parts of it are separated by their proper Glands, and Nature has planted no fewer than four pair about the Mouth, which supply the Juices that make the Saliva; to wit, the *Parotides*, and the *Glandula Nuckiana*, the *Glandula Maxillares internæ*, and *Sublinguales*.

guales. Whereas if the *Saliva* were but one more simple Liquor, a less Number of Glands might have been sufficient. At least there appears no Reason why one of every Pair should disembogue it self into the Mouth so very near to the Orifice, by which a Gland of some other Pair throws in its Juice; and they are not rather all planted at more equal Distances from one another, so to flow in upon every part of the Aliment at the same time.

Not that I suppose, as there are four pair of salivatory Glands, so there are four sorts of Juices supply'd from them, to make the *Saliva*; but, as I hinted before, that there are only two different Juices, that constitute it. And these are not only sufficient, but more proper to excite and secure that Fermentation, which is necessary to Concoction. For we find that most of those Fermentations, which arise upon Mixtures made for Experiments, are produced from the Mixture of two things, and it is not so easie to find out three or four such Liquors of a different nature, as will, upon the Mixtion of them all, produce a Fermentation, and from the Omission of any one of them discover no Discord or Disposition to ferment. Besides, it is certain that two do better secure the End, which Nature designs. For, if there were three or four different Juices, of which the *Saliva* naturally consists, these must all have their proper Qualities preserv'd to them, or else the Fermentation, which should arise between them, will not necessarily follow upon their Mixture; and it is certain, that there would be more Danger, that one of three or four should be depriv'd of its natural Quality, than one of two.

What Nature these two Juices are of, I do not pretend positively to determine; but so far as I have been able to make my Conjectures about it from Experiments, I do think one of them to be an acid Juice; the other

an oleaginous Liquor, something like Oil of Turpentine. For amongst the many Experiments I have made, there was no one that gave me so much Satisfaction as that which I made with Oil of Turpentine and Oil of Vitriol, tho' I try'd several other things, that will produce a Fermentation upon their Mixture. And it was for this Reason that I made the Experiment with Oil of Turpentine, and the other Oil.

I took a piece of raw Flesh, and having cut it into pieces, but much larger than what our more solid Food is reduc'd to by due Mastication, I mix'd some Crums of Bread with it, then I poured in the Oil of Turpentine to them, and upon that the Oil of Vitriol, and having shak'd them together, I digested them about four Hours in *Balneo Mariæ*, and then shaking them again in the Glass, I found the Meat dissolv'd, and they all became a thickish Pulp. I could not but take notice, that Oil of Camphire (tho' it does not otherwise seem much different in its Nature from Oil of Turpentine) and Oil of Vitriol, which upon Mixture will produce an effervescence as well as the Oil of Turpentine and Oil of Vitriol, yet did not touch the Meat, upon which I poured them, so as in the least to dissolve them. I cannot deny but that an Acid, and a Solution of Salt of Tartar, did dissolve some part of the Flesh-meat, which I mix'd them with, but yet neither so soon nor so perfectly as the two forementioned Oils. And I do the rather think one of those Juices, which constitute the Saliva, to be of the Nature of Oil of Turpentine, than of a fix'd Salt, because it will correct and temper even Oil of Vitriol, so as to render it more tolerable to the Fibres of the Stomack. Not that I suppose the acid part of the *Saliva* to come near to the Acidity of Oil of Vitriol. For tho', when they are mix'd, they will make a Liquor that may not be injurious to the Stomach, yet the acid
Juice,

Juice, if it were so corrosive as Oil of Vitriol, would certainly be injurious and painful to the salivatory Ducts, which convey it to the Mouth before it is mix'd with the oleaginous Liquor. But I only say it is an Acid, and in some degree approaches to the Nature of that Oil. And Nature, which can much better adapt several Causes for the Production of such an Effect than Art, may attain her End by a more temperate Acid. Tho' at the same time we may be able to make some probable and true Conjectures about the Nature of those Causes from Experiments.

It being most reasonable to suppose, that there are but two sorts of Juices, of a different Quality, that make the *Saliva*, I do conceive, that four of the eight salivatory Glands, or two pair of the four, do supply one of these Juices, and the other four Glands the other. And this seems to be a very good Reason, why they are so planted, and the Orifice of their Ducts so order'd, that the Juice, which is supply'd by one Gland, is discharg'd into the Mouth, very near to the Orifice, by which the Juice of a different Nature is transmitted from another, so that they must necessarily meet and mix together. Thus the *Glandulæ Nuckianæ*, and the *Parotides*, throw in two different Juices by Orifices, which open into the Mouth very near to one another; and the *Glandulæ Maxillares internæ*, and *Sublinguales*, do below supply the same kind of Juices by Orifices, that open so near to one another as to secure the Mixture of the two different Juices.

These Glands, I say, do between them afford two diverse sorts of Liquors, of such a Nature as are apt to ferment upon their first Mixture, but perhaps more considerably when they come to be digested by the Heat of the Stomack. So that the Colluctation, or Fermentation, which attenuates and concocts the Food in the

Stomack, does not ordinarily arise between the Aliment and the *Saliva*, but between the several Parts of the *Saliva* it self. And indeed, if the *Saliva* did not consist of two Juices, whose Nature is in such a manner different, as to render them apt to ferment upon their Mixture, it would be very hard to conceive how it should so readily and indifferently serve for the Digestion of all Eatables ; how it should ferment with, and dissolve so great a Variety of things, not only of a different, but of a contrary Nature ; how it should ferment with Acids as well as Alkalies, digest things that are cold as well as hot or temperate ; some things that are salt, others that are insipid, bitter, and sweet, mucilaginous, oily, &c. But if we suppose, that the Fermentation, which serves for the Digestion of the Food, arises from a peculiar Difference in the nature of two Juices, which constitute the *Saliva*, it will be easie to give a rational Account of our Concoction of innumerable things of a different Nature. And this seems to be as effectual, and a more certain way to attenuate and dissolve the grosser Parts of our Food, than if the Fermentation were made only between the *Saliva* and the Aliment: Besides, the *Saliva* seems to discover a Fermentation upon the Mixture of its constituent Juices, even at those times when we do not actually eat ; for it is always attended with Bubbles, and a Froth, when it has not been at all agitated in the Mouth, and many of those Bubbles will remain for some considerable time after we have spit it out.

Nature therefore having appointed the *Saliva* for the Digestion of the Food, has taken care that it shall be thrown in upon the Aliment on every side. Thus the *Glandulæ Nuckianæ*, and the *Parotides*, supply their Juices to that part of the Food, which lies on the outside of the Gums, between the Cheeks and the Teeth, and the

Glandulæ

Glandulæ Maxillares internæ, and *Sublinguales*, do bestow their Liquor upon the Meat, which is within the Teeth and Gums. Neither has she had a Regard only to that Supply, which is due to all the Parts of our Food, but likewise to the Mixture of the two different Juices of the *Saliva*, which is necessary to its Fermentation. And therefore, as I have already observ'd, the Orifices of the Ducts, which belong to one sort of Glands, are placed near the Aperture of a Duct, which conveys a Juice from one of the other Glands. So the Ducts of the *Glandulæ Nuckianæ*, and the *Ductus Stenoniani*, do on each side open into the Mouth, near one another; and the salivatory Ducts of the *Glandulæ Sublinguales*, and the *Maxillares internæ*, tho' they have distinct Orifices, empty themselves under the same *Papillæ*; and the Juices, which are supply'd by them, meet there, and flow into the Mouth together.

The several Parts of the *Saliva* being discharg'd into the Mouth in such a manner as to meet and begin a Fermentation, the *Saliva* does, partly as it is agitated with the Food by the Teeth, and some other Parts of the Mouth, partly by its own Fluidity insinuate it self into, and mixes with the Food, and not only moistens and softens it, but excites the Fermentation, which is to dissolve it. And when the Aliment is thus mix'd with the *Saliva*, which serves to ferment the whole Mass, it is then to be convey'd into the Stomack, that great digestive Vessel of the Body, where the Fermentation is not only continued but improved.

The Nourishment being convey'd into the Cavity of the Stomack, is there kept for some time in a digestive Heat, all which time it is under a Fermentation produc'd by the different Parts or Juices of the *Saliva*, which are mixed with it; which Fermentation does first agitate the more tenuious or subtil parts of the Food, and puts them

them into motion, and so with the Fermentation of its own, and those Alimentary Parts, which it first communicates a motion to, improv'd by the Heat of the Stomack, the *Saliva* must necessarily act upon the grosser Parts. For the intestine Motion, which is excited in the Mass, does not give the Particles, which are fermented, the same Tendency, but what is so various and confus'd, that they must inevitably strike not only one against another, but against those, which are more gross, so as to attenuate them, sometimes by a Collision, which strikes off smaller Particles from the larger Parts ; sometimes by a Compression, when the Particles, which are in motion happen to strike directly against any grosser Part, on every side of it ; sometimes by a kind of Explosion. For without doubt the *Saliva*, which is fluid, insinuates it self into the Interstices of the more crass Parts of the Aliment, and whatever is agitated and expanded in those Interstices, requiring a larger space for the Freedom of its Motion, and offering a Violence to every thing, that opposes its Tendency, will, like Gun-powder included in a Shell, force its way out, and tear to pieces that Matter, which does endeavour to confine it.

Thus the grosser Parts are broken and divided, until they are at last so far attenuated as to mix more equally with the Fluid, and with them to make one Pulp or chylous Mass. And altho' I do not apprehend how the Stomack should by its reciprocal Motions in Inspiration, and Expiration, be able to break and attenuate any Matter, that will not be soften'd and dissolved by agitation in a Liquid, yet it is certain that these Motions, caused by the Diaphragme and Abdominal Muscles in Respiration, do make those Parts, which are broken off, as they are dissolv'd, mix intimately with the more liquid, as the Meat which I digested with Oil of Turpentine, and
Oil

Oil of Vitriol, did by agitation mix more equally with the Oils, and became a Pulpament.

As the Juices, which constitute the *Saliva*, do ferment upon their Mixture, so it is probable that from their Mixture and Fermentation there results such a *Tertium quid* as is apt to ferment with the Bile. And therefore, when the Aliment has been under the Fermentation, excited by the *Saliva*, a sufficient time, it is then thrown into the *Duodenum*, where it meets with the bilious Juice, which flows into that Intestine from the Liver, from which a new Fermentation seems to begin; and the Commotion of the Parts of the Aliment being still continued, does carry on the Business of Digestion until the Food is perfectly concocted. Tho' it is probable, that this new Fermentation serves not only for the more perfect Digestion of the Food, but likewise for the Separation of the Chyle from the feculent Parts.

Neither do I by a random Guess, and an ungrounded Conjecture, suppose that from the Mixture and Fermentation of the two Juices, which constitute the *Saliva*, there results a Matter, which is apt to ferment with the Bile. But to me the Notion seem'd to be confirm'd by an Experiment that I made. For considering with myself that the Bile is generally allow'd to have much of a saponary nature, I made a Solution of Soap in fair Water, and mix'd it with the Oils of Turpentine and Vitriol first put together, and from their Mixture I observ'd a very easie and gentle Fermentation, which continued for a considerable time.

III. *An Account of the Moorish Way of Dressing their Meat (with other Remarks) in West Barbary, from Cape Spartel to Cape de Geer.*
By Mr. Jezreel Jones.

THE *Mauritanian* or *Barbarian Moor*, when he rises in the Morning, washes himself all over, and dresses, then goes to their *Jiama*, or Church, says his Prayers, and returns home, where his Wife, Concubine, or Slave, hath his Breakfast provided for him, which is sometimes made of Barley or Wheat-Gruel; for I have known both. It is made somewhat thicker than ours, till it be ropy; they put *Origan*, and other Herbs, powder'd, into it, which for such uses they keep dry'd all the Year; some will put a little Pepper, and other Spice. I have often been treated with warm Bread, fresh Butter, and Honey, in a Morning, which is not seldom used amongst themselves, an Hour or two after they have had Gruel; as also Hasty-Pudding, with Butter, and sometimes Butter and Honey, (as the Guests are, and according to the Ability of the Entertainers.) Some again give *Cuscusoo*, with Milk, others with Flesh, a third with Roots. It is to be observed, when any one hath a Guest or Guests in his House, the Neighbours bring their Dish to welcome him or them, on account of the Respect and Love they bear to their Neighbour, as well as to shew their Readiness to entertain the Stranger. This Practice is found constantly used throughout the whole Country amongst the *Moors*, one towards another, reciprocally. And I have as often found the like Civility, as I had occasion to take up my Lodging at any Place, where I was acquainted with any of the
Inhabitants.

Inhabitants. The *Jews* likewise shew great Civility to any *Christian*, and treat him with what they have, as stew'd or baked Hens, Capons, hard Eggs boil'd or roast-ed, which they press flat with Pepper, and Salt, Wine, Brandy, &c. They have generally the best Bread, and every thing else of the kind that they can get. They put Annis, and two or three other sorts of Seeds in their Bread; one is black and angled, tastes almost like Carrot-seeds, and I think I have seen these sometimes used in Bread in *Spain*; I know not the Names of the other Seeds in *English*, nor any Language but *Arabick*. They esteem Honey as a wholesome Breakfast, and the most delicious that which is in the Comb, with the young Bees in it, before they come out of their Cases, whilst they still look Milk-white, and resemble (being taken out) Gentles, such as Fishers use: These I have often eat of, but they seem'd insipid to my Palate, and sometimes I found they gave me the Heart-burn.

In *Suse* I had a Bag of Honey brought by a Friend who made a Present of it, as being of great Esteem, and such as they present to Men of greatest Note amongst them. This, he told me, I was to eat a little of every Morning, to the quantity of a Walnut; it was thick as *Venice Treacle*, and full of small Seeds. I used to breakfast on it for several Days together, taking the said quantity at a time; it always made me sleepy, but I found my self well, and in very good temper of Body after it. The Seeds were about the bigness of Mustard, and, according to the Description of them to me, and the Effects I found by eating the Honey and them, they must be a large sort of Poppy-seed. The Honey was of that sort they call in *Suse*, *Izucanee*, or *Origanum*, which (the Bees feed on, and) these Seeds were mixed with.

Cuscus, or *Cuskfoo*, is the principal Dish amongst them, as the *Olla* is in *Spain*: This is made of Flower of Wheat, and when that is scarce, of Barley, Miller, *Indian* Corn, &c. They shake some Flower into an earthen Pan, made on purpose, which is not glazed, sprinkling a little Water on the bottom of the Pan first, and then working it with both their open Hands flat, turning them backwards and forwards to grain it, till they make it much resembling *Sago*, which comes from the *East-Indies*. They stew their Flesh, keeping their Pots close covered, which are made of Earth, put the *Cuskfoo* into an earthen Cullender, which they call *Caskafs*, B. *vid.* Fig. and this Cullender into the Mouth of the Pot, C. that so all the Steam which arises from the Meat may be imbibed by the *Cuskfoo*, which causes it to swell, and make it fit to be eaten: When it is enough, for they love every thing thoroughly done, they put this *Cuskfoo* out into the Dish they serve it up in, which is somewhat like D. and the *Cuskfoo* being heaped up, they make (as it were) a Bed or Place for the Meat to lie in, then they put good store of Spice, as Ginger, Pepper, Saffron, &c. This Dish is set upon a Mat on the Ground, and four Men may easily sit about it, tho' I have seen six and more at one Dish; they sit with their Buttocks upon the Calves of their Legs, with the bottom of their Feet on the Ground. If there are many to eat at this Meal, there are more Dishes. This Dish they have in use sometimes at Breakfast, as well as Dinner and Supper, but it is commonly used for the two last Meals. They cover it with a thing made on purpose, somewhat like E. and it will keep hot enough two Hours. At a stately Entertainment they will have a Sheep roasted whole, sometimes a half, or a quarter, on a wooden Spit, or the most convenient thing they can find. They do not continually keep turning it, as

we do, but leisurely let one side be almost roasted before they turn the other. The Fire is commonly of Wood burnt to clear Coal, and made so, that the Heat ascends to the Meat. They baste it with Oil, and a little Water and Salt incorporated. They let it be thoroughly roasted; then they say, *Bismillah*, *In the Name of God*, after they have washed their Right Hands, and pulling the Meat in pieces, they fall to eating. It is to be noted, that they never use but their Right Hand in eating, and one holds whilst the other pulls it asunder, distributing the pieces to the rest, as he pulls it off. They seldom use a Knife, and a Fork is a strange thing amongst them. They are dextrous at this way of carving, and never flinch at the heat or warmth, for that would look mean, and might occasion one more bold to take his Office upon him to perform. When they have done, they lick their Fingers, and as often as they have a hot Dish, they wash their Hands afresh. Then they have *Alfdoush*, or *Virmizzelli*, with some Meat on it, stew'd Meat, well spiced, with savoury Broth; which, after they have eat the Meat, they dip their Bread in the Sauce, or Broth, and eat it. They are cleanly in their Cookery, and if a Hair be found it is a capital Crime, but a Fly not, because it has Wings, and may get in after it passes from the Cook's Charge or Management; to be well and strongly seasoned is no great Fault; and if one should say 'tis too high of Pepper, they'll reply, It is better to be *Ah* than *Faugh*; alluding to the Differences between a strong, high, or hot, and savoury Taste, and an insipid, watry, or unpleasant. *Cubbob* is small pieces of Mutton, with the Cawl of a Sheep wrapped on them. Some make good *Cobbob* of the Liver, Lights, and Heart. They Pepper and Salt them, and put Sweet Herbs and Saffron into them, then roast them, and when they dish them

up, squeeze an Orange or two on them. Thus they use commonly in their stewed Meats, Lemon and Orange for Roast or Fish.

Elmorofia is another : This is pieces of Beef, of Cow or Camel, stew'd with Butter, Honey, and Water ; some will put *Rob* of Wine amongst it ; they add Saffron, Garlick, or Onions, a little Salt, and when 'tis enough, serve it up. They esteem this a delicious Dish, used mostly in the Winter, and say it is good against Colds, notwithstanding they say Beef is cooler than Mutton. They have a piece of good Houlewifry for a ready Dish, which is likewise appropriated to the Winter Season ; and this I will give an Account of before I have done. Then they will treat you with Hare stew'd, stewed and roasted Hens and Partridges : These they disjoint, and let stew in Water, and Oil, or Butter, if they are not fat enough of themselves. When they are almost enough, they beat a couple of Eggs, mix them with the Liquor, with Juice of Lemon or Vinegar, which they usually have very good, and serve it up.

Then you may have more baked and roast, and another Dish of stew'd Meat, which for its Goodness would be esteem'd amongst us : They take a Leg of Mutton, cut off the fleshy part, leave out the Skin and Sinews. This Flesh they mince very fine (with two Knives, one in each Hand) by holding them across, which they manage with great Dexterity ; they also mince some Suet, Parsly, Thyme, Mint, &c. Then they take Pepper, Salt, and Saffron beaten together, and some Nutmeg ; all these they add to the rest, with about half a handful of Rice ; they cut an Onion, of the best sort, half through, and take off the first Lay, as not so fit for use, unless it be thick. (They that are curious take out the inner Skin, saying it is not whollome, and bad for the
 Eyes,

Eyes, it being the worst thing in an Onion, which otherwise would be the best of Roots.) This Lay they fill with forc'd Meat, then the next, and so on, which makes them look like so many Onions; some they put up in Vine-leaves of the best they can find for their purpose. Whilst this is doing, the Bones and Residue of the Leg of Mutton, being in moderate pieces, are stewing, with as much Water as will just cover them; then they put on their forc'd Meat Balls atop of the Meat, and a green Bunch of Grapes upon them, cover it, and let it boil till thoroughly enough. This, I think, is one of their best Dishes, which they often use in *Fes* and other Cities. *Pillow*, or *Pilôe*, is a Dish very well known, made with Rice boiled, with a good Hen, Mutton, and Spice, the Flesh and Fowl being put on the Rice in a Dish, as *Cuskfoo*, and so served up.

A Bustard, which they roast and stew, and make an excellent Dish of its Guts, I eat of it once; to me seem'd very pleasant and savoury, and very grateful to the Stomack. This Bird is fit for their King's Table, as likewise the Hedgehog, of which I will give an Account anon. Then they have *Ragous*, made with Sparrows, Pigeons, &c.

Their Drink is plain Water, or Milk, and sometimes *Rob* of Wine mixed with Water. I was once treated with this by the Bassaw of *Suse*, *Abdolmeleck ben Alchotib*, and there was brought to me a great Bowl which held above three Quarts; he told me there was not above half a Pint of this *Rob* in it, and the rest was filled up with Water. It was very generous and pleasant, and tho' I did not drink a quarter of it, yet I found the Strength in half an Hour. This they say is a Remedy against Cold likewise, and pretend to take it medicinally; tho' *Rob* of Grapes is lawful according to their *Law. Under this Pretext, many *Fessée* Merchants,* *Alcoran.*

to make *Rob*, or Vinegar, press all the Grapes in their Vineyards, put it up in great Jars, under Ground, and keep it long, so that it proves excellent Wine. When four or five merry Companions, with every one his Mistress, appoint to be merry, they go out to their Vineyard or Garden, have Musick, and all or most of these Dishes, and there sit and carouse over a great earthen Bowl full of Wine, of about four or five Gallons, and so drink round in a Cup that will hold almost a Pint, like a large Tea-Dish, till there is none left; it often happens that they do not part till they have made an end of the whole Jar, which seldom is less than a Week's time. I have known some that have been nine Days successively drunk; those that are known to drink Wine, or piss standing, their Testimony will not be valid in Law.

In a Morning, during this time of Merriment, they are for some savoury Bit, *Pickled Fish*, or *Escaveche*, or *Elcholle*. They are great Lovers of Fish, and have as great Variety, and very good, which they fry in *Organ Oil*, stew, roast, and bake, with good store of Spice, Onions, Garlick, Cummin, Parsly, and Coriander. The *Escaveche*, or fry'd Fish, is cut in thin slices, and put into Vinegar, with the aforesaid Spices, adding Saffron and Pepper, &c. It will keep above a Month, and this they have commonly, as also pickled Limes, Olives, Capers, &c. They eat parched *Garavanças*, parched Almonds, and Beans, which they parch in a Pan with Water and Salt. These, and other things, they have to relish their Glass of Wine, or give them a fresh Appetite to drink. They say, to cure the ill Effects of a drunken Bout, is, to take a swinging Cup of the same Liquor, which invites them to more, and so on.

But I have left some Dishes, by this Digression, to give an Account of their extravagant Mirth.

The

The Hedgehog is a Princely Dish amongst them, and before they kill him, rub his Back against the Ground, by holding its Feet betwixt two, as Men do a Saw that saws Stones, till it has done squeaking; then they cut its Throat, and with a Knife cut off all its Spines and singe it. They take out its Guts, stuff the Body with some Rice, sweet Herbs, Garavancas, Spice, and Onions; they put some Butter and Garavancas into the Water they stew it in, and let it stew in a little Pot, close stopped, till it is enough, and it proves an excellent Dish. The *Moors* do not care to kill Lamb, Veal, nor Kid, saying it is a Pity to part the Suckling from its Dam. They eat with their boiled Meat, many times, Carots, Turnips of two or three sorts, Cabbage, Beans, and Pease, &c. which they have plenty, and very good. I have eat of Porcupine stewed, which much resembled Camels Flesh in Taste, and that is the nearest to Beef of any thing I know.

I come now to give an Account of the *Alcholea*: It is made of Beef, Mutton, or Camel's Flesh, but chiefly Beef, which they cut all in long slices, salt it well, and let it lie twenty four Hours in the Pickle. Then they remove it out of those Tubs, or Jars, into others with Water, and when it has lain a Night, they take it out, and put it on Roaps in the Sun and Air to dry; when it is thoroughly dry'd, and hard, they cut it into pieces of two or three Inches long, and throw it into a Pan, or Cauldron, which is ready, with boiling Oil and Suet, sufficient to hold it, where it boils till it be very clear and red, if one cuts it, which, taken out, they set to drain: When all is thus done, it stands till cool, and Jars are prepared to pot it up in, pouring the Liquor they fried it in upon it, and as soon as it is thoroughly cold they stop it up close. It will keep two Years, it will be hard, and the hardest they look on to
be

be best done. This they dish up cold, sometimes fry'd with Eggs and Garlick, sometimes stew'd, and Lemon squeez'd on it. It is very good any way, either hot or cold.

Before I conclude, I willingly give an Account of their Travelling-Provision, viz. Bread, Almonds, Raisons, Figs, hard Eggs, cold Fowl, &c. But what is most used by Travellers, is *Zumeet*, *Tumeet*, or Flower of parched Barley for *Limereece*. These are not *Arabian* but *Shilha* Names, so I believe it is of a longer standing than the *Mahometans* in that Part of *Africk*. They are all three made of parched Barley Flower, which they carry in a Leather Satchel. *Zumeet* is the Flower mixed with Honey, Butter, and Spice; *Tumeet* is the same Flower done up with *Organ Oil*; and *Limereece* is only mixed with Water, and so drank: This quenches Thirst much better than Water alone, satisfies a hungry Appetite, cools and refreshes tired and weary'd Spirits, overcoming those ill Effects a hot Sun and fatiguing Journey might occasion. This amongst the Mountaineers of *Sufe* is used for their Diet as well at Home as on their Journey. All things taken in Game, as Hawking, Hunting, and Fowling, are lawful for them to eat, if they take it before it be dead, so that they can have time to cut its Throat, and say, *Bismiillabe*; or if he is known to be an expert Man at the Game, and says those Words before he lets the Hawk take its Flight, lets slip the Greyhound, or fires his Gun, it is lawful; all (I say, but Swine's Flesh, and what dies of its self) they have Liberty to eat, and may sell it. They tell us there is but one Part about the Hog or Swine that is unlawful, which they do not know, and are obliged to abstain from the Whole; but if they knew it, they would let us have but little to our share. They eat Snails boil'd with Salt, and praise their Wholsomness. Fish of all
forts

forts, are lawful. In *Taffilet* and *Dra* most of their Food is Dates, there are ten or a dozen sorts. They have good Capons all the Country over ; no Turkeys, Ducks, nor Geese, but wild, and those they have of two sorts ; Duck, Teil, and Mallard, Corlews, Plovers, Snipes, Oxbirds, Pipers, a sort of a black Crow, with a bald Pate, and long crooked Bill, is good Meat, and a hundred other sort of Fowl. I have eat Antelope, which we have killed in hunting, and are very good Food. They are as large as a Goat, of a Chestnut Colour, and white under the Belly ; their Horns are almost quite streight from their Head up, tapering gradually, with Rings at a distance from one another, till within an Inch and a half of the top ; fine large black Eyes, long and slender Neck, Feet, Legs, and Body, shaped somewhat like a Deer ; they have two Cavities between their Legs, I think the Male as well as the Female. I have sent of these Antelopes alive to *England*. There are many in a Herd, when at the same time they have Scouts, or those who by running give 'em notice of an approaching Foe. When two lie down together, they lay themselves so, that their Backs are towards each other, and the Head of one towards the Tail of the other, that they may see every way. Their Dung is sweet and pleasant enough. They are taken sometimes by the Hawk, sometimes by the Shot ; for they are too swift for a Greyhound. Partridges in *Sus* commonly roost on Trees ; there are so many Foxes which would otherwise destroy them.

And here I should make mention of another Dish : The *Moors* will eat Fox, if it be fat, either stewed or roasted, but they do not care for it lean, which has occasioned a Proverb amongst them on that Account, to wit, *Hellel deeb, harom deeb* ; alluding to the Scruple might be made of its lawfulness. Those Words signifie,

a Fox is lawful, and a Fox is unlawful; *i. e.* Fat, Lawful; Lean, Unlawful.

Fruits and Sweet-meats they have of many kinds, as of three or four sorts of Pumpkins, Macaroons, Almonds prepared many ways, Raisins, Dates, Figs dry and green, excellent Melons of two or three sorts, and Water-Melons, Pomgranates of several kinds, Apples, Pears, Apricocks, Peaches, Mulberries white and black, Plumbs, and Damascens, Cherries, *Grapes of many kinds, and very good, and if they would assist Nature, they might have every thing in Perfection.

Lat. 30, or thereabouts.

* Grapes in

Messia I have

known as big

as a Pigeon's

Egg; but they

do not make

Wine.

Their Salating is Lettuce, Endive, Carduus, Parsley, Apium, and other sweet Herbs, Onions, Cucumbers of several kinds, some about a Yard in length, and two or three Inches thick, and hairy, (this is esteemed the wholsomest) Radishes, *Fumatas*, or Apples of Love, all which they will cut, and put Oil, Vinegar, and Salt, with some red Pepper: This Salate they eat with Bread. They have a Fruit called *Baranêen*, in *Spain*, *Baragenas*; these they stew with their Victuals, and sometimes cut them in thin slices, and fry them; it makes a pretty Dish. When the *Moors* have feasted, every one washes his Hands and Mouth, thanks God, and blesses the Hosts and Entertainers from whom they had it; they talk a little, or tell some Story, and then lie down to rest, where I shall leave them at present, and do beg your Pardon for so tiresome and frivolous a Discourse.

IV. *An Account of BOOKS.*

An Account of the Third Volume of Dr. Wallis's Opera Mathematica, in Folio; finished and published at Oxford, 1699; the two former Volumes having been published in the Years 1693 and 1695.

HOW much the Learned World has been obliged to the Reverend and Worthy Dr. *Wallis*, S. T. D. (Professor of Geometry in the University of *Oxford*, and Fellow of the Royal Society) is evident to all who have any Concern in these Matters. The great Improvements that have been made in Mathematical Learning in this Century now expiring, are very much owing to him, who, for more than one half of it, has made so great a Figure among the Mathematicians.

The two first Volumes of his Works, of which there is an Account given in N^o 216 of these Transactions, are lasting Monuments of his great Reach, Industry, and Success in these abstruse and useful Studies.

Much of this Third Volume is employed in Preserving and Restoring divers Ancient Greek Authors (very considerable) which were in Danger of being lost. For which Work the Doctor is fitted not only by his excellent Knowledge in Mathematicks, Accurateness in the Languages, and great Industry in collating Manuscript Copies; but also, by what is peculiar to him, his Art and Practice in *Deciphering*; which enables him to make sagacious Conjectures, Supplements, and Emendations: Which must often be an Editor's Business, and which we so justly admire in him.

He begins with that of *Ptolomy's Harmonicks*, the most considerable of all the Greek Musicians. This he had first publish'd in the Year 1682, (and hath now re-printed) out of 11 or 12 Greek Manuscript Copies, (having been never before published in Greek, and but very Imperfectly in Latine, by *Gagovinus*, more than an Hundred Years ago.) To this he gives a new Latine *Translation*, with large *Notes*; giving Account of the *Various Readings* in the several Copies, and the Reasons of what *Emendations* he thought necessary to make; with clear *Explications* of what might seem difficult in the Greek Musick.

To this he subjoins an excellent Treatise of his own, comparing the *Ancient Greek Musick* with that of the *present Age*; whereby that which was before Admired rather than Understood, is now rendred very *Intelligible*, according to the Language of Modern Musick.

Next to this is the Commentary of *Porphyrius* (in Greek and Latine) on a great part of *Ptolomy's Harmonicks*; never till now published in either Language: With like *Notes*, and necessary *Emendations*, as the former.

Then follow the *Harmonicks* of *Manuel Bryennius*, (now first publish'd) in Greek and Latine; with *Notes*, and necessary *Emendations*, as the rest.

So that now we have all the *Ancient Greek Musicians* (which are known to be extant) published in Greek and Latine: *Marcus Meibomius* having formerly published divers of them in the Year 1652; and the remaining Three (which he seems to have intended, but did not publish) being now added.

The next Piece is *Archimedes's Arenarius*, or *Ἐπιπέδων*, (which he had first published in the Year 1676.) Of this we had a Greek Edition of *Hervagius*, published at *Basil*, in the Year 1544; which seems to be done by *Hervagius* with great Care and Fidelity, but out of a
 very

very faulty Manuscript Copy. Of which, (beside some others) there is extant a Latine Translation of *Commandinus*, (a Person who hath very well deserved of the Mathematicks) but out of a faulty Greek Copy, of which he oft complains: So that in many other Places he doth rather attempt giving the Sense, than the Words of his Author; and even in that doth many times mistake. For whereas *Eutocius* had long since revised divers Pieces of *Archimedes*, and given us his Commentaries and Emendations of them; this Piece (with some others) had escaped his Care, and so remained (uncorrected) with all the old Errors which had then happen'd; and, in the old *Dorick* Dialect (which *Eutocius* had changed with the *Attick* in most of those Pieces which he had revised) and but very few Copies remaining, (of which *Hervagius* seems to have had but one, and *Commandinus* either but the same, or but one other. And the present Editor having no Manuscript Copy to consult, was left to use his own Sagacity, making *Rational Conjectures* (from the Foot-steps remaining which *Hervagius* had carefully preserved in his Edition of his faulty Copy) for Restoring this Excellent Piece of *Archimedes*.

To this was then subjoined (and is now reprinted) that of *Archimedes*, called *Κύκλος Μέτρσις*, or *Dimensio Circuli*, (a Piece worthily admired and valued by all Mathematicians since his Time) which had been formerly published in Greek, with other Works of *Archimedes*, in the *Basil* Edition, by *Hervagius*; not without some *Sphalmata*, but much fewer than those of the former Tract, by reason that this had been revised by *Eutocius*, and thereby freed from many Errors which before that time had happened; but subject to some others which have happened since.

To this, (because very succinctly handled by *Archimedes*) was then added (and is now reprinted) the Commentary

mentary of *Eutocius*, (formerly extant in Greek, but now published in Greek and Latine) partly, as a *Specimen* of the Method which the Greek Commentators were wont to use for explaining of more ancient Authors; partly to illustrate that of *Archimedes*, whose Demonstrations were very brief, and his Calculations only pointed at; which *Eutocius* hath actually performed: And chiefly, to shew how troublesome it was (at that time) to perform the Arithmetical Operations of Division and Extraction of Roots, (and other intricate Operations) before the Introduction of the *Indian Algorithm*, (or Calculation by the *Numeral Figures* now in use) of which *Archimedes*, in his *Arenarius*, gives us the true Foundation, as to the *Oeconomy* of Numbers, but without the *Notation* now in use.

After these Pieces of *Archimedes* and *Eutocius*, in Greek and Latine, (with necessary *Notes*) follows a Treatise of *Aristarchus Samius*, (*De Magnitudinibus & Distantiis Solis & Lunæ*) first published by Dr. *Wallis* (out of some Manuscript Copies) in the Year 1688, (and now reprinted) with the Latine Translation of *Commandinus*; and with the Annotations of *Commandinus*, and of his own.

To this was then subjoined (and is now reprinted) in Greek and Latine, a *Fragment* of the *Second Book* of *Pappus Alexandrinus*'s Mathematick Collections. The *Latine Translation* of which Author, published by *Commandinus*, (the Greek being not yet published by any, but whereof there are in *Oxford* some M. S. Copies) begins at the *Third Book* (the two former being wanting.) But a good part of the *Second Book* (being extant at *Oxford*, in one *Greek Manuscript*) is now published in Greek and Latine: Whereby we may judge of the Contents of what is lost; and that the Loss is not great; as giving an Account of the *Arithmetical Operations* then in use;

use ; which are now performed with much more Advantage by the *Algorithm* or *Numeral Figures* now in use.

After this Preservation and Restitution of these ancient Greek Authors, here follows a Collection of divers *Letters* (relating to *Mathematical Affairs*) which have formerly passed between Mr. *Oldenburg*, the Lord *Brouncker*, Mr. *Newton*, Monsieur *Libnitz*; and, more lately, between Dr. *Wallis*, Monsieur *Libnitz*, Monsieur *Menkenius*, and some others) wherein may be seen by what Steps some of the late Methods for the improving and promoting of *Mathematicks* have proceeded (and by whom truly made, and to whom justly owing) as that of Dr. *Wallis's Arithmetica Infinitorum*; which, by way of *Induction* and *Interpolation*, (proper Methods of *Investigation*, but with *Demonstrative Certainty*, hath given an In-let to many new Discoveries, not formerly thought of, (Reducing *Geometrical Inquiries* to purely Abstracted *Arithmetical Consideration*;) And that of Mr. *Newton's Methodus Fluxionum*; and Monsieur *Libnitz's Calculus Differentialis*; with some others.

There is also an Account of the Business of *Deciphering* (wherein Dr. *Wallis* hath been so remarkable) with some *Specimens* thereof. Which Art of the Doctors, Monsieur *Libnitz*, (a competent Judge) among many others, in a Letter dated the 24th. of *March*, 1698, which in this Collection is Epist. XXV. Pag. 688, calls the *greatest Instance that is known of the Force and Penetration of humane Understanding*.

With these follows a Letter of Dr. *Wallis*, wherein he gives an Account of his Methods for teaching Persons *Deaf and Dumb* to *speak*, and to understand a *Language*; and thereby to express their Minds by *writing*; and to understand what other Improvements of *Knowledge* may be obtained by *reading*: And for the correcting of Impediments of Speech from *Stuttering* or *Stammering*. or
otl er

other *Imperfections* in the pronouncing some *Sounds* (of our own or other Languages :) All which he hath exercised with good Success, and doth here give an Account of the *Method* whereby he hath done it. The which Letter (in English) we have given an Account in N^o 245.

And, Lastly, here is a Letter of Mr. *Flamsteed*; wherein he gives an Account of a very remarkable Discovery of the *Parallaxis of the Earth's Annual Orb*, observable in some of the *fixed Stars*. Which is a noble *Phænomenon*, diligently sought after, for some Ages, but hitherto without Success; and now at length discovered in *England*, and confirmed by the concurrent Observations of *Eight Years*, compared together. By which the *Copernican Hypothesis* (as it is wont to be called) seems to be clearly established.

After these Treatises, (more particularly *Mathematical*) he subjoins divers other *Miscellaneous Tracts*; which (though not so purely *Mathematical*) may at least be acceptable to inquisitive Persons, and shew how useful Mathematicks are in most other Studies. Where the Author has so dextrously and successfully applied them.

Amongst these, in the first place, appears his *Tractus de Loquela, Grammatico-Physicus*, (first published in the Year 1653, and since reprinted many times;) wherein he gives a very particular Account of the *Physical or Mechanical* Formation of all *Sounds* used in *Speech*, (expressed by the Letters of several Languages :) A Design which is not known to have been (before him) undertaken by any Person: In Pursuance of which he hath undertaken (with Success) to teach some Dumb Persons to speak.

To this is adjoined a *Grammar of the English Tongue*, adapted to the peculiar Genius of this Language; very different from that of the *Greek and Latine* Languages. Whereby the *English Language* is rendred very *easie*, and clear

clear of the Encumbrances which do attend many other (even of the *Modern*) Languages. Which hath been since imitated by some of the French in *Grammaire Universelle*, &c. And this hath been also several times reprinted; with a *Praxis-Grammatica* thereunto annexed, for the easie Understanding and Exercise of the English Language.

Then follows his *Institutio Logica*, first published in the Year 1687. Wherein he makes it his Business to give a clear Account of the true *Foundation of Logick*; and reducing the same, from the ordinary *Disputes* in the *Schools*, to the true *Use* of it in the common *Affairs of Life*; and the Advantages thereof to be made in Rational Discourses and Argumentations of all kinds.

To which are annexed *Three Theses*, or particular *Discourses*, for the Rectifying some Mistakes commonly committed by Logicians in their Treatises of Logick.

After this, follows a *Latine Sermon*, preached by him to the *Determining Batchelors of Arts*, on *Ash Wednesday*, *Febr. 20. 1655, Stilo Angliæ*. (on *Tit. 2. 6.*) intitled, *Mens Sobria*: Directing them to a Serious and Sober Prosecution of their *Studies*.

To which is subjoined his *Cursory Exposition* of the *Epistle of Titus*, and a *Theological Thesis*, by him maintained (in the *Vespers* of the Act in the Year 1654) in order to his Degree of *Doctor in Divinity*, (*De Electione; & De Potestate Ministeriali etiam ultra limites particularis Ecclesiæ*) first published in the Year 1657.

Then follows another *Latine Sermon*, *De Fædere Evangelico*; preached to the University of *Oxford*, (*pro inchoando Termino Academico*) in the Year 1661, (now first published:) From *Gal. 3. 17.* (partly *Theological* and partly *Chronological*) Wherein is particularly discoursed what is the *Promise* or *Covenant* there asserted, in

Contra-distinction to the *Law* there mentioned, and the true Date thereof: And what are those 430 Years which are there said to intervene; with the *Force* of the *Apostle's Argument* from hence for the *Abolition* of *Circumcision*, and the *Jewish Rites*, against the Pretensions of the *Judaizing Christians*, or other *Impostors*, contrary to the Truth of the *Christian Religion*, defended by *St. Paul*.

After this follows a *Sermon* preached to the University of *Oxford*, on *Easter-Day*, in the Year 1679, (from *I Cor. 15. 20.*) Wherein the *Resurrection from the Dead* (both of *Christ* and of *Believers* through him) is clearly asserted. Published in *English* the same Year; and now put into *Latine*.

Then follow some short Discourses, (first published in *English*, in the Year 1692, and now made *Latine* :) One concerning *Melchizedek*; who he was, (most likely to be the same with *Shem*,) and where was that *Salem* of which he was King; (not *Jerusalem*, or any part of *Canaan*; but on the other side of *Jordan*, in the Land of the *Shemites*.) Another concerning *Job*, the Place of his *Habitation*, (near that of *Melchizedek*;) and the Time of his Life, (during the Time while the *Israelites* were in *Egypt*;) Which Treatises were partly *Chorographical*, and partly *Chronological*. And a Third concerning the *Titles* of the *Psalms*, and the *Three Orders* of *Singers* to whom some of them are directed.

After these follow Three Sermons concerning the *Sacred Trinity*; first published in *English*, in the Year 1691, and now made *Latine*: Wherein are contained the Substance (digested into a convenient order) of several Pieces about that time published, for the true *Explication* and *Defence* of the Doctrine of the *Sacred Trinity*: Occasioned by several Pamphlets then printed and published to the Derogation of it.

Then



Phi. Tr. H. 255.

fig: 2.



fig: 3.



fig: 4.



Then follows a Discourse in Defence of the *Christian Sabbath*, to be celebrated on the *Lord's Day*, or *First Day* of the Week : Being the Substance of *Two Treatises*, published in *English*, in the Years 1692, 1693, in Vindication of the *Lord's Day*, against some Treatises of *T. B.* contending for the *Jews Saturday-Sabbath* to be now observed. Which Two Treatises are here made *Latine*, and digested into another order : Wherein the whole Controversie is managed at large, and many Occasional Points therein discussed ; which seem not to have been so well considered by former Writers. With several Particulars Historical, Chronological, and Cosmographical, which are there occasionally discussed and cleared.

And lastly, There is a short Discourse of *Pædo Baptism*, in Answer to a Letter of an *Anti-Pædo Baptist*, delivering Satisfaction as to that Point.

Which *Miscellaneous Treatises* (if thought not so proper to be subjoined to the Discourses purely *Mathematical*) are so ordered as that they may be separately bound apart.

Dr. Wallis having so highly obliged the World with his own Works, and those of some of the Ancients, part of which, as the *Harmonicks* of *Ptolomy*, &c. (had it not been for him) in all likelihood would never have seen the Light in their Original Language ; being, for their Imperfections despaired of, ever since the Restoration of Learning : We cannot but (with all who know him) wish and hope that he would be pleased (if his great Age may permit) to adorn the succeeding Century also with the Edition of some other of the Ancient Geometers in Greek, as *Apollonius*, *Serenus*, or *Pappus*, which (by the Catalogue of Manuscripts, lately pub-

lished) we see are still in the Libraries of *Oxford*, tho never hitherto printed; And that he may continue in the next (what he has been in this Century) an Ornament to the Chair which he fills in that Famous University.

F I N I S.

LONDON: Printed for *Sam. Smith*, and *Benj. Walford*,
Printers to the Royal Society, at the *Prince's Arms*
in *St. Paul's Church-yard*. 1699.

PHILOSOPHICAL TRANSACTIONS.

For the Month of August, 1699.

The CONTENTS.

I. *Part of a Letter from Mr. Leuvenhook, dated Delft June 23. 1699. containing his Answers to Objections made to his Opinions concerning the Animalcula in Semine Masculino. A Letter of Dr. Wallis to Dr. Sloan, giving an Account of some late Passages between him and Myn Heer Leibnitz, of Hannover. An Account of Mounfieur Pezron the Abbot Charmoy's Book according to his own Relation, sent to Abbot Nicaise, in form of a Letter, which he calls, L' Origin des Nations.*

II. *A Letter from Dr. Wallis to Dr. Sloan, concerning some Alteration of the Meridian Line; which may affect the Declination of the Magnetical Needle, and the Poles Elevation.* III. *An Extract of a Letter from Mr. Thomas Luffin of Colchester to Dr. Wallis, concerning the use of the Numeral Figures in England as old as the Year 1090. And, concerning the Application of an Air-pump, to Cupping-glasses.* IV. *Some Attempts made to prove, that Herbs of the same Make or Class for the generallity, have the like Vertue and Tendency to work the same Effects. In a Discourse made before the Royal Society, by Mr. James Petiver Apothecary, and Fellow of the said Society.* V. *A Catalogue of Shells, &c. gathered at the Island of Ascention, by Mr. James Cunningham Chirurgeon, with what Plants he there Observed; Communicated to Mr. James Petiver Apothecary, and Fellow of the Royal Society.* VI. *Part of a Letter from Mr. Leuvenhook, Dated June 9th. 1699. concerning the Animalcula in Semine humano, &c.*

I. *Part of a Letter from Mr. Leuvenhook, Dated Delft 23d. of June, 1699. Concerning his Answers to Objections made to his Opinions concerning the Animalcula femine Masculine.*

I Have seen in the *Philosophical Transaction*, Numb. 247 fol. 337. The Objections, proposed by way of Questions, which the very learned Dr. *Martin Lister* maketh, against many positions, concerning the Procreation of an Animal out of the Masculine Seed.

Concerning this, I must tell you, that these Objections do not at all alter my Opinion.

We see almost always that provident Nature, doth, concerning the encreasing or Procreation, be it in Animals, Fish, or other things, almost go every where the same way to Work. For we have as little Reason as we have to ask, how out of the Seed of a Tree, let us take an Apple-tree, which Seed we know to be a Kernel, of an Apple, can not only come to grow a whole Tree, but also in a few Years time, can be Multiplied into a thousand Trees. All the Trees, that we find on the Globe of the Earth, Originally are come, and do proceed, from Seed of the Trees, that were at first Created on our Globe.

Now we come to see, In the Seed of an Apple, the Leaves although they are very much less, then the Leaves of other Seeds of Trees, but according to the smallness of the Leaves proportionably, seems to us in the Pith of a Seed of an Apple-tree, much bigger that part, that shall make the stem of the Tree, and in this we see the Pith of the Tree, and a great many Vessels, part whereof did carry up the Juices and the Bark; but, I believe, that we shall never penetrate into these Mysteries, that in the Plant of the Seed of an Apple which we endeavour to Anatomize, we should be able to discover, the Tree with its boughs, much less the Blossoms and Apples; and although such an investigation shall remain hid from our Eyes, yet notwithstanding daily Experience doth teach us, that out of a Seed of an Apple, is produc'd a young Plant; which Plant in process of time, after the expiration of some years, is not only grown up into a Tree, but it also doth Bear Apples; Now certainly the whole Tree and Fruit was locked up in one Seed of an Apple, for if it had not been locked up in the Seed, how could (according to my supposition) possibly the Tree and Fruit sprout out of it.

Must not we stand amazed, when we consider, the encreasing and procreation, of so many sorts of Fish that have Rows, and whose Masculine Seed is the Soft Row, viz. that out of one Soft Row, to Wit the Cods, proceed so many Millions of small Animals every year, and that at that time when the Cod has shot his Soft Row, he Lobs thereof that k up, or the twisted parts of these Soft Rows shrink up so close together, that they only seem to be Skins or Membranes; and we see that some Weeks after, the Soft-row doth encrease.

crease again from time to time and accordingly the twisted parts of the Row, doth grow full again, with Masculine Seed, that so at the striking time, they are so Lively, or are so much enlivened that we have often times seen them swim forth, in this Moisture that containeth them.

This being so, we must certainly assert it as a truth, that when a Cod hath finished his Masculine Seed, there doth still remain in his Soft Rows, a great deal of Seeding Matter, where our more Seedy Animals are produced, then were first out of in the Year before, by Reason as Fishes grow bigger from Year to Year, so doth also their Soft Rows increase in bulk.

Now that these Animals should come or proceed from themselves, seems to me not to be apprehended, for if they should come from, or out of themselves, I imagine that then they could not all be endued with one and the same quality as now they are.

For we find that the Masculine Seed of a Cod, doth, intermix with the Female Eggs of other Fish, although they strike at the same time. We have only observed that the Fishes which we call *Soals* and *Scharrs*, intermix their Soft Seeds (yet very seldom) with one another, from whence comes a Fish, that is neither *Scharr* nor *Soale*, and therefore the Fisher give him the name of *Scharr-soale*.

Now are also the Fishes, as many sorts as are found, not of themselves, but Originally come from the first Seeds, and that from the same, that were Created from the beginning.

Now if we know which way the Fish do increase, that it is not done but by Intermixing of the Male and Female Seeds, and likewise we do know the great Mystery that is included in the small Seed of an Apple, why might not we then assert, that in an Animal of the Masculine Seed of a Man, is locked up a whole Man, and that the Animals of the Seed, are all descending from the first Created Man.

We know, that the Testicles are chiefly consisting of a very thin and long Vessel, that doth lay in a multitude of turnings and windings, and that we have pulled out near the end of it some Living Creatures.

Now if we imagine, that through this long and thin Vessel, the Matter of the Masculine Seed, wherewith this long vessel is filled up, is from time to time carried very slowly further, to fill up the places again, of these Animals that in and about the Copulation were carried off; and who doth know, but these Animals have left behind them some Seminal Matter, from whence their Species can be Propagated, and that without Copulation, as we have Observed, that small Animals, that were not near come to perfection bring forth their Kind without Copulation, are increased in bigness, and afterwards changed into Flying Creatures.

It will seem strange to many, that cannot comprehend, how in an Animal of the Masculine Seed, that is so incomprehensively small, so great a Secret, as a Body of a Man doth comprehend, can be Locked up. But if we remember that there are Living Creatures in Waters, that we have many times seen come before our Eyes, that being of a Roundish Body, were no thicker then the thin Seed of a Tayl of an Animal in the Masculine Seed.

And we have also at the same time judged, that a thousand Millions of these Animals together, could make up no bigger a Body then a single Corn of a
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Course Sand, (as I have said heretofore) and If we then also consider, of how many pieces and Instruments the Body of such an Animal doth consist, wherewith it moveth It self from place to place, and also farther consider, what great Wonders can be lodged in such an Animal, we must stand amazed, and cannot apprehend, the extraordinary smallness of these Parts, whereof these Creatures are composed, and say within our selves, how impervestigable is the depth of Wisdom.

It being then that hitherto, nothing at all is come before me that can make me the least Scruple, to induce me to recede from my former opinion, and to receive an opinion to believe, or hold, that Animals should come forth of themselves, therefore I still remain of this my opinion, that out of the Animals of Masculine Seeds, come forth Animals of the same kind as they were Created in the beginning, and that as hitherto no truer Position is left. For if Animals could be born of themselves, which I should reckon to be a Miracle, then must not only every Minute, but every Second, Millions of Miracles be done, which is an opinion not to be received, for If this was so, there must daily new Creatures be brought forth, which hitherto we have not observed.

Now if we add hereunto, as I have Judged it to be formerly, that in the Animals of the Masculine Seed, there was a small difference, from each other, from whence I conclude the one sort to be Males the other Females, and if this takes place in all Masculine Seeds, I cannot see, why we have not a hundred times more Reason to believe, that the Animals in the Masculine Seed, when they are grown to perfection, are provided with Matter fit for Seed, wherewith to propagate their Kind, then that we should Forge in our Brains, that Animals come from themselves.

I know no Animal (small Insects only excepted) that is subject to so many changes as a Frog, for out of the Egg, comes forth an Animal, that is more like unto a Worm, then unto a Frog, and as it could in the beginning nothing else, but swim a long by the moving of its Tail, and beating of it from side to side, it doth Swim (after It is come to be a Frog) by pulling in and thrusting out of Its Four Legs, and It runs and jumps upon the Land, where it also gets Its Food.

Now as the change of the Animals in the Masculine Seed cannot be investigated by the Eye, as we can do in other things, so we have the Liberty to communicate to others our reasonable thoughts, so as after a most notable consideration they may be Framed in our Brains, so that every one may think his pleasure.

My intention is, shortly to communicate to you some of my Observations, concerning the Motion and Stagnation of the Blood in the Tail of a Frog, in the mean while I remain, &c.

II. *A Letter of Dr. Wallis to Dr. Sloan, Secretary to the Royal Society, giving an Account of some late Passages between him and Myn Heer Leibnitz, of Hannover.*

April. 22. 1699.

S I R,

I Received lately a Letter from Myn Heer *Leibnitz*, of *March 30th.* 1699. wherein are some Passages relating to *Mathematicks*; of which I shall not at present trouble you with a particular Account.

After which follows a Passage somewhat relating to the Royal Society, in these words: *Nescio quomodo remissius nunc tractantur studia altiora, cum tamen nunquam, post tot aditus apertos, facilius potuerint tractari. Sed puto infelicia tempora intercessisse, dum bella curas hominum aliò vertère, Ita pauci admodum juvenes in pristinae gloriae spem succrescunt. Etiam Natura quam paucos nunc Observatores diligentes habet. Utinam, ut Gallica Scientiarum Academia nuper à Rege suo restituta est, etiam Vestrae Regiæ Societati novus calor insunderetur.* To which what I have thought fit to return in Answer, you will see afterwards.

He then sends me the Copy of a large *French* Letter, of *l'Abbé de la Charmoye* to *l'Abbé Nicaise*, giving him a Particular Account of the Contents of a Treatise intended to be shortly published, concerning the *Original of Nations*; wherein, out of *Ancient Mythology*, he endeavours to discover an *Historical Account* of the *Original* of divers Nations. Which Copy Myn Heer *Leibnitz* desires me to communicate to the Right Reverend the Bishop of *Lichfield and Coventry* [now Bishop of *Worcester*] (who doth sometimes make use of such

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Methods

Methods where Histories are silent) and to such others as to whom I may think it grateful, which makes me to send it to you, to communicate as you shall see cause.

To which Myn Heer *Leibnitz* subjoins some Thoughts of his own to that purpose, He thinks this *French* Author may be perhaps inclinable to be somewhat partial in favour of his *Gauls* or *Celtæ*, but however that some good Discoveries may be hence made. He tells us, as his own sense, That *Celtæ olim Germanos & Gallos complectebantur. Quòd Wallica seu Cambrica nostra Lingua, est Semi-germanica, veteri Gallicæ proxima. Putatque, saltem suspicatur, Camros vel Cambros nostros, pro parte, ex ipsorum Cimbricæ antiquis habitatoribus venisse, ut postea Angli ex posterioribus sunt egressi. Titanum cum Diis bello, veteres intellexisse putat, Scytharum vel Celtarum antiquas in Asiam & Græciam irruptiones; tunc cum ibi regnabant qui postea Diæ sunt habiti. Et Promethei (Titanis) alligationem ad Caucasum, forte non aliud designare, quam, coercitos copios ad Caspicas portas locatis Scythas. Sed nihil (inquit) est in his ultra conjecturas.*

III. *An Account of the Abbot Charmoy's Book, according to his own Relation, sent to Abbot Nicaise, in form of a Letter, which he calls, L' Origin des Nations.*

THE Author first says, his Book shall be publish'd under the Name of, *The Origin of Nations*. That it shall be an Historical Comment upon the Tenth Chapter of *Genesis*, where *Moses* mentions the first Fathers and Replenishers of the Earth, after the Deluge. This Work the Author divides into Five Books.

In the First he discourses on that Subject which relates to the Inhabitants of the Earth, before the Confusion of Tongues, and Tower of *Babel*; and who it was that undertook this great and wonderful Work or Enterprize; Also what Number of People and Tongues there were before the Confusion, and how dispersed throughout all the Lands and Regions of the Earth. In this Book, the Author says, he sees the perfect Uprightness of *Moses* in the 32^d. of *Deuteronomy*. *Quando dividebat altissimus gentes, quando separabat filios Adam, constituit terminos populorum juxta numerum filiorum Israel*; or as some read it, *Juxta Numerum Angelorum Dei*. This Passage, and some others in Scripture confirming it, have laid open singular matters, to the Author, concerning the first People; and he finds by these words, *Constituit terminos populorum*; that *Noah*, by God's special Command, had, before his Death, laid out, and limited certain Portions of Land for his three Sons, *Sem*, *Cham*, and *Japhet* to possess; he proves that *Japhet* is the youngest of the three Brethren, &c.

In the Second Book he discourses at large of the Descendants of *Sem*.

In the Third, He enquires into the Posterity of *Cham*. And

In the Fourth, the Establishment of *Japhet*.

Then the Abbot says, in the Three Books, that *Monsieur Bochart*, who deserves great Praise for the good Account he left concerning the Colonies of several People (though in some considerable Passages he is mistaken) he proves the Priviledges of the *Chaldeans*, *Ethiopians*, *Gomoreans*, and many other Nations. After this, he goes on, saying, that the Posterity of *Cham* were the first Usurpers, invading some Rights belonging to the Children of *Sem*, in their Alotments in *Asia*; *Canaan*, and his Sons, invaded them, who afterwards

called the Land, *Canaan*; for most of this the Author gives good Proof (as he says) from the time of the *Canaanites*, or *Phœnicians*, who were known to inhabit the Borders of, before they were established in *Palestine*. Moreover, he gives Reason, why the Twelve or Thirteen Tribes, who went away from the *Canaanites*, seven only should be exterminated; and this, the Abbot says, he proves from Holy Scripture. He then proceeds on many other things, as of *Mizraim*, or the *Egyptians*, and concludes this Part with an Account of the first Ancient Tribe they had.

In the Author's Fifth Part of his Work, he says, he discovers the beginning of the Ancient *Celtics*, who were afterwards called *Gauls*: And he tells the Abbot *Nicaise*, he will make appear from *Josephus*, and other Ancient Writers, that they descended from *Gomer*, youngest Son to *Japhet*; yet will not rest his Proof here, he says, he will give good Reasons, that *Asia Major*, toward the *Caspian Sea*, was their first Establishment; that is, about *Margia*, *Hyrcaïna*, *Bactria*, and other adjoining Parts; also that they had the Name of *Gomorians*, or *Gomarites*, for many Ages, as descending from *Gomer*, *Japhet's* youngest Son. He then says, That those who went out from the *Parthians* in the first Age, were called *Saces*, or *Sagues*, in Latin, *Sacæ*; and that their Names were celebrated throughout the East, that during this Age they were scattered all over *Armenia*, then into *Cappadocia* near the Lake, and some time after that, into *Phrygia*, which passes into *Asia Minor*; where they began to bear the Name of *Titans*, this word signifying in the *Celtic*, Men of the Earth; though the Abbot says, the *Greeks* have strained it too far by *Tyræveds*. And then shews what part of them were established from this time to succeeding Ages on the *Euxine-Sea*, who had the Name of *Cimmerians*, or *Cimbrians*;

Cimbrians; who inhabited afterwards the *Chersonesian Cimbria*, then *Denmark*; after this, they had the Name of *Celtes*, and then *Gauls*; these two last Names signifying in their Language Valorous or Valiant.

Then the Author returns again to the *Titans*, who are called (he says) by the ancientest *Greeks* *Τιτῆνες*, *Calimachus* (adds he) knew it well, and in his Writings says, the *Celtes* or *Eastern Gauls* were descended from them. From hence he tells the Abbot *Nicaise*, that they have done unexpressible things under that Name (since *Abraham's* time) which cannot be contained in a Letter; but continues to give this Relation. They afterwards made themselves Masters of *Asia Minor*, *Thrace*, *Greece*, and the Island of *Crete*, and then of all *Europe*, and if I be not mistaken, part of *Mauritania*; during their stay in *Phrygia*, *Greece*, and Island of *Crete*, their Princes lived in those Provinces for near two Centuries, the Names of four amongst them (which Antiquity hath preserv'd) I shall here shew you. The first is *Acmon*, his Son is called *Ophion*, by the Poets, *Uranus*, he was Father to *Saturn*, whom the *Titans* or *Celtes* call *Satdorn* in their Tongue, and from him was born the famous *Jupiter*; his true Name with them being *Javu*, or *Jou*; from whence is formed the Ancient Latin *Jovis*: But he was called so before they gave him the Name of *Jupiter*, as in some cases he still retains the Name of *Jovis*, instead of *Jupitris*; neither *Varro*, nor any other *Latin*, can give a reason for this, the thing seems so strange to them; also amongst the *Greeks* *Plato* himself is ignorant, as appears by his belief of the Etymology they gave; for which I render a plain and easie Reason from the *Celticks*. By the three last of their Princes (from whom I derive this my Discourse) you will be informed of their well-known Antiquity: They had very Potent Kings amongst them,
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bearing that Title, & whose Names were *Saturn* and *Jupiter*, doing great things, though with a mixture of Vices and Disorders towards their Friends. They were called Gods of the First Order, by which may be seen their Brutality, and what they did to inveigle and deceive Men; I say, the first *Greeks* and Ancient *Latins*, are the Abbot's words. You will see, Sir, their Actions, as well good as bad, described in this Fifth Book, but it shall be free from all ridiculous Fables and Fictions of the Poets, for the whole Narration shall be Authentick, and bear most Ancient Truth. In the Conclusion of this Paragraph the Abbot seems to be transported, and cannot express whether it was a Vision or Antiquity he had been delineating, and returns again to the *Titan* or *Celtic* Princes, who Reigned a long time in *Greece* and *Italy*, where *Saturn*, being persecuted by his own Sons, fled for Refuge. Their Language was so mixed with *Greek*, that it became almost *Æolick*, which is consonant to the Ancient *Latin*.

Then he tells the *Abbé de Nicaise*, how it will surprize him, when he relates some words which agree with the *Celtic*, especially in Numbers; for Example. The *Celtic* say *dec*, Ten, and the *Greek* *δέκα*; the *Celtic* call Four *pedwar*, and the *Æolians* *Πέρογες*; the *Celtic* say *undec*, Eleven, *dawdec*, Twelve, &c. and the *Greek* *ἑνδέκα*, *δωδέκα*, &c. He goes on, assuring him that he finds above 1200 *Latin* words in the *Celtic*, and says, he will leave it to any learned Man, who (he is sure) cannot be against what seems so true, viz. to judge, that the *Celtics* had these words from the *Greeks* and *Latins*. It remains then less surprizing, that the *Latin* Tongue should have so many of the *Celtic* or *Gaulic* words. But the *Ombrians* (continues our Author) being the ancientest People of *Italy*, bordering and mixing with them, from the beginning, who were

were the true *Gauls*; it appears, they were called by the Ancients *Propago Gallorum*. And from these *Ombrians* descended the *Sabines*, to whom the *Romans* were so beholding for many things, among some of which the word *Quirites*; it should be pronounced *Curites*, as from *Curis*, which is as much as *hastæ*. The Learned (he says) are not ignorant of this, but do not know that *Curis*, as well as *Lancea* is from the *Celtic*, and signifies the *Greeks* *Kuertes*, which occasion'd so great pain and study to find the meaning, and from whence it came. Then he refers to *Strabo* for to justify what he says; and goes on with the Account of the *Ombrians* and *Sabines*, saying, the *Osci* or *Opici* were equal and Originally *Celtics*; and gives some Reasons that the *Laconians* were *Celtics*; he confesses that for the discovery of this Antiquity, he is much beholding to the Languages of *Europe*, especially the *Teutonic*, or *German*, whom the Abbot affirms to be derived from *Aschenez*, the youngest Son of *Gomer*, Father of the *Celts*, or *Gauls*; that from *Aschenes* came the *Daes*, or *Latin Dæ*, or *Dai*, afterwards called *Daces*, and *Getes* by the *Greeks*: He was also Father of the *Phrygians*. From these *Dæs* and *Phrygians* came the *Teutons*, who from the beginning have had great Friendship, and as great a share in the Expeditions with the *Celtics* or *Gauls*. From these *Daces* (continues the Abbot) are descended the Ancient *Parthians*, the *Arfacides*, who were scattered throughout *Persia*, and do still retain so many *German* words in their Tongue, as also a great many *Celtic*: But the *Greeks* taking many more words from the *Phrygian* (as *Plato* observes) it need not seem strange, that the *Greek* has so many of the *Teutonic*, since the Original was *Phrygian*. The *Teutons* were mixed with the *Ombrians* in *Italy*, and from thence it happens the *Latins* have so many more words, especially

Verbs,

Verbs, which the Abbot passes over in his Letter, and Concludes that the word *Germanes*, which the *Romans* gave the *Tentons*, shewed the great Friendship between them and the *Gauls* or *Celtes*, as *Strabo* well observes, were like Brothers.

IV. Illustrissimo Celeberrimoque Viro D. Godofredo Gulielmo Leibnitio, Hanoveræ.

Oxonix, Apr. 20. 1699.

Illustrissime Vir,

TU novis me continue cumulas beneficiis: Talia siquidem reputo tuas Literas. Quarum ego aliquot (te permittente) meis interserui; ut Gemmas & Ornamenta. Neque tibi erit dedecori, te ea dudum fuisse meditatam, quæ etiam nunc non forent contemnenda.

Ultimæ tuæ, 30 Martii datæ, serius huc accesserunt quam ut possent præcedentibus associari; quum totum illud opus absolverant Typographi; istiusque ego duo exemplaria tradideram Juveni *Menkenio* (*D. Menkenii* filio) quæ suscepit ille se Parenti suo transmissurum, indeque eorum alterum ad Te transferendum (quod factum iri spero) dicitque, jam esse in itinere; Idemque Juvenis ingenuus, qui apud nos egit aliquandiu, ad Patrem die crastino ait rediturus, est harum lator.

Ludovicum Ferrarium, *Bombellio* priorem, *Æquationem Biquadraticam* in duas *Quadraticas* distribuissè, ipso *Bombellio* id sponte agnoscente (& *Cardano* pariter comprobante,) ego te monente jam rescisco. Et quidem suspicor, me id olim apud *Bombellium* legissè; sed, cum illud jam ante multos annos factum fuerit, istius ego eram plane oblitus; tibi que gratias habeo quod

quod candide monueris. Quod de illo peculiarem scripserit dissertationem Cardanus, vel nesciebam vel oblitus eram.

De *Æquationibus Superiorum* graduum, exponentem habentium numerum compositum, ad inferiorem reducendis cujus exponens sit numerus incompositus proximè minor; ego plane juxta tecum sentio. Atque in hunc, credo, finem, Harriotus tot paradigmata subjecit *Æquationum Inferiorum*, ex quibus Superiores componi possent, atque in illas resolvi.

De differentiis *Infnitesimarum-infnitesimis* explicandis, non est ut sis porro sollicitus. Nam, ut tu mihi facilis concedis, *quod nihili quodvis multipulum sit adhuc nihil*; eadem ego facilitate tibi permitto, ut *Differentias infnitesima, in infnitesimas ductas*, tu merito negligas; potestque id tuto fieri, modo caute, (quod ego vos fecisse, diserte dixeram.) Quippe, in quovis genere *Quantitatum, quæ differunt dato minus*, reputanda sunt *Æqualia*. Quo nititur *Exhaustionum* doctrina tota, Veteribus pariter & Recentioribus necessaria. Methodo tua, cum tibi usui sit, quo utaris non repugno.

De *v. bb* seu *lv. i*, jam ante dixi (quantum mihi videretur) satis; neq; jam vacat rem eam penitus excutere.

Quod tu quereris, Remissius nunc tractari altiora studia; & Pauciores esse Naturæ observatores diligentes; quadantenus verum esse non diffiteor. Sed mirandum non est, (ut res alias, sic) hominum Studia, suas habere vicissitudines. Præsenti seculo (quod jam ad finem vergit) Eruditionem, in omni rerum genere, insignes (& quidem insperatos) processus obtinuisse, certum est; in re Physica, Medica, Chymica, Anatomica, Botanica, Mathematica, Geometrica, Analytica, Astronomica, Geographica, Nautica, Mechanica, ipsaq; (quod minus lætor) Bellica. Et quidem longe majores quam per multa retro secula obtinnerat. Quippe quibus vix

aliud sibi proposuisse videntur homines, quam, ut intelligere videantur quæ ab Euclide, Aristotele, cæterisque; ex antiquis jam olim fuerint tradita; de progressu porro faciendo haud solliciti; quasi scientiarum metas posuerint illi, quas transcendere sit nefas. Cum vero ausi sint aliqui (& quidem pauci) ultra prospicere; facti sunt aliis animi, late patentem campum ingredi. Et res novas aggredi, novus ardor, novus impetus impulit; nec infeliciter. Sed, postquam hæc desit esse res nova; hic novus ardor deterbruit. Mortui sunt ex sedulis indagatoribus non pauci alii morituri: Juvenes que non accendebat (ut antea rerum, Novitas.)

Sed et ipsa materia erat magna ex parte exhausta; ut non tam. Messis jam speranda sit quam Spicilegium. Equidem, jam tassis & fatigatis permittendum videatur, ut quadantenus quiescant, et que hinc factum (pro variabili naturæ hominum,) quod severiora studia negligantur Fieri; forte potest, (quod tamen ominari nollem) ut præsentis seculi diligentæ succedat desidia sequentis.

Opras Tu (& quidem ego pariter) ut, sicut Gallorum Academica Scientiarum jam videatur restituta, sic Nostræ Societati Regiæ novus calor infunderetur. Atque hoc ipsum jam modo monui tuis verbis. Sed & ipsi (quod tibi non displicebit) reapse me monentem prævenerant; qui jam nuper sibi novas leges posuerunt, varias hujusmodi Inquisitiones viritim promovendi. Sed & inter Gallorum illam Academiam, nostramque Societatem, hoc interest Discriminis; Fruuntur illi sumptibus Regis, suisque gaudent singulatim Saliariis. Nostri suis sumptibus agunt omnia.

Verum etiam, ubi obtinueris quod ego tibi nuper nisi Volumen meum Tertium; videbis, in *Flamstedii* ad me Epistola, non plane otiosos nostrates esse; ut qui, tam Fixarum loca plurima a se sedulo observata narrat;

tum

tum nobile exhibet Phænomenon, Parallaxeos Orbis Anni Telluris, ab ipso deprehensum, & continuis Annorum Octo observationibus inter se collatis stabilitum. Phænomenon per aliquot retro secula frustra quæsitum, & fere desparatum, nunc in Anglia primo detectum.

Literarum exemplar tuis inclusum, mittendum curavi (quod tu petis) ad D. Episcopum nuper *Asaphensem* nunc *Lichfeldi-Coventriensem*, mox futurum *Wigorniensem*, (seu *Worcestrensem*.)

Idq; mihi jam in mentem revocat Tractatum bene longum, cujusdam *Olai Rudbeck*, Succi; ante Annos (si satis memini) quasi sexdecim (aut etiam plures) editum, (saltem sub id tempus a me inspectum;) quo deducere satagit, ex veterum Mythologia, res Historicas, quæ Fabulis hæc fecerint occasionem; et speciatim, ex *Homericæ* narratione Itinerum *Ulyssis* (post captam *Trojam*), deducit eum (partim Navigio, partim Terrestri itineres, Septentrionem versus, atq; ad extremas oras *Sueciæ* Septentrionales; ubi figit *Rudbekins Columnas Herculis*, (non ad fretum *Gibraltar*;) indeq; per oras *Norwegiæ*, (jam dictæ) Insulasq; *Britannicas* circumvectum, perducit ad *Phæacum* Insulas (jam *Canarinas* aut *Afores* forte dictas;) indeq; per fretum *Gibraltar* & *Mediterraneum Mare*, ad suam tandem *Ithacam* restituit. Omniaq; hæc, ex Poetarum Mythologia desumptis characteribus, adorant haud invenuste; ut, si vera non sint, magnam saltem habeant veri similitudinem. Id autem ego inibi speciatim notavi quod habet ex Poetarum quodam veterrimo, (cujus ego nominis jam sum oblitus,) de quadam Insula (prope *Britanniam*) tum olim a Mari absorpta; unde Mare totum, circum circa, redditum est longo tempore lutosum, & cæno turbidum, ut per plures Annos navigari non potuerit; donec tandem, disperso sensim luto, ad statum eum redierit quem jam cernimus.

Qualis fuerit hæc insula, aut ubi particulatim sitas non memini quod *Rudbekius* diserte dicit; nequidem ex conjectura. Sed mihi subiit cogitare (cæteris stantibus,) hoc insinuari posse, Rupturam Isthmi, quo Britannia tuerat olim (ante omnem harum rerum certam Historiam) cum Gallia conjuncta. Quippe si talis fuerit olim Isthmus, marium impetu Britannici & Germanici coeuntium (Isthmumq; marino Æstu, utrinq; verberantium,) ruptus, (quod non est inopinabile,) necesse est ut inde talia obvenerint Phænomena quæ narrantur. Non enim tota moles Isthmi foret uno impetu discussa; sed, postquam Marium alterum, Isthmi summum transcenderat, molemq; illam (eundo & redeunda) sensim abluerat; lutosum interim turbidumq; factum est (propter Maria jam conjuncta, quæ fuerant Isthmo pridem determinata; indeq; ortum insuetum Marium horum motum,) haud Navigabile; donec, turbidis hisce mōtib; tandem compositis, in pacatum statum rediret. Ego nihil hac in re statuo, sed rem totam pernitius considerandam permitto. Ad id quod Tu alicubi quæris, de Litoribus Gallico & Anglicano; Hoc porro dicendum putem; Præruptos Clivos atq; præaltos (congeneris Materias, & simili situ, quasi ad perpendiculum) erectos ad *Dubrim* & *Caletum* Longum tractus contra positos (ubi est brevissimus Trajectus ab Anglia in Galliam) magnam præsi ferre speciem, quasi fuerit olim aliquando (ante hominum memoriam) Isthmo continuati, nec nisi rupto Isthmo (qui Angliam forte cum Gallia conjunxerat) separati; & quasi dilacerati, Multoq; quæ dudum me legisse memini, apud *Rudbekii* Atlanticam (sed quæ post tot Anno, non jam distincte reminiscor a veteri nescio quo Scriptore deprompta, mihi videntur hæc spectare. Quæ ille aliam trahit; puta, ad Insulam (nescio quam) quam supponit ille a Mari absorptam; unde factum sit Mare (per multos Annos) cænosum, tervidum, & innavigabile, sed huic Isthma (siquis olim fuerit) hæc aptius convenirent. Tu interim vale; atq; favere dignare.

Tui observantissimo

P. S. Aug. 29. 99.

- Johanni Wallis.

V. *A Letter from Dr. Wallis to Dr. Sloan, Secretary to the Royal Society, concerning some supposed Alteration of the Meridian Line; which may affect the Declination of the Magnetical Needle, and the Poles Elevation.*

Oxford, June 21. 1699.

S I R,

I Received (two days since) a Letter (to me directed) from an unknown Person (without any name Subscribed, or mention of the Place from whence,) containing a Suggestion about some *Variation* of the *Meridian Line*, (which, if so, may consequently affect the variation of the *Magnetick Needle*, and the Elevation of the *Pole*;) which he desires may be Communicated; and is *Verbatim*, as followeth,

“ For the Reverend Dr. *John Wallis* Geometry Professor in *Oxford*, these, *June 12, 99*. Sir, This comes
 “ from one who is no stranger to your Abilities, though
 “ unknown to your Person; however I presume on a
 “ Minute of your Leisure, without any further Apology, than that I hope it may tend to promote a
 “ Point of Learning. Upon Reading the *Philosophical Transaction*, Num. 241. And as I was wondering how
 “ an ordinary *Mathematician* could miss so easy a thing
 “ as the drawing a true *Meridian*, I hit upon a Thought,
 “ that *Meridians* must needs vary; but whether in such
 “ manner, and proportion, as appears in the Instance
 “ of that *Transaction*, I am not able to determine:
 “ Having contented my self with such skill in Astronomy as serves only to contemplate the wonderful Fabrick of the visible Heavens, without adding so much
 “ Geome-

“ Geometry and Arithmetick, as are needful for ma-
 “ king Calculations. What I would offer, is this, Taking
 “ for granted that the Earth moves, &c. You know,
 “ that besides the Diurnal and Annual Revolutions,
 “ there must also be a Third, to account for that slow
 “ Motion of the fixed Stars, upon the *Poles* of the
 “ Ecliptick, in about 25000 Years; which is solved by
 “ the direction of the Earth’s Axis from one Point to
 “ another of the Polar Circle. And that direction be-
 “ ing nothing but a certain wobble in the Earth’s Mo-
 “ tion, must needs make the Noon-shade of a Perpendi-
 “ cular not lye always in the same Line. I would re-
 “ quest, that this hint might be improved in one of the
 “ next *Transactions*, if I were sure that it were not
 “ a Blunder. But if so, I have this to excuse, that I
 “ have not made it tedious. *I am, Sir, your most*
 “ *humble Servant.*

Now, this being a new Suggestion, and which (if
 well grounded) may be of considerable consequence
 (both as to the Declination of the *Magnetick Needle*,
 and the *Poles* Elevation,) and therefore deserving to be
 well considered: And, it not being very probable, that
 so careful a Man as *Ticho*, and those concerned in the
 Church of *St. Petronio* (mentioned in the *Transactions*,
Num. 241.) should be so much mistaken in the *Meridian*
Line: I thought fit to recommend it (as is desired)
 to your consideration, and (thereby) to the Thoughts
 of others. But, if there be ought of this nature; it
 must arise from a change of the *Terrestrial Poles* (here
 on Earth) of the Earths Diurnal Motion; (not of their
 pointing to this or that of the fixed Stars:) For, if
 the Poles of this Diurnal Motion remain fixed to the
 same place on the Earth; the Meridians (which pass
 through these Poles) must remain the same.

Your Humble Servant,

John Wallis.

VI. An

VI. *An Extract of a Letter from Mr. Thomas Luffkin of Colchester to Dr. Wallis, concerning the use of the Numeral Figures in England, as old as the Year 1090. And, concerning the Application of an Air-pump, to Cupping-glasses.*

Colchester, June 22. 1699.

Reverend Sir,

I Having lately taken notice of your accurate Treatise of Historic and Practic Algebra, and finding therein that you cannot Trace the use of *Numeral Figures* amongst us in *England* lower than the Year 1133; and I meeting with an undeniable instance of their exceeding that Age by 43 Years amongst us, I thought the Communication of it to you could not but prove satisfactory. And if it really do so, I shall enjoy the utmost of my ambition. The account take as followeth; Over against our Market place, stands the House of Mr. *Furly*, a Linnen-Draper; some of the backermost part of which is an Ancient *Roman* building, but the Front is of Lesser standing, and Timbred. Upon the bottom Cell (which is almost in the form of a Triangular Prism) of one of the Windows of the Front, between two Carved Lions, stands an Escutchion, containing only these Figures 1090 (as near as my rude hand can delineate them.) They are of a Secretary form [*or rather square Text.*] the Periphery of the Ciphers, and Nine, are rather Fracted than Fleeted, prominent, large, and very fair; but to make them the more perspicuous, they are Gilded by the Proprietor. The Window looks directly North; the Date being thereby preserved from

from the scorching heat of the Sun ; and by its inclination (falling from the Verten [or perpendicular] by an Angle of about 60 degrees) from Rain, Snow, &c. It's possible that it may be objected, that the Second and Fourth Figures, may represent that amongst the *Arabians* (from whom we seem to have received our Numeral Figures, and they theirs, from the *Indians*.) which is with us a 5 ; To this I answer, that the Window is in *England* and not in *Arabia* ; nor is there any likelihood that ever it was imported from thence ; [nor is o with all the *Arabs*, used for 5, but with some for a Cipher, and so it was used by the *Moors* in *Spain*, who first brought these Figures into our parts ; nor is the Square o an *Arabick Letter*, but an *English Letter*, of that Age.] And the form of these Figures soon degenerated from that of the *Arabs*, into such as we now use, if not at the first reception from the *Arabs* [or *Moors*] certainly long before 1595 (as this construction would make it.) Sir, about three Months since I received your Letter in Answer to one of mine. In order to compensate which favour, I shall (if you testify your willingness to receive it) oblige you with a description of an improvement, or rather invention (of my Brothers) of a neat, compact, very portable *Air-pump*, applyed to Cupping ; with 2 or 3 Suctions of which, a person may exhaust the Air from a Large Cupping-Glass ; and, by the pressure of the External Air upon the Circumjacent parts of the Body (and not by *fuga vacui*) the Flesh shall be admirably forced up into the Glass ; and, by continuing of the Suction as need shall require, he may take away what quantity of blood he pleaseth. It is an invention of extraordinary advantage to Mankind, &c.

Your most obliged Servant

Thomas Luffkin.

Some

VII. *Some Attempts made to prove that Herbs of the same Make or Class for the generality, have the like Vertue and Tendency to work the same Effects. In a Discourse made before the Royal Society, by Mr. James Petiver Apothecary, and Fellow of the said Society.*

HAVING by some *Persons* been asked what Method might be best propos'd towards the *discovering* of the *Vertues* of *Plants*, amongst others I thought this might not prove an altogether unsuccessful conjecture, *Viz.* That *Plants* of the same *Figure* or *Likeness*, have for the generality much the same *Vertues* and *Use*: Especially if we consider, that the *Organs* or *Structure* of all *Plants* of the same *Family* or *Class*, must have much the same *Vessels* and *Ductus's* to consummate that Regular formation, and consequently the *Juices* Circulated and strained thro' them cannot be very *Heterogeneous*; and that as for the most part, the *Scent* and *Tast* have great affinity, so of course their *Vertue* likewise cannot be very *dissonant*.

E. As for Instance, the *Herbæ Umbelliferae* or *Tribe of Umbelliferous Herbs*. These the Learned Mr. Ray hath accurately Treated of in the 9th. Book of his excellent *History of Plants*, pag. 406. and his *Synopsis* p. 63. and in his 2d. Edition, pag. 101. as hath Mr. Dale also in his *Pharmacologia*, pag. 202.

It's the property of these *Herbs* to have the Position of their *Flower-branches* to proceed from one Basis or *Center*, which expand themselves into an Umbel, whose *Flowers* consist of Five irregular or rather unequal, (that is, differing in shape and bigness) *pentapetalose Leaves*,

U u

from

from whence their *Seed* are produced, which are naked or double, or by their splitting seem so.

This *Genus I* generally observe to be endowed with a *Carmjnative* Taste and Smell, are powerful expellers of Wind, and are therefore good in all flatulent Diseases, and of great use in the *Chollick*, &c. To Instance a few for *Example*, as *Anifs*, *Caraway*, *Cummin*, *Angelica*, *Smallage*, *Parfly*, *Lovage*, &c.

Here is to be noted, that the *Seed* of Umbels are most used, as in all those just mentioned, and the *Roots* also of some are no less prevalent, *Viz.* the *Angelica*, *Fennel*, *Parfly* and *Smallage*, and the *Leaves* of some few, *Viz.* these last recited.

2. Let us now look into another Class, *Viz.* the *Plantæ Galeatæ* and *Verticillatæ*, *Raii Hist. Plant. lib. II. pag. 508. Synops. 77. and Ed. 2. 122.* The Medicinal ones of this Tribe are also Treated of in Mr. *Dales Manuductio ad materiam Medicam*, pag. 230. These are a Family of Plants which bear their Flowers in *Rundels* or *Whorles*, at more or less distances round the Stalk, whose *Monopetalose* Flowers, if we may so call them, being such at the bottom, being *Tubulose*, contrary to the last, and are generally divided into Five unequal Segments as the Umbels, but with this distinction, that the two greater *petala* or *Flower-leaves* in this Tribe are sometimes above, and other times below; whereas the others are constantly the same, that is always lye in the same place, being expanded on a flat or plain Surface: The *Flowers* of our Verticillated Plants from the different Position of their *Petala*, are therefore distinguished under the *Floræ Galeatæ seu Labiatæ*. The Calyx or Case to the lower, or *Tubulose* part of each Flower serves also for it's Seed Vessel, in the bottom of which is contained, in all I have yet observed, 4 Seeds set close together upon a Plain, which Nature lets fall out when ripe,

ripe, the Husk being always open, and commonly divided into Five Points, Adequating the Segments of each Flower.

Now whereas the greatest *Vertue* of the *Umbelliferous Tribe*, were specified to lye in the *Seed*, and next to them the *Roots*, there are few or none as I have yet observed in this *Genus* famous for any extraordinary *Vertues* or *Effects* in those parts, but the Sovereign balm of these chiefly consist in their *Leaves* and *Husks*, rather than the *Flowers*; which last, especially all *Authors* has hitherto given the preference to; as for *Example*, in the *Flowers* of *Rosemary*, *Lavender* and *Sage*, particularly the first, as the only part from which our best *Queen of Hungary's Water* is extracted. I will therefore take this occasion to give my *Reasons*, for preferring that part which by all others has been hitherto neglected and slighted, or if used, has been by accident only or casually by being contiguous to the *Flower*.

I would not be thought to propose this *Hypothesis* for Cheapness sake, for if my assertion holds good, as I doubt not to prove it, I fear they will quickly sell the *Husks* as dear as the *Flowers*, if they find a great vend or a frequent demand for them.

My *Reasons* for giving the preference to the *Husks* of this *Tribe*, before the *Flowers*, are, because I commonly observe the *Calyces* are the chiefest, if not the only part on which I find it's Viscous or Sulphureous Particles to adhere, this you may very easily perceive, not only by it's much stronger and penetrating smell, but by the Clamminess of this, far beyond the other parts, as is very apparent, particularly in the *Husks* of *Sage* and *Clary*, and if with Spirit of Wine you make a *Distillation* of these alone, you will find them much stronger than from a greater quantity of *Flowers* only, which being of finer and more Volatile parts, are only capable

of retaining what the vicinity of the stronger and thicker Texture, which the *Calyces* are composed of, and can without prejudice easily communicate to them.

I look upon the generality of this Tribe, to be a degree Warmer than the last, and their Heat consequently to approach nearer to the *Aromata* or Spices, than the *Carminatives*, and the Effects therefore to be more peculiarly appropriated to such Nervous Diseases, as are more intense, and the *Umbelliferae* cannot so quickly reach, *Viz Apoplexies, Epilepsies, Palsies, &c.* in which cases our *Lavender, Rosemary, Sage, Stæchas*, and some others, are Simples which all our antient *Physicians* (in these stubborn Diseases) have very much applauded. Yet at the same time we must not forget the many Celebrated Effects that are owing to some others of this Family, as *Mint, Bawn, Pennyroyal, Savory, Time, Hyssop, Marjoram, Basil, Origanum, Dittanny of Creet, Marum* or common *Mastick-time*, with *Marum Syriacum* and some other, no less Noble Herbs of this Family, that I have lately received both from the *East* and *West-Indies*, which I have also Experienc'd in some Cases with very good success.

3. We proceed next to those herbs which have a *Tetrapetalose Regular Flower*, (by *Regular* I mean, such as have Four equal *petala* in each Flower), these Mr. *Ray* Treats of in his Sixteenth Book of his *History of Plants*, and in his *Synopsis Stirpium Britannicarum* pag. 108. and in his *Second Edition*, p. 164. under the Title of *Herbæ Flore Tetrapetalo uniformi* and by Mr. *Dale* in his *Pharmacologia*, under the same Character pag. 292. these in Relation to their Seed-Vessels, are sub-divided under two Heads, *Viz. Siliquosæ vel Capsulatæ*, being such as have their Seeds contained in long or short receptacles as *Pods* or *Capsules*.

The known Herbs of this Genus that are most commonly used in *Physick*, are the following, *Viz.* The *Sinapi*, *Raphanus*, *Eruca*, *Alliaria*, *Paronychia* or *Whitlow-grass*, *Sophia Chyrurgorum*, *Erysimum*, *Nasturtium*, *Cochearia utriusq;* with some others.

The most Essential Vertue and use of the Herbs of this *Class* I observe are more particularly in the Leaves and Seed, and next them the Roots, and if any parts are slihed, it's the *Flowers* and *Podds*.

The *Leaves* are more particularly used in the *Water* and *Garden Cresses*, *Sea* and *Garden Scurvy-grass*, *Hedge-Mustard*, *Iberis*, or *Sciatica Cresses*, *Lepidium* seu *Piperitis* *Officinarum*, *Cardamine*, *Bursa pastoris*, &c. To which may be added our *Cabbage*, *Coleworts*, *Savoy*s, *Sprouts*, &c. which are of this Tribe also; and tho' they are of no great Reputation in *Physick*, yet for some Ages past they have got no small esteem in the *Kitchen*.

Others of this *Family* that are more peculiarly eminent for the *Vertue* contained in their *Seed*, are the Common *Mustard* and *Rape*, the *Iblaspi* *Dioscoridis* or *Treacle Mustard*, the *Eruca* or *Rocket*, and *Sophia Chyrurgorum* or *Flixweed*, the Seed of which last I am informed, by a very Worthy Member of this Society, hath for some Years past been used by several People in the *North* of *England*, for the *Stone* and *Gravel* with very good success. The like hint, if I mistake not, Signior *Paul Boccone* gives us in his late *Italian Book*, Intituled *Museo di Fisica*.

We come now to the *Roots*, Two or Three of which have gained no small repute, as well in *Diet* as *Physick*, *Viz.* The *Radishes*, both *Garden* and *Spanish*, (which is the large *Black-rooted*;) as also the *Wild* or *Horse Radish*, and to these the round and long Rooted *Turnep* must be added.

Most

Most of this *Tribe* I find, tho' they are *not* like the two last, *viz.* the *Umbelliferæ* and *Verticillatæ*, yet they exert their power in a much different manner, to wit, by a *Diuretick volatile Salt*, and are found most prevalent and effectual in *Chronick Diseases*, as the *Scurvy*, *Dropsy*, *Gout*, *Faundice*, and other ill habits of the Body, where the *Blood* is vitiated, rather in it's Particles, than irregular Motion, carrying off it's impurity by a *Diuretick Discrasis* or discharge of the offending *Heterogeneous Salts* therein contained, and consequently by purification, disposing of it to a better, or more sane disposition.

Whether these conjectures agree with the opinion of some *Practitioners* of *Physick*, I know not, but I am certain the effects of many of these *Herbs*, as *Water-Cresses*, *Garden* and *Sea Scurvy-grass*, with *Mustard-seed*, and *Garden* and *Horse Radish*, which are all of this *Family*, are by most, if not all *Physitians*, as well Antient as Modern, allowed to be extraordinary *Diureticks* and *Anti-scorbuticks*.

Something more might be said on these *Heads*, and some other *Classes*, which at another time I shall endeavour to illustrate, if what I have here already humbly offered, may be thought Worthy the acceptance of so *Illustrious* and *Learned a Society*

May the 10th.

1699.

VIII. *A Catalogue of Shells, &c. gathered at the Island of Ascention, by Mr. James Cuninghame Chirurgion, with what Plants he there Observed; Communicated to Mr. James Petiver Apothecary, and Fellow of the Royal Society.*

I Intend to range the following *Shells*, according to the accurate *Method* of that most *Sagacious Naturalist* and *Expert Physitian* Dr. *Martyn Lister*, in his Elaborate and curious *Historia sive Methodus Conchyliorum*, and shall therefore begin with,

1. *Buccinum parvum brevè asperum.*

This comes next of Kin to that which Dr. *Lister* kept alive in his *Garden* a whole *Summer* or more, which was brought him from *Jamacia*, by that *Industrious Promoter of Natural knowledge* Dr. *Hans Sloan*, and very nearly Resembles, if not the same, as Dr. *Lister* himself asserts, with that variety which he has Figured in his excellent *Historia Conchyliorum* Lib. 1. below *List. Hist. Conch. l. 1. Num. 28.* without a name, it being less, the Nodes sharper, and not Umbilicated. *Fig. 28.*

2. *Pecten ex rubro alboque fasciatus, nodis inflatis striatus. an ? P. ruber striis circiter 10 nodosis, sive bulbatis & inequalibus donatus, List. Hist. Conch. l. 3. Lib. H. Conch. lib. 3. Fig. 24.* *2.*

3. *Ostrea rupestris sulcata, capite cavo.* *3.*

4. *Spondylus fere ruber muricatus List. H. C. l. 3. Fig. 40.* *4.*

These are also found on the *Barbadoes Shore*, yet rarely in Pairs and entire, the only one I have yet observed, is in the incomparable *Museum* of that most

Curi-

Curious Preserver of both *Natural* and *Artificial Rarities*, and my *Worthy Friend*, *Mr. William Charlton* in the *Middle Temple*.

5. *Pectunculus albus, parvus, striatus & fasciatus.*
6. *Pectunculus albus compressus, rugis faciatu. an. ?*
P. orbicularis planior rugosus *List. H. C. l. 3. Fig. 119.*
7. *Pectunculus triquetrus albus, striatus, undis rufescentibus.*
List. H. C. l. 3. F. 153. Bon. p. 111. Fig. 94.
 The 94th Figure in the 2^d Class of *Bonannus* his *Shells*, exactly Resembles this, it is also next of Kin to *Dr. Lister's Jamaica one*, figured in his *Hist. Conch. l. 3. pag. 153.*
8. *Musculus arcuatus major, sulcis profundior striatus. an. ? M. angustior crassioribus striis donatus, undatim depictus,* *List. H. C. l. 3. Fig. 209.*
List. H. C. l. 3. Fig. 209.
9. *Musculus triquetrus albus minor cancellatus.*
List. H. C. l. 3. Fig. 69.
 This is much larger then the *Garnsey Shell*, which *Dr. Lister* has Figured in his *Hist. C. l. 3. Fig. 69.* otherwise very like it, and therefore it may rather be that above it, Figured in the same Page, under *Num. 67.* without a Name.
10. *Balanus compressus albus, 6 fissuris, sulcatus.*
11. *Patella foraminosa minor, striis ex albo rubroq; alternis.*
12. *Vermiculus, circumflexus albicans, supernè striatus.*
 This seems very much to Resemble that which *Philippus Bonannus* in his *Recreatio Mentis & Oculi* hath Figured under *Num. 20.* *Lit. B.* of his *First Class*, *pag. 92.*
Bon. p. 92. Fig. 20. Lit. B.
13. *Nerita bidens facis sulcatis, ex albedine nigroq; striata, clavicula productiore.*
List. H. C. l. 4. Sect. 6. Fig. 1.
 This may be one of those Figured in the 1st Chapter, *Listeri Hist. Conch. lib. 4. Sect. 6. De Neritis dentatis*, *claviculâ paululum prominente*, but the distinctions of some

some of them are so nice, that I dare not yet be positive which of them it certainly is.

14. *Concha Venerea media Castanei coloris, utroque capite bimaculato.*

15. *Buccinum Persicum parvum, striatum, fuscum, ore trimaculato.*

16. *Buccinum dentatum leve subrufum, fasciis intersectis sive maculatis depictum, List. H. C. l. 4. Sect. II. Fig. 41.*

This *Shell* was 1 Inch $\frac{1}{4}$ long and near $\frac{1}{4}$ thick, it's ground pale Brown, fasciated with darker spots, often separated by lighter, cross the Middle of the upper Whirle is a Remarkable pale List, beset with Arrow-headed Brown Marks: The *Mouth* is Canulated along the left Lip; the Middle of the other side is smooth, the top somewhat Warded, but at the lower part which is near the Middle of the *Shell* is one very conspicuous Ridge, attended underneath with a smaller, by these a dead *Shell* may be easily known.

I have Received these also from *Barbadoes*, as hath *Dr. Lister* from *Jamacia*. Place.

Buccinum bilingue majus, tenue, ex rufo nebulatum Muricatum List. H. C. l. 4. S. 12. Fig. 17. List. H. C. l. 4. S. 12. Fig. 17.

A very fair *Shell* of the same, but much less, was gathered on the *Island of Flores* in the *East-Indies* by *Mr. Rowlston Jacobs*. Place.

Buccinum rostratum facis elatis ore crispo.

This seems to be Figured in *Dr. Lister*, his *Hist. Conch. l. 4. S. 14.* under *Numb. 36.* with out a Name. 18. List H. C. l. 4. S. 14. Fig 36

Buccinum nodis ornatum, costis iisdem alatis, ore crispo & aspero. 19.

Dr. Lister has Figured Three or Four of this Species in his Fourth Book, 14th. Section at *Num. 38. &c.*

20.

Dr. Grew his lesser *Persian Wilk*, with furrowed Lips. *Mus : Reg. Soc.* 127. Tab. 9. Fig. *Dors.* and *Ventr.*

Buccinum recurvirostrum ventricosum, labro pulvinato, variegatum striatum, magnis preterea sulcis ad claviculam donatum List. *H. C.* 1.4. S. 15. Fig. *D.* 57.

Turbo auritus Muricatus Bonan, pag. 132. Fig. *D. & V.*

This *Author* says, the *French* call this *Shell* the *Purse*, because there is joyn'd to it's long and narrow Mouth, (one of whose Lips is tooth'd, the other notched) a *Gloar puff*, like a full *Bag*, or *Purse*.

N. B.

The *Figures* in all these *Authors* have *reverse Postures*, and must therefore be viewed on the back side of the Paper, holding it between the Eye and the Light, and then you see it in it's Natural position.

To the *Shells* we add

Our small Warted *Barbadoes* Sea Egg.

21.

Echinus Ovarius *Barbad. verrucis plurimis minoribus*

Mus. Petiver
123.

Mus. Petiver. 123.

The *Spines* of these are *Purplish*, especially the *Tips*, the largest I have yet seen, exceed not a *Crow-quill* in thickness, and are scarce an Inch long; they end pointed, and are finely striated if strictly viewed. The naked Shell of this was somewhat more than six Inches in Circumference, and about 5 *Broadways* and $5\frac{1}{2}$ *Lengthways*.

We come now to the *Vegetables, &c.* Viz.

22.

Chamælyce frutescens elatior floribus comosis.

This chiefly differs from the *East* and *West-India* sorts of this Species, in having all it's *Flowers* at the top only, and those in Clusters, something Resembling our *Laurustinus*.

Cha-

Chamæfyce frutescens humilior floribus comosis.

23.

The *Flowers* and *Seeds* of this grow like the last in Clusters, at the top of each Sprig only, the *Leaves* grow also in pairs, but much closer together; this is more Branched, and seems Shrubby, the stalks being Woody; yet the *Sprigs* much shorter, many of them not more than 1 Inch and $\frac{1}{2}$ from the Woody Stalk; and yet plentifully in *Flower*.

Indian Forked Leav'd Sea-Bindweed.

24.

Soldanella Malabarica cordato folio Mus. Petiver. 98. Mus. Petiver. 98.

Convolvus maritimus majore folio Chinensis Pluk. Pluk. 24. f. 405. *Marinus Catharticus folio rotundo*, Plum. p. 89. Fig. 104. Plum. 89. f. 1

Though I have often times seen the *Leaves* of these whole, at the point; yet they are generally found *Forked*, and sometimes very large.

100. Pis. 103. C. 69. Fig.— Ed. 2. p. 258. F. Mames. 51. Pl. 3. Fig. 89. Pl. Mal. V. 11. Tab. 57. pag. 117.

Ketmia fetida flore luteo fundo purpureo.

The *Leaves* of this, are somewhat like our *Black-poplar*, they are often Notched, but not jagged like the common kind of *Shrub Mallows*, which grows in most *Gardens* with us; of which this seems a true Species, *Viz.* Of the *Alcea Arborescens glabra* *Ketmia dicta*, I B. V. 2. l. 23. p. 957. Whose name I follow to distinguish it from the *Althea's* and *Aleca's*, amongst whom it has hitherto been falsely plac'd, they having *naked Seed*, and this a *Capsule*.

SL. Jam. 57. H. 2. Alm. Bot. I & 4 Pl. 112. Ray H. 726. Pl. 14. 25.

Festuca Funceis foliis, spica minus sparsa, aristis trifidis. an? Gramen Avenaceum, paniculâ minus sparsâ, cujus singula grana 3 aristas longissimas habent SL. Jam. 35. pl. 5.

Handwritten: 256
26. SL. Jam. 35. Pl. 5.

The *Roots* are all *Fibres*, whitish and unbrancht, the *Leaves* long and narrow like small *Rushes*, the *Spike* very much Resembles our *Capons tail Grass*, which grows with us pretty common on the *Brick-walls* about *London*; but what in this is most Remarkable is, that each

Description.

gluma or *husk*, terminates in three Awns, two of which are even, the other somewhat longer.

Plac.

This same Grass Mr. *George Stonestreet* brought me some time since from this same *Island*. Dr. *Sloan* hath also observed one very like it near the *City of Funchal* in the *Isle of Maderas*.

These are all the *Plants* except *Purslain*, which this *inquisitive Person* could find at this *Island*, What he else observed is as follows, *Viz.*

27. *Corallium album minus Conglomeratum.*

This seems a Congeries or Cluster of our *small White English Coral* Clung together, and which is often Crust-ed over with the same substance.

28. *Spongia globosa reticulata Coralloides.*

This grows very like our *common Branched Coraline Moss*, and exactly Resembles Mr. *Doody's Pseudospongia Coralloides*, *Ray's Synops. Edit. 2d. pag. 346.* but this gives way as other *Sponges*, whereas his is brittle.

Ray Syn. Ed.
2. pag. 346.
Pl. 3.

This I found in the hollow of a dead *Echinus*, brought from *Ascention*.

29. *Terra Spongiosa nigricans, Carbonibus exustis per-
fimis.*

This is what several parts of the *Earth* is covered with, and in many Places it lies in Heaps, it's very light and porous, exactly Resembling a *Cinder* or *Burnt-Coal*.

30. *Glareola Maritima Perlata.*

Instead of fine *Sand*, the Shoar here is Stored with this sort of *Gritt* or *small Gravel*, a great part of which is smooth and shining like *Millet Seed* or *Pearl*.

*Part of a Letter from Mr. Leuvenhook, Dated
June 9th. 1699 concerning the Animalcula
in Semine humano, &c.*

IT did happen so that a certain Dr. of *Physick* did Accomodate me with a Book called *Novelles de la Republique des Lettres*, and shewing me on the 552 pag. an Extract in *Latin*, of a Letter Written by Mr. *Dalen Patius* to the Writer of the *Novelles*, wherein the Author of the Letter amongst the rest says thus,

At length it has happened beyond expectation, *viz.* by way of a Magnifying-Glass, so good (without praise be it said) that none better can be made, because it doth hardly exceed the smallest visible Point in bigness, &c.

When he is speaking about the small Animals in the Seed of the Male, he says thus.

Besides these, we discovered some small Animals, of the same shape, as are in the *Pools* in the Month of *May*, &c. like the Spawn of Frogs that is in small Waters; and this Body doth hardly exceed the bigness of a small Corn-grain, the Tail being Four or Five times as big as the Body; these do move themselves with a strange quickness, &c. and make with the beating of their Tail, small Bubbles, which they also did pull along.

How should we have believed, that in them, a Human Body was Locked up, &c. Yet notwithstanding we have seen it with our own Eyes: For when we did Contemplate every thing with great Curiosity, one did appear that was somewhat bigger, &c. that had pull'd of the Skin, wherein it was Locked up.

This

This showed clearly the two naked Thighs, the Legs, the Breast, &c. Both the Arms, &c. the Skin being pulled up somewhat higher, did cover the Head like a Cap.

We could not discern the difference of Sex, &c. and at the same time it pulled of it's Skin it died. This changing, although hitherto never heard of, must seem to no Body strange, or wonderul; because many other Animals change their shapes daily, whereof possibly the opinion of the Transmigration of the Souls, hath drawn it's Original. Moreover, we did also observe parts of the Blood, which we found shining and Globular, &c. the Diameter about half a Line, driving stuff like unto seed, which perhaps is useful to Carry the Humours through the Body. These Particles do sink, &c. and grew into one, when the Moisture was gone. We shall perhaps shortly publish some Writings, that may perhaps not be useles, &c. but pleasant and intermixt with severall Observations, we made about the parts, causing venereal and other Diseases; which no body did yet to this day, but only seek after; and also many other things concerning the Circulation, and feeding of the Juices in Plants. In the mean while, we had a mind to make this publick, that the Learned World might give us their opinion and Sense thereof.

Concerning this last Writing, I take the freedom to say to you.

That what concerns his Magnifying-glass, of so incomparable smallness, as ever was made, we will let it be so; I believe that amongst the Members of your Royal Society, some of an equal smallness are to be found. But to mount such small Glasses well, requireth a far greater judgment, then to make them.

Concerning my Self, although they have been made
by

by me for these Forty Years almost, of an Extraordinary smalness, yet they have been but little used by me ; for according to my judgment, they are not fit to make the first Discoveries, for these that are ground of a bigger Diameter, are more fit for that.

I have discovered the Saline parts, and the shape of the *Animalcula* in the Masculine Seed, and sent the same to you in the Year, 1677. Which also are come out in Print in your Philosophical *Transactions*, Numb. 142. fol. 1042. But that one should find such a perfect Human shape, as I have sent herewith, which I got Drawn after the Figure out of the said *Novelles*, Marked with 3 and 4 ; I am certainly perswaded you will not allow of it.

We know that the small Animals in the Masculine Seed of a Frog, have no Similitude at all, with them that come out of the Eggs of a Frog, and if we Contemplate the Animals that are come of the Eggs of the Frog, and are grown bigger, by the help of a Magnifying-glass, they have no Similitude at all with these, we find in the Masculine Seed of a Man, save only that they both have Tails, and so can Swim, and if we Anatomise one of these Animals that come out of the Egg of a Frog, that is come to a Considerable bigness, yet we can not discover their Legs, but when it is grown a hundred and more times as big as it came out of the Egg, then the Legs begin first to shew themselves.

Now is it certain, that although we can not discover the Shape of a Frog, in an Animal that is come from the Egg of a Frog, when we Anatomise it, that yet notwithstanding the Frog is Lock'd up in it.

Now if an Animal, in the Masculine Seed of a Beast or Fowl, was provided perfectly with all it's Members, so that by the help of a Magnifying-glass they might be discovered, they endeavour to make us believe else, then these Animals must from time to time, as they
grow

grow bigger, encrease in their perfection. But that it is not so, we see by the Observations that the highly Learned *Malpigi* has made, about the beginning of a Chicken in the Egg, for as much as was then in his power.

As what concerns me, I cannot imagine, that an Animal of the Masculine Seed, can pull of it's Ski nor Film, or to free it self of it, but that the Membranes or Skins are strong, and more than one, and the Membranes wherein the Creatures lye in the Mothers are not depending from the Mother (*uterus*) but that the Animals that are injected into the *uterus*, are only brought there for to grow bigger, which Membranes we call the after burdens.

I have had brought several times to me, uteruses of Sheep, after they had been some days before impregnated, and took out of them, the same wherein the creature did lye, that would have come to be a Lamb.

When we did look upon this Creature through such a Magnifying-glass, as we judged to be most convenient for it, we were forced to look out very sharply, to discern the parts of this Body from one another; partly because all the parts of so small a Creature, are very soft and smooth, and partly because this Creature was in a round or Globular Posture, so that when we came to unfold them, by the help of a gentle hand, we broke several of the Members.

We see also, that when a small conception cometh away from it's Mothers Womb before it's time, that the Skins wherein it lyeth, are perfectly whole, and that the Creatures therein, are not extended strait, but they lye round, and in such a posture, that it can be no better contrived.

The first figure in the before mention'd *Novelles*, represents it's Saline Figures, and the second Figure sheweth an

an Animal in the Masculine Seed of a Man, which we have Contemplated a hundred times and oftner, and a few days since above 1000 times which since we have all kept very carefully ; but hitherto I could not yet discover any such Creature as this Cut sheweth to us, for as this delineated Animal (and such an other kind of delineation is also come to my hand) has it's Tail almost every where, or quite through of the same thickness, and is split at the end, as if it was made on purpose to take hold therewith of something, yet we see every where, that the Tail is the longer the smaller to the end, nay to that degree, that where it doth lye the thinness thereof makes us loose it's sight.

Now if we consider the Postures of the Figures of 3 and 4, which show the shape of a Human Body so exactly, so that they lay straight extended, with their hands upon the Abdomen, and the Two Legs Straight out by one another, I believe that no Member of the Royal Society will allow of the discovery of such a Creature, but rather take it to be a Fancy or imagination, then a real truth.

For Experience teacheth us daily, that all kind of Creatures, that lye in the *uterus*, make a roundish or Globular Figure, as well as the Scituation will allow of it, as I have already said before, that the Mother in Bearing of the Fruit, may be less hindered, and *Secondly*, Because the Foetus laying in that Posture is the more easy, and then because a round Figured Body doth lye in less room, then any other.

This being so, how is it possible to comprehend, that such a perfect Human Body, could be comprehended in so small a place, quite stretched out, and what is yet more, that it should have such a Motion, as to break in pieces, that wherein it was wrapt up, and to stretch it's self at length, which is altogether contrary to Natural experience, for we never see that a new Born Child, doth stretch out it's Limbs, but it doth always draw it's Arms and Legs inwards, according to the Posture it did lye in, in the Mothers Womb.

We have formerly observed, that in all Seeds that come to our hands, the Plant of a Tree or any Herb, or Shrub, was included in it, that the Kernel or Pith, is only for Preserving, or to Nourish and Feed the Plant that doth lye between them until it can shoot a Root sufficient to draw Nourishment enough out of the Ground it stands in to Feed it.

It is so, that in Wheat, Barly, &c. we have discovered several

veral Plants in each of them, and accordingly, in each of them are several Acres of Wheat or Barly; for if they were not included within them, how could they come out of them. And yet much less do the Ears of the Wheat, shew us their Wheat Corns, when we Anatomise them, for this great Mystery doth remain hid from our Eyes.

I put this down as a certain truth, that the shape of a Human Body is included in an Animal of the Masculine Seed, but that a Mans Reason shall dive or penetrate into this Mystery so far, that in the Anatomizing of one of these Animals of the Masculine Seed, we should be able to see or discover, the intire shape of a Human Body, I cannot comprehend.

As to what concerns my Magnifying-glasses, I will not brag of them, I make them as good as possible I can in my power, and I must say that several Years since, I have not only Ground them still better and better, which is a matter of consequence, but I have also Mounted them better from time to time, which is also very Material: I have known some that have made Magnifying-glasses, and have bragged of them, and yet were not fit to judge, whether a Glass did discover well or no, and seeing that every one is not fit, to judge well and truly of a Magnifying-glass, much less can he be fit to make new Discoveries, and thus doing so, no Body must Publish or bring to light, new Discoveries, and judge by one sight, but he must see the same over and over several times, for it doth happen often to me, that People looking through a Magnifying-glass, do say now I see this, and then that, and when I gave them better Instructions, they saw themselves mistaken in their opinion, and what is more, even he that is very well used to look through Magnifying-glasses, may be misled by giving too sudden a Judgment, of what he doth see.

In the mean while that I am busie in Writing these, I have 8 or 10 Magnifying-glasses lye before me, which I have set in Silver my self, and although I have never had any Instruction at all how to Work any Mettal with Hammer or File, yet I mount my Glasses and Tools so well, that Workmen in Gold confess themselves that they are not able to do the same.

These Magnifying glasses Magnify some more then others, and before them stand the Animals, that are in the Masculine Seed of Mankind.

These

These Magnifying glasses are thus placed, that although I have some-times Twenty five, sometimes a Hundred coming before my Eye sight, and in the space of the beating of a Pulse, others do appear again; yet not one came ever before my Eyes, that was 12 times as big again as any of the rest, which I found in great numbers, so that it is a certain Maxim to me, that the said Animals do not grow bigger, as long as they are in the *uterus*, and have received yet no Nourishment from it.

Now if an Animal doth come a little too far from the Focus of the Magnifying glass, then we see in a Glass that doth Magnify very much, only the highest parts of the Body, and thus the Animal doth appear Less to us, then it would do otherwise, and if we put the Animal somewhat nearer to the Glass, then we begin to see the outside thereof, and by placing the Animals so, we may easily judge some to be bigger then the others.

It may also happen, that when Two Animals lye by one another, or lye partly one upon another, so that we see but only one Tail, we may in such a Case judge that we see but one Animal, that exceeds the other in bigness very much, and in so doing, we conceive, to see something, that in reality was not true.

In this sight looking narrowly to it, we see very well that the parts that are within the Body of the Animals, stand somewhat out of the Skin; now to look into it with a roundish part, and then two or three parts again that stand out, and then again one and sometimes two parts that are longest and lye one by the other, and that each of these parts Represents a clearer being then the other, we see in each Body, that is lying separated from the other parts a peculiar shape, for as now one Animal does lye with it's back towards us so can another again lye with the Belly towards us sideways. In short, it can appear or Represent it self before us, in so many peculiar shapes or postures, as any great Beast, can Represent it self before our naked Eyes in standing, turning, winding, or lying. Nay, it is possible that Four Animals may lye together in such a Posture, that Two of their Tails might Represent the Arms, and the other two the Legs.

I cannot omit to tell you, &c. how I come to handle these Animals in the Masculine Seed, so that I may see them as distinctly, as ever it is possible. For if we look upon the
Mas-

Masculine Seed of any Animal so as it is, then the Multitude of these Animals do not only deceive our sight, but they also hinder the exact inspection and contemplation of them. But I take only a little thereof the bigness of a Pins-head, and mix it with a common drop of clear and clean Rain water. This stuff thus mixt, I spread about, and that so thin as I can possibly even to the greatest extremity, on a very clear Glass, that I have by me ready made for that purpose, and in so doing, I do not only bring a thinner Watty moisture about the Animals, but they lye dispersed in many places so far asunder, that they do not touch one another. And thus doing I reckon to be the best way and means, to contemplate these Animals in the ground with the utmost accuracy that is possible. Part of these spread Animals, I fix before such Magnifying-glass, as I Judge to be most convenient for that purpose, and thus they seem to lye before my sight, as in open Field, which I contemplate in a clear day, and sometimes by Candle-light, and to have still more light, I use sometimes a metal Conçave Looking glass, but above all things you must have a care, not to make your view in the Sun-shine, for if you do so, the Circumference of each Animal, will have almost as many Colours, as we see in the Rainbow.

I have also observed, that between these Animals, did lye some smaller Roundish parts, and these have seemed to me, as if they had Tails, wherefore I took into consideration, whether these parts might not be young Animals, for certainly these Animals shall procreate, and from small ones grow to their perfect bigness, and who doth know, whether these Animals do not come to their perfect bigness in the space of Twenty Four hours, as we have observed in small Water Animals, and also, if any of these Animals come to dye, they do not serve as Food for the growing of the rest.

And thus I imagine that I have satisfied the desires of the Author, *viz.* to confer my Observations, and to give my opinion thereabout; which I think I cannot better Address than to You.

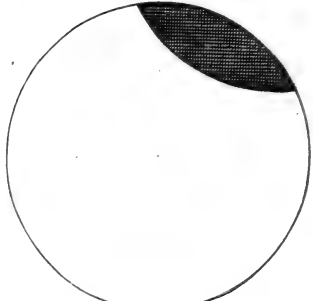


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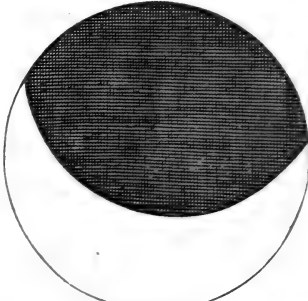
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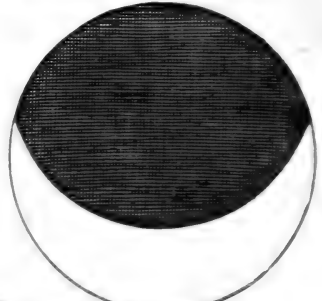
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a Davide Gregorio M.D. Astronomiæ Professore Saviliano & S.R. S.*



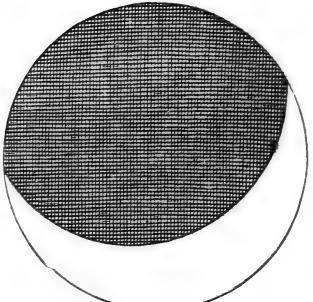
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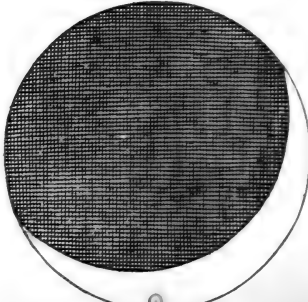
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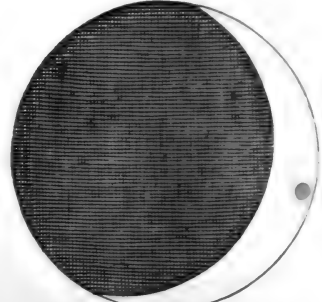
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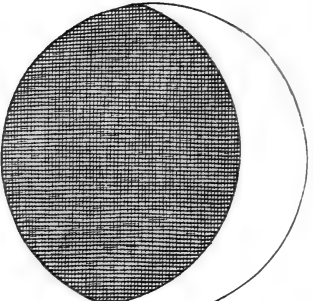
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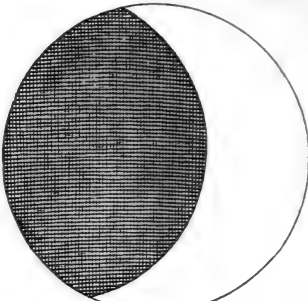
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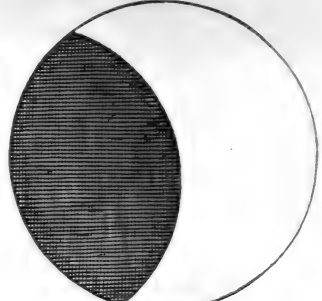
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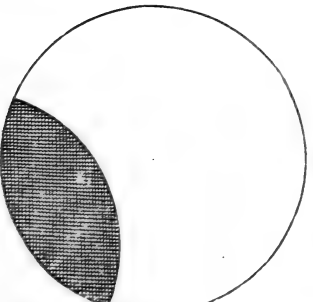
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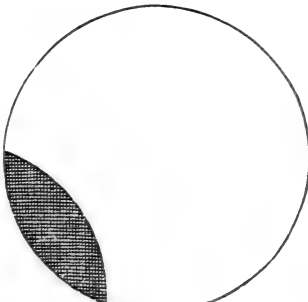
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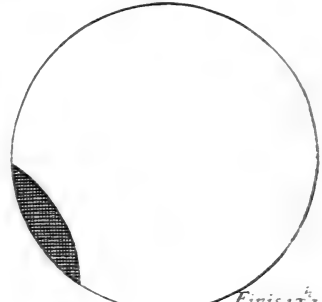
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10^h 16' 25"

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Temp. approx.*

Abaga Sulph. Ox.

PHILOSOPHICAL TRANSACTIONS.

For the Month of *September* 1699.

The CONTENTS.

- I.** *Departium Septentrionalium quibusdam affectibus & remediis.*
Autore Phil. Lloyd. M. D. 2. A Discourse of Coffee, read at a Meeting of the Royal Society, by Mr. John Houghton, F. R. S. 3. A Letter from Mr. John Friend to Dr. Sloane, dated Oxon. Jul. 26. concerning an Hydrocephalus. 4. Some Observations of the Mercury's Altitude with the Changes of the Weather at Emüy in China. Lat. 24° 20. N. 5. Part of a Letter from Dr. David Gregory, to Dr. Sloane, dated Oxford, October 12. 1699. containing some of his observations of the Eclipse of the Sun on the 13th of September last. 6. Of the Origin of white Vitriol and the Figure of its Crystals, not yet accounted for. By Dr. Martin Lister, F. R. S. 7. A Letter communicated from Mr. Thoresby, F. R. S. to John Evelyn Esq; F. R. S. concerning some Cures done by Mr. Greatrix the Stroker. 8. An account of Books, and Geography Anatomiz'd, or the Compleat Geographical Grammar. Being a short and exact Analysis of the whole Body of Modern Geography, after a new and curious Method. The Second Edition, much improv'd and enlarged. By Pat. Gordon. M. A. F. R. S. 9. The Celestial World Discover'd, or Conjectures concerning the Inhabitants, Plants, and Productions of the Worlds in the Planets. Written in Latin by Christianus Huygens, and Inscribed to his Brother Constantine Huygens, late Secretary to his Majesty King William, in 8vo. with 5 Copper Cuts of Illustration. 10. Oran Outgan, five Homo Sylvestris: Or the Anatomy of a Pygmie, compared with that of a Monkey, an Ape, and a Man. To which is added a Philological Essay concerning the Pygmies, the Cynocephali, the Satyrs and Sphinges of the Ancients, &c. By Edward Tyfon. M. D. Fellow of the College of Physicians, and of the Royal Society, &c. London, in 4to. 1699.

I. De partium Septentrionalium quibusdam affectibus & remediis. Autore Philippo Lloyd. M. D.

BAlnea nusquam frequentiora sunt quam in Lithuania: Balneum ingressi postquam largiter sudarunt, cucurbitas sibi apponi faciunt, aut virgis tergum cædunt usque ad insignem ruborem: Inter Cosacos quoque si quis graviter infirmatur, Balneum ingreditur, & corpus tegunt certis herbis, partique dolenti applicant certum Cornu Cavum ad vesicam attrahendam, quâ ruptâ effluit ichor variî sæpe coloris, flavi, viridis, & nigri, & patiens convalescit; varietas autem ista colorum, herbis quibus patiens tegitur aut Cornu fuco aliquo imbuto adscribi debet. Cosacorum quoque Cura multum in Aqua Vitæ, aut Jusculis acidis cum oleo & pipere ad sudorem eliciendum, consistit: nec abstinent in Diætâ à carnibus cum aceto & cæpis coctis, quod Bigost vocant: Sicuti autem istæ nationes pharmaceutica non multum æstimant, ita vice versa sunt prodigales quoad ea quæ ex fonte Chirurgico petuntur, ut Ven. Sect. usum Sanguisugarum (quas etiam palato & gingivis intro applicant) fonticulos, & trepanationem, cujus usus est valdè frequens in Suecia bono cum successu; habent enim Sueci capita fatis dura & ursina. Apud Moscovitas usus herbæ Theæ ob viciniam cum Chinensibus frequens est, non solum in decocto sed in substantia pulverisatam sumunt pondere ʒs. cum Aqua Vitæ.

Sunt apud ipsos pastilli certi odoriferi & flavi coloris in usu; per nares attrahunt pondere gr. iv, ore aperto. Per 2 horas tanta copia mucî viscidî rejicitur, quantum vix Catharticum eliminare possit, quo remedio curant omnes affectus Capitis à frigida causâ ortos: aliqui hauriunt fumum Tabaci, non per vices, sed simul & semel, ex tubulo capaci de hoc fumo quantum possunt deglutiendo; tunc corruunt in terram non aliter quam Apoplexia tacti; somnum abbreviat superveniens vomitus & alvi perturbatio, quod etiamsi non superveniat, postquam expurgantur capitis levamen sentiunt, & sunt ad omnia bene dispositi.

Natio Tartarorum ut plurimum à teneris lactis & carnis Equinæ pabulo assueta, in continuis equitationibus Medicinam quærens, præter externa eaque Empyrica, pauca interna excolit remedia; v. g. dum quis graviter infirmatur, & est suspicio febris malignæ, tunc capiunt lepusculum juvenem, cui incidunt arteriam Carotidem, & sanguinem sugit ager quamdiu poterit, postea pelle detracta & calente tegit caput; seque ad sudorem & somnum disponit: dum quis ex captivis aut servis feбри corripitur, tunc apprehensâ Comâ ipsum aliquantisper exagitantés & circum rotantes in aquam profluentem projiciunt, hocque modo humores & spiritus alterando procurant feбри fugum. Hæc

Hæc sunt quæ ab amico in Castris accepi, qui diu versabatur in locis istis Septentrionalibus: idem mihi retulit Coronidis loco dari obfascinationem solo aspectu inductam in Lithuania præsertim (Credat quis vult) ubi homines effluviis subtilibus ex oculis emanantibus non modo aliis noceant sed etiam animalibus: hoc mali genus Uroki appellatur: ad quem effectum producendum requiritur approximatio corporum vicinissima, & deinde ne alter altero stet notabiliter editiore loco: curantur tales præcipue balneo, Origano, Hyperico, aliisque herbis parato; suffumigio ex crinibus, unguibus aliisque partibus ipsius obfascinatoris si fieri potest, & demum sudoribus.

Inter Tartaros si quis ex Equo vel aliàs graviolem passus est Casum, ante omnia illum stimulant ad urinam, dein Venâ sectâ Ossa Equorum combusta vel certum albi boli genus quo Terra illa abundat, ad ebibendum præbent.

Lac equinum acidum factum est illis universale omnibus morbis calidis refrigerium, imo balsamicum Stomachale.

In variolis infantum, loco venæ Sect. apponunt Moscovitæ cucurbitulas scarificatas clunibus, subinde sanguisugas. Emulsiones parant ex semine Napi, haustui imponunt album græcum.

Poloni habent certum medicamentum alimentosum ipsis familiare Barst. dictum, quod fermentum stomachale acido suo suaviter restaurat, & Polonicæ Nationis crapulas, ex largiori, cremati, mulsi, & vini generosi, haustu, vel ex Ciborum calidorum copiâ, contractâ conveniens: hoc edulii medicamentosi genus ex Branca ursina, vel ex solo pane siligineo fermentato suo modo, conficere norunt in forma decocti herbacei aquosi.

Cæterum si quis infirmari incipit, & conqueritur de ingenti capitis dolore, torminibus ventris, arthritide vagâ, &c. Statim formatur suspicio de plica sine Koltum: nihil aliud satagunt quam plicam in Capitis capillis procurare, id quod lotionem ex brancâ ursinâ aliisque herbis, vel saltem mixturâ olei & vini sæpius lavando Caput, efficiunt. Plicâ ita procuratâ, in capite, videtur ipse morbus mæscere materia morbificâ quasi criticè sic translata, & naturæ tonum relinquitur opus: quod planè indicat hunc morbum ab alia causâ quam neglectu peccinationis produci; si quis peccinando divellere aut Capillos abscindere tentat, in alium incidet morbum, & sanguis sæpe effluit tanquam ex venæ ramulis pilis abscissis; nec mirum hoc videri debet, cum pili ex arteriæ, venæ, & nervorum ramulis in Capsula inclusis, & postea extensis formentur; ut patet autopsia;

fia ; ope microscopii in pilis barbæ felis aliorumque animalium.

Quicquid de causa Plicæ tradunt authores vel nimis genericum est vel imperfectum & insufficiens : nam quod ad aquas in Russia spectat, etsi certum sit ex illarum hæstu causari, unde etiam dum exercitus militaris illas partes transit ad aquarum istarum vada alii stant vigiles milites transeuntibus prohibitorie similes aquas hauriant. Quæritur quomodo illi qui ad 100 leucas inde distiti habitant & ultra Plicâ corripuntur ? nisi forte nobis persuadeamus aquæ illius ex Russia venas propagari per totam Poloniam.

Causa intrinseca in glandulis subcutaneis constitui potest, quomodo plures earundem ductus & pori conjuncti sunt ac obliqui, ex quibus deinde pili copiosiores angustiore in loco positi, accedente simul glandularum succo nimis viscido, intrlicantur & complicantur ; sed & ista causa cum extra Poloniam dari possit, ad morbi Endemii naturam, sola non sufficit : quamobrem causa adæquata passim in Contagio partim rerum non naturalium usu incongruo quærenda : de contagio non dubitandum, cum familiare sit itinerantibus lectos secum circumvehere : aer satis rigidus Boreali acido coagulante abundat, unde transpiratio pituitæ illius glutinosæ circa pilorum radices hærentis facilè impeditur, vel maxime dum Poloni nudato Capite frequenter incedere consueverunt.

Laborantes hoc morbo habent appetitum in certum objectum defixum alii solam Aquam expetunt, alii crematum, alia potulenta averfantes : ex similibus remediis in scorbuto juvantur.

Præter febrem malignam Hungaricam dictam, occurrunt alii morbi levioris momenti. Endemii ut Czemer, porcellus Cassoviensis, strumæ.

Czemer est tumor aliquis sub carpis manuum a latere supra arterias ad instar nodi alicujus mollioris, dolorem dum tangitur excitans ; curatur emetico & sudoriferis.

Porcellus Cassoviensis est tumor durus instar porcelli, regioni lienis incumbens incolis Civitatis Cassoviensis familiaris, estque schitrosa dispositio lienis cum flatibus Colon obfidentibus : curatur aperitivis.

Strumosi in Hungaria non reperiuntur nisi circa montanas civitates ubi auri sunt fodinæ propter aquas mercuriales & effluvia mineralium : decrescente Lunâ spongiâ combustâ fumum ore excipiunt strumosi & residuum Cinerem melli admixtum devorare solent in principio ; nam strumæ inveteratæ nullam admittunt Curam.

II. *A Discourse of COFFEE,* read at a
Meeting of the ROYAL SOCIETY,
by Mr. John Houghton, F. R. S.

Several have written of this Plant, and particularly the Learned Mr. Ray, in his large History of Plants, pag. 1691, 2. 3. But for its Description, I shall only refer you to what was Published by Dr. Sloane, in the 17th. Vol. of these Transactions, No. 208. pag. 63. where is the Figure, Description, &c.

At the beginning of the Transaction, is a Cut of the Branch, with its Leaves and Berries, only the Leaves are not set opposite one to another, as he tells me they ought to have been.

I cannot learn the use of any part of this Plant, except the Berries, of which boil'd in Water, a Drink is made, and drunk much among the *Arabians* and *Turks*, and also now in *Europe*.

How the *Arabians* fell first into the use of Coffee is hard to tell, perhaps 'twas their *Succedaneum* for Wine, which *Mahomet* had prohibited; nor how they come to roast it before boiling, which it's probable is owing to Chance, or perhaps a debauch'd Palate, as some with us love the burnt part of broil'd Meat, and from some great one, it might grow into a Fashion, as the use of Tobacco and Coffee with us, although had they been imposed by a Law of the State, or Physician, it would have been thought very severe. However it got head,

for by its actual heat it refresh'd the weary, and did several other Services, as Wine that acted by a potential heat.

The general use of it quickly made it a Trade in great Towns, and the frequent use of it made it be desired stronger and stronger, till the excessive Drinkers would take whole Spoonfuls of the Oyl that swims on the top, as our great Drinkers arrive from Wine to Brandy, and from thence to more burning Spirits.

Into these Publick-houles they would come by Hundreds, and among them Strangers would venture, where they learn'd the Custom, and carried it to their own Countries; for one Mr. *Rastall* an *English* Merchant, whom I knew, went to *Leghorn* in 1651, and there found a Coffee-house. To the same House of Merchandise where this *Rastall* was, came Mr. *Daniel Edwards* a Merchant from *Smyrna* (where Coffee had been used immemorially) who brought with him, Anno 1652, a *Greek* Servant, named *Pasqua*, who made his Coffee, which he drank two or three Dishes at a time, twice or thrice a Day.

The same Year *Edwards* came over Land into *England*, and Married the Daughter of one Alderman *Hodges* a Merchant, who lived I think in *Walbrook*. This *Hodges* used with great delight to drink Coffee with *Edwards*, so it is likely, that this *Edwards* was the first that brought Coffee into *England*, although I am inform'd that Dr. *Harvey* the famous Inventer of the Circulation of the Blood, did frequently use it.

After this it grew more in use in several private Houses, which encouraged Mr. *Edwards* to set up *Pasqua* for a Coffee-man, who got a Shed in the Church-yard of *St. Michael Cornhill*, where he had great Custom, inso-much that the Ale-house-keepers fearing it should spoil their Trade, Petitioned the Lord Mayor against him, alledging his not being a Freeman. Upon this Alderman *Hodges* joyned as a Partner with *Pasqua* one *Bowman* his Coach-

Coachman, who was made Free, upon which they lived unmolested in the same place, where Mr. *Rastall* found them in the Year 1654, but sometime after this *Pasqua* for some Misdemeanour run away, and *Bowman* had the whole Trade, and managed it so well, that by his Profit, and the Generosity of his Customers, who contributed Sixpence a piece, to the number of almost a Thousand; he turned his Shead into a House, and when he died, left his Wife, who had been Alderman *Hodges's* Cook-maid; pretty Rich, but she died Poor not many Years since.

John Painter was *Bowman's* first Apprentice, and out of his Time in 1664, *Bowman* died 1663, and after one Year his Wife let the House to one *Batler*, whose Daughter Married *Humphrey Hodskins* *Bowman's* second Apprentice, who was with him before *Monk's* March, Anno 1659. This *Humphrey* lived long in *St. Peter's-alley* in *Cornhil*, and died not many Years since, and left there his Widow, *Batler's* Daughter, from whom I had this Account.

How long this has been in use in the World, is hard to say, but *Tavernier's* Travels, the *English* Edition, says it had been in use but Twenty Years, although the Author said Six-score years.

I am inform'd that *Dr. Beveridge* has an *Arabick* Book, that says a Hermit drank it, and called it *Coffee* which signifies *Drink*, but the name is *Bun*.

This is what I can learn of the Original of *Coffee*, and *Coffee-houses*, but as for its Virtues, I think no body has Published any thing considerable about it. I shall give my Thoughts, which perhaps may provoke some that understands better to shew the Weakness of them, and in their room set forth better.

The best *Coffee-berry* is what is large and plump, with a greenish cast, and having on the thin parts a Transpa-

rency; the other has a yellowish cast, and is more opaque, but when they are roasted, 'tis hard to distinguish.

I put some Berries into a Glass of Water about a Week since, to see if they will sprout, but as yet there is no appearance, altho' they are tollerably swell'd, and look white and bright.

I have made a Decoction of them, which has made them shoot.

The common way of preparing the Berry for the Drink Coffee, is roasting it in a Tin Cylindrical Box full of holes, through the middle of which runs a Spit, under this is a semicircular Hearth, wherein is made a large Charcoal-fire: By the help of a Jack, the Spit turns swift, and so it Roasts, being now and then taken up to be shaken. When the Oyl arises, and it's grown of a dark brown colour, it's emptied into two Receivers made with large Hoops, whose bottoms are Iron-plates, these shut into, and there the Coffee is well shaken, and left till alm st cold, and if it looks bright, Oily, and shining, 'tis a sign 'tis well done.

Of this, when fresh, if an Ounce be ground, and boild in something more than a quart of Water, till it be fully impregnated with the fine Particles of the Coffee, and the rest is grown so ponderous, as it will subside and leave the Liquor clear, and of a redish Colour, it will make about a Quart of very good Coffee.

The best way of keeping the Berries when roasted, is in some warm place, where it may not be suffered to imbib any Moisture, which will pall it, and take off it's br kness of Taste: It's best to grind it as used, except it be ram'd into a Tin-pot, well covered and kept dry, and then I believe it will keep good a Month.

There will swim upon the Coffee an Oyl, which the *Turkish* great Coffee-drinkers will take in great plenty if they can get it: When the Coffee has stood some

Some time to cool, the gross parts will subside, the briskness will be gone, and 'twill grow flat and almost clear again.

That I might farther understand Coffee, and how it agrees with Horse-beans and Wheat, which sometimes I have heard has been used instead of it: I sent to the Chymists 1 Pound of clean Coffee, 1 Pound of Husk'd Horse-beans, and 1 Pound of pick'd Wheat, and I received back

Coffee		Horse-beans	
Spirit net	3vi 3vi	3vi 3i gr. xii	
Oyl	3ii 3iiii 3ii	3i 3iii gr. x	
Cap. mort.	3v 3iii	3v 3iii	
Wheat			
Spirit	3viii 3ii 3i		
Oyl	3i gr. vi		
Cap. mort.	3iv 3vi		

By this account it appears that Coffee yields by distillation, in a Retort, almost double as much Oyl as Beans and almost treble as much as Wheat; the other proportions may easily be seen above.

The Oyls are very thick, but they and the Spirits have all of them ill favours as is usual from burnt Materials.

By Spirit is meant the Flegm.

The *Capita Mortua* have no smell. They have been calcin'd over and over with all the Art my Chymist has, but he cannot reduce them to a Calx or Ashes, and concludes there is no Salt to be gotten from them. But that from your more knowing Considerations

tions they may be better understood, I have brought all the particulars hither.

From what's afore said I note, that from the common drink called *Coffee*, there is little good can come from any part, but its Oyl, because its other thin parts are evaporated, and its thick subsides; but its Oyl I suppose to be nutritive *quasi* Oyl, and warm *quasi* a Chymical Oyl, for all the warm parts are brought hither as to a point, and thereby it may enliven and invigorate some heavy parts in the fermentative juices, and nourish weak Parts within as other Chymical Oyls do the parts external when rub'd, but being diluted as it usually is, I question whether it does any more good than hot Tea, hot Broth, or any thing else that is actually hot; for I believe that actual and potential Heats are much of the same operation, for I have often found, that in a fainting, or weariness, a hot supping has refresh'd me as much as a glass of Wine.

It has been generally thought to be an Antihypnotick or Hinderer of Sleep, which I dare not gainsay; Dr. *willis* and other learned Men having declared it so, but now it is come into frequent use, the contrary is often observ'd, although perhaps Custom as it does with *Opium* alters its natural Qualities. Could I meet with a satisfactory Theory of Sleep, perhaps at this I might give some better guesses.

As to the Political uses of Coffee, I am told, that our three Kingdoms spend about one hundred Tun a Year, whereof *England* spends about seventy Tun, which at fourteen Pounds a Tun (a middle price now a Days) will amount to 20586 Pound sterling, and if it were to be all sold in Coffee-houses, it would reach treble 61740 Pounds, which at ten Pounds a Head will find employments for 6174 Persons, although I be-

believe all the People of *England* one with another do not spend five Pounds each.

Coffee when roasted loses about a fourth part ; then there is spent about fifty two Tun and a half of roasted Coffee, which makes 117600 Pound or 1881600 Ounces or 15252800 Drachms, which if there be Eight Millions of People, it is not two Drachms or half a pint of Coffee a piece for a Year. How little is this Trade when thus considered, and how greatly may it be improved, although we spend as many Tuns in half a Year, as it has been Years with us. Besides what we use, we send a great deal abroad, and I doubt not but in short time the gain of what we send abroad will pay the first cost of all we shall spend at home, and I believe one of the best ways to make advantage of Foreign Trade is to use such Wares much at home, and that will teach all we trade with to follow our Example ; it does thus in Silks, Calicoes, Pepper, Tobacco, and several other things.

Furthermore Coffee has greatly increased the Trade of Tobacco and Pipes, Earthen dishes, Tin wares, News-Papers, Coals, Candles, Sugar, Tea, Chocolate and what not ? Coffee-house makes all sorts of People sociable, they improve Arts, and Merchandize, and all other Knowledge ; and a worthy member of this Society (now departed) has thought that Coffee-houses have improved useful knowledge very much.

June 14th 1699.

III. *A Letter from Mr. John Friend to Dr. Sloane, dated Oxon. Jul. 26. concerning an Hydrocephalus.*

Sir;

THE encouragement you give to Enquiries of this Nature, by communicating your own Observations, as well as recommending those of others, makes me trouble you with the following account: Having had the good luck to meet with an *Hydrocephalus* which seem'd to have somewhat extraordinary in it, I thought it might not be improper to acquaint you with it. I shall only set down the particulars, as they offer'd themselves in Dissection, and leave it to your Judgment, whether they deserve to be taken notice of or no.

The outward Dimensions, taken before the Head was open'd.

	Inches
From the Eyebrows over the Crown to the Nape	23
Circumference from the	
Nape round.	26
the <i>Ossa Bregmatis</i>	
the <i>Os Frontis</i>	24
From Ear to Ear, over the Crown	19
From the Eyebrows to the Chin	4
From one extremity of the Eyebrows	4 and half.
to the other.	
From the Chin to the coronal Suture	7 and half.
Circumference from the Chin round the Crown.	30
From one extremity of the	
Ear backward to the other	12
round the Nose	
round the Nape	6 & half
From Temple to Temple over the Fore-head	11
Circumference of the Head round the <i>Os</i>	
<i>Frontis & Occipitis</i>	29
	Cir-

Circumference	} of the Neck	9 and half	
Length		2	
Length of the Body		33	
Circumference of the Thorax		18	
Length of the Foot		4 and half	
From the middle Fingers end to the Acromion		12 and half	
Circumference of the	} Arm	5	
		Calf	5 and half
		Thigh	8

After the integuments were remov'd the top of the *Cranium* appear'd soft & *Membranous*. The extent of the *Membran* from one Temple to the other was 8 Inches, between the parietal bones 3 and half, from the *Os frontis* to the *Os Occipitis* 12. In the middle just upon the Crown lay a Bone (in some places a little Cartilaginous) 5 inches long, and 1 broad, join'd to the *Membran* on every side, of the same thickness with the rest of the upper part of the *Cranium* that was bony, which was extremely thin every where, and the *Lamina* lay so close that in many places no diploe could be discern'd. The *Membran* was as thin as the *Pericranium* which yet was easily divided from it.

None of the Sutures were entirely clos'd, those of the upper Jaw very loose. In the Temporal and Lambdoidal was an infinite number of the *Triquetra Wormiana*, all which had so many distinct Sutures.

Upon piercing the *Dura Mater*, a great quantity of Water flow'd out; it lay as well between the *Dura Mater* and the *Pia*, as in the Ventricles of the Brain. The Liquor was thin, pale, and insipid, there was taken out Five Quarts of it.

The *Dura Mater* was firm and entire, of its usual thickness, and stuck very close as well to the Membranous as to the bony parts of the *Cranium*. All its Processes and Sinus's were singular, the 4th sinus somewhat

ger than ordinary. A very large Vein of the *Dura Mater* enter'd the Longitudinal *Sinus*, directly forwards towards the *Crista Galli*, contrary to the Course of the Blood.

The *Pia Mater* was very much distended, and seem'd to be stretch'd as much as it cou'd bear. It lay smooth and equal upon the Surface of the Brain, there being neither any Circumvolutions in the Brain for it to go between, nor any Partition to the *Corpus Callosum*, tho' there was a large Falx in the *Dura Mater*. The lateral Ventricles were very thin: Towards the *Cerebellum* their upper part was quite wasted, so that nothing was left to cover the Cavity in that place, but the *Pia Mater*. This was so thin, that in stooping down the Head to empty the Water, it broke and hindred us from knowing exactly how much Water the Lateral Ventricles contain'd; but by their Cavity, which was very large, one might guess they held at least a Pint each: The 3d. and 4th. Ventricle had some little Water in them, but were scarce larger than usual, as *Steno* hath observ'd in his *Hydrocephalous* Calf.

The Brain had all its Parts plain and intire, tho' its Substance in most places was but very thin and loose: About the *Corpora Striata & Thalami nervorum Opticorum* it was tolerably thick, and firm enough, tho' nothing to what it is in a natural State.

The *Cerebrum & Cerebellum*, when laid out in their right Position were 11 Inches long; the *Cerebrum*, cross the lateral Ventricles, 9 broad. After all the Water was taken out, both of them weigh'd, *lib. 1 ff.*

The *Corpora Striata & Thalami Nervorum Opticorum* were very small in all their Dimensions; within side toward the Ventricles they were wrinkled and lay in folds, like those in the inner Coat of the Stomach. In the *Corpora Striata* there were no *Striae* discernible.

The

The *Plexus Choroides* was very small. The *Glandula Pinealis* was somewhat bigger, but less compact than ordinary.

The Nates were very red and large ; 2 Inches long, 1 broad, and 1 thick : The Testes were not distinguish'd from them by any Protuberance ; they seem'd rather to be a Production, into which the Nates lessen'd by degrees like a Sugar-loaf.

The *Cerebellum* was very firm every where, and did not much exceed its natural Bulk. The Medullary Trunk which sends out those little Branches, like Trees, was thicker and harder than usual ; the Branches were not so much dispos'd, like those of a Tree, but went rather in single oblique Lines, like so many Rays drawn from a Point.

The Nerves were all regular and plain ; only the Olfactory were very small, the Optick did not joyn before they enter'd the Orbits.

The *Rete Mirabile* was very large, so was Dr. Ridley's Circular Sinus.

On the right side were two Carotid Arteries (the intercostal Nerve lay between them) they enter'd the Skull at the same hole. The Trunk of the Vertebral (where those Arteries unite) was extremely big and full of Blood. The Veins were neither larger, nor more than usual. Upon the Brain over the Lateral Ventricles, I could easily discern three or four Lymphaticks ; but they were too small to be trac'd. Whether this great Effusion of Water was caus'd by an Obstruction in the Capillary Arteries, (which might make the finer part of the *serum* ooze thro' their Coats) or by a Rupture in the Lymphaticks, must be determin'd by those of a better Judgment, at least of a stronger Conjecture.

The Mother brought the Child to *Oxford* for a Sight, the Account she gave of it was, that she was in Travel three Weeks, and that at last she was forc'd to have the

Vagina rip'd for its Passage. The Child was two Years and six Weeks old, it cou'd speak a little, cou'd not go, or hold up its Head; 'twas always Merry, never subject to Drowfiness, Pain in the Head, want of Appetite, or Indigestion. Its Sight was somewhat Dim, and its Smelling but dull. It never had any Illness, only two or three Days before it Dy'd, 'twas very much troubled with the Gripes, and upon opening the *Abdomen*, the Guts were found extremely swell'd with Wind. Every thing else in both the lower Cavities was as it shou'd be.

By comparing those two Hydrocephali, which *Tulpius* gives an Account of; we may see how different each of them is from this. For his first was a Boy five Years old, the Skull no bigger than a Man's, and only five Pints of Water in it; the Brain had lost all its Shape, and most of its Substance, the Relicks of which stuck to the Skull. He says nothing more of the latter, than that it had a Quart of Water in one of the Lateral Ventricles.

Honoured Sir,

Your very humble Servant,

John Freind.

IV. *Some Observations of the Mercury's Altitude, with the Changes of the Weather at Emüy in China. Lat. 24° 20'. N°*

By Mr. *James Cunningham.*

October 1698.

From the 1st. to the 8th. fair and clear Weather, the Mercury's Altitude, $29\frac{14}{20}$ Digit.

From the 8th. to the 11th. close and cloudy Weather, the Mercury falling to $29\frac{12}{20}$ Digit.

11th. Close Weather, somewhat cloudy.

12th. Close Weather blowing fresh at *North-east*.

13th. and 14th. close and cloudy Weather, with much Rain, and fresh Winds from *North-east* to *North-west*.

The Tide, (which commonly flows 3 Fathoms) did flow above half a Foot higher 3 Days after the full Moon, then it did on the full Moon at the Equinox.

15th. Fair and clear Weather, with small Gales at *North-east*.

From the 15th. to the 24th. fine moderate fair Weather, with small Gales about *North-east*, and to the 31th. Winds and Weather variable.

November the 1st. to the 15th. variable, close and cloudy Weather, with some Rain, and variable Gales round the Compass.

♂ 15th. Fair and clear Weather, with small Gales at *North-east*, in the Morning the Mercury's Altitude $29\frac{12}{20}$ Digit, at Noon $29\frac{14}{20}$; and at ten of the Night, being cold, rising to $29\frac{16}{20}$.

♄. 16th. At Sun-rising very cold, the Mercury's Altitude $29\frac{18}{20}$. At Noon fair and pleasant Weather, the Mercury falling to $29\frac{17}{20}$. At Night cold, rising to $29\frac{18}{20}$. The Wind at *North-east*.

♃. 17th. This Morning cold, the Mercury at $29\frac{18}{20}$, fair and clear Weather all Day, and at Night blowing somewhat fresh at *North-east*, the Mercury at $29\frac{17}{20}$.

♀. 18th. This Morning cold, the Mercury at $29\frac{17}{20}$. All Day fair and pleasant Weather, the Mercury falling to $29\frac{14}{20}$, and by Noon to $29\frac{12}{20}$. The Weather fair, somewhat close and cloudy; the Afternoon Sun-shining and Warm, and at Night temperate, the Mercury continuing at $29\frac{12}{20}$. Small Winds at *North east*, and almost Calm.

♁. 20th. A pleasant Sun shining Morning, the Mercury at $29\frac{12}{20}$. At Noon overcast, and cloudy, with little Wind at *North-east*, the Mercury falling to $29\frac{10}{20}$. In the Afternoon some drops of Rain, with close Weather, and at Night the Mercury continuing at $29\frac{10}{20}$, with small Westerly Winds. Some Rain in the Night.

♃. 21st. Close and cloudy Weather, with small Gales at *North-east*, the Mercury at $29\frac{20}{20}$ in the Morning, and continued so all day, with some drops of Rain in the Afternoon, the Gale freshning, and a shower of Rain at 8 of the Night, the Mercury rising to $29\frac{22}{20}$.

♁. 22d. Gray and cloudy Weather all Day, with fresh Gales between *East* and *North-east*. the Mercury at $29\frac{12}{20}$, and at Night rising to $29\frac{17}{20}$. Fair Weather, somewhat Cloudy.

♀. 23d. A very cold Morning, fair and clear, with fresh Gales from *North-east* to *North*, the Mercury at 30 Digit. Fair and clear all Day, with a moderate Gale about *North east*: Clear and very cold all Night, the Mercury continuing at 30 Digit.

♄. 24th.

4. 24th. A fair, clear, and cold Morning, the Wind at *North-east*, a moderate Gale, the Mercury continuing at 30 Digit. A clear Sun-shining Day, cold and clear all Night, the Mercury as before.

5. 25th. A sharp cold Morning, fair and clear, with a moderate Gale at *North west*, the Mercury fallen to 29. All Day fair and pleasant, very warm, and no Wind, the Mercury falling at Noon to $29\frac{15}{20}$, and at Night being somewhat Hazy and Calm withal, to $29\frac{14}{20}$.

6. 26th. temperate Weather all Night, and this Morning somewhat close and hazy, and no Wind, the Mercury at $29\frac{14}{20}$, and towards Noon growing clearer and warmer, rising to $29\frac{16}{20}$. Small Brizes at *North-east*, at Night falling to $29\frac{14}{20}$, temperate Weather.

7. 27th. Fine pleasant Weather all Day, with small variable Brizes from the *North* to *west*. and about to *South*, the Mercury in the Morning at $29\frac{14}{20}$, and at Noon falling to $29\frac{12}{20}$, and at Night rising to $29\frac{14}{20}$. Fair Weather and Calm.

8. 28th. Fine moderate Weather, with a Gale at *North east*, the Mercury at $29\frac{14}{20}$. In the Afternoon the Gale fresh'd, the Weather somewhat Cloudy, and at Night the Mercury was at $29\frac{15}{20}$, blowing fresh.

9. 29th. Fair and clear Weather, somewhat cold this Morning, with a fresh Gale at *North-east*; the Mercury at $29\frac{18}{20}$. Fine pleasant Weather all Day, with small Gales at *North-east*, at Noon the Mercury falling to $29\frac{15}{20}$, and at Night being clear and somewhat cold, rising to $29\frac{17}{20}$.

10. 30th. Fair and pleasant Weather, with small Gales at *N. E.* the Mercury at $29\frac{17}{20}$. At Noon a fresh Gale, the Mercury falling to $29\frac{14}{20}$. At Night temperate Weather, and little Wind, the Mercury rising to $29\frac{16}{20}$.

D E C E M B E R.

2. 1st. Fine temperate Weather, with small Gales at *North-east*, the Mercury at $29\frac{16}{30}$ in the Morning. Fair Weather all Day, and small Brizes at *North-east*, the Mercury at Noon falling to $29\frac{14}{30}$, and in the Evening to $29\frac{12}{30}$, and at Night rising to $29\frac{14}{30}$, being fine clear Weather.

♀. 2^d. Fair and temperate Weather, somewhat Cloudy, and overcast with small Gales at *North-east*, the Mercury at $29\frac{14}{30}$, and at Night rising to $29\frac{16}{30}$.

♂. 3^d. A clear and cold Morning, with a fine sharp Gale at *North*, and by *East*, the Mercury at $29\frac{17}{30}$. A cold Air all Day, the Mercury at Noon falling to $29\frac{15}{30}$, and at Night the Gale freshning made it colder, the Mercury rising to $29\frac{18}{30}$.

♂. 4th. A sharp Morning with a fresh Gale at *North* and by *East*, the Mercury at $29\frac{19}{30}$. Fair and clear all Day, with a small *Northerly* Gale, the Mercury by Noon falling to $29\frac{17}{30}$. A serene temperate Night, and almost Calm, the Mercury as before.

♀. 5th. A fine clear Morning, with a moderate Gale at *South-west*, somewhat cold, the Mercury at $29\frac{17}{30}$. At Noon a small Brize at *East* by *South*, pleasant Weather, the Mercury at $29\frac{15}{30}$. At Night a small Gale at *South* by *East*, fair and temperate Weather, somewhat hazy, the Mercury at $29\frac{13}{30}$.

♂. 6th. This Morning somewhat close and Cloudy, with a few drops of Rain, the Weather temperate, with small *Southerly* Brizes, the Mercury at $29\frac{13}{30}$. The Afternoon Calm, and somewhat Hazy, the Mercury falling to $29\frac{10}{30}$. At Night overcast and Cloudy, with some Rain, blowing fresh at *North*, the Mercury rising to $29\frac{14}{30}$.

♀. 7th. A gray Morning, clearing up with a fresh Gale at *North-east*, the Mercury at $29\frac{17}{20}$. In the Afternoon the Horizon a little Hazy, the Mercury falling to $29\frac{15}{20}$. At Night clearer, with a fresher Gale, the Mercury rising to $29\frac{18}{20}$. A very cold Night.

4. 8th. A sharp clear Morning, with a fine Gale at *North-east*, the Mercury at 30 Digit. At Noon falling to $29\frac{18}{20}$, a fine Sun-shining Day. At Night cold and clear, a small Gale at *North-east*, the Mercury rising to 30 Digit.

♀. 9th. This Morning as the last, all Day and Night the same, and the Mercury also.

h. 10th. A cold Morning, somewhat Foggy, with a fine Gale at *North-east*, the Mercury at 30 Digit, all Day Fair, Clear and Sun shining. At Night cold, the Mercury at $29\frac{18}{20}$.

©. 11th. A cold Morning, with a moderate Gale at *North-west*, the Mercury at $29\frac{18}{20}$. All Day fair and clear, the Mercury falling to $29\frac{16}{20}$. At Night a fresh Gale at *North-east*, the Mercury at $29\frac{18}{20}$.

∅. 12th. A gray cold Morning, somewhat Cloudy, with a hazy Horizon, a fresh Gale at *North-east*, and the Mercury at $29\frac{19}{20}$, towards Noon falling to $29\frac{17}{20}$, with little Wind, and fair Weather; at Night calm and somewhat cold, the Mercury rising to $29\frac{18}{20}$.

♂. 13th. A fine pleasant Morning, with a small Brize at *North-west*, the Mercury at $29\frac{18}{20}$. At Noon a small Gale at *North-east*, and in the Afternoon Calm, the Mercury falling to $29\frac{15}{20}$. All day Serene, at Night Calm, with a clear Sky, somewhat cold, the Mercury rising to $29\frac{15}{20}$.

♀. 14th. A fine temperate Morning, with some small Rain like Dew, and a moderate Gale at *South west*, the Mercury at $29\frac{15}{20}$. The Afternoon a little overcast, and the Horizon somewhat Hazy, a small Gale at *South-east*, the Mercury falling to $29\frac{12}{20}$. At Night Temperate and Calm the Mercury rising to $29\frac{14}{20}$.

4. 15th. A fine temperate calm Morning, the Mercury at $29\frac{15}{20}$. At Noon fair, pleasant, calm Weather, the Mercury fallen to $29\frac{12}{20}$. All the Afternoon, and at Night a fresh Gale at *North-east* fair Weather, the Mercury rising to $29\frac{15}{20}$.

5. 16th. A gray cloudy Morning, somewhat Hazy, with a fresh Gale at *North-east*, the Mercury at $29\frac{17}{20}$. At Noon fair and clear, the Gale moderate, and the Mercury falling almost to $29\frac{14}{20}$. The Afternoon somewhat Cloudy with a fine Gale at *North East*; At Night a little Wind, serene and sharp, the Mercury rising to $29\frac{18}{20}$.

6. 17th. A Gray Morning somewhat cold with a fine Gale at *North East*, the Mercury at $29\frac{17}{20}$, and at Noon falling to $29\frac{15}{20}$. At Night little Wind, the Mercury rising to $29\frac{16}{20}$.

7. 18th. A fair temperate calm Morning somewhat foggy, the Mercury at $29\frac{17}{20}$. All Day fair Weather somewhat Cloudy with small Winds at *North East*, the Mercury falling to $29\frac{15}{20}$. At Night blowing fresh, the Mercury rising to $29\frac{18}{20}$.

8. 19. A Gray cloudy Morning with a fresh Gale at *North East*, the Mercury at $29\frac{18}{20}$. Close Thick Weather, with continual Rain all Day and Night, and a moderate Gale at *North East*; at Night the Mercury rising to $29\frac{19}{20}$.

9. 20th. Close thick Rainy Weather, the Morning with a moderate Gale at *North East*, the Mercury falling below $29\frac{18}{20}$. And by Noon to $29\frac{16}{20}$, continual thick rainy Weather all Day and Night, the Mercury at $29\frac{16}{20}$, and the Gale as before.

10. 21st. A gray cloudy Morning but fair and beginning to clear up and Calm withal, the Mercury at $29\frac{15}{20}$, at Noon fair Weather, and somewhat clear, with a small Gale at *South-west*, the Mercury falling to $29\frac{15}{20}$. At Night calm and somewhat cloudy, the Mercury at $29\frac{14}{20}$.

7. 22d. A gray cloudy Morning continuing so all Day with a small Gale at *North-East*, the Mercury at $29\frac{14}{30}$, at Night rising to $29\frac{15}{30}$.

8. 23d. A gray cloudy Morning, continuing so all Day, with small Gales at *North-East*, the Mercury at $29\frac{14}{30}$, at Night more serene the Mercury rising to $29\frac{15}{30}$.

h. 24th. A gray Morning and calm Weather, the Mercury at $29\frac{15}{30}$, close and cloudy Weather all Day and no Wind, the Mercury falling to $29\frac{14}{30}$. At Night rising almost to $29\frac{15}{30}$.

©. 25th. A gray cloudy Morning, (some Rain before Day light) with small *southerly* Brizes, the Mercury at $29\frac{14}{30}$. Towards Sun-shining and pleasant, little Wind variable, the Mercury falling to $29\frac{12}{30}$. The Afternoon and at Night overcast and cloudy, the Wind at *South by East*, and the Mercury rising to $29\frac{13}{30}$.

δ. 27th. A fine pleasant Morning, with a hazy Horizon, and altogether calm, the Mercury at $29\frac{13}{30}$, and by Noon at $29\frac{11}{30}$. All Day pleasant Weather, and at Night small Gales at *North-East* the Mercury rising to $29\frac{12}{30}$.

γ. 28th. A fine pleasant Morning with a small Brize at East North East, the Horizon somewhat hazy and the Mercury at $29\frac{11}{30}$. at Noon falling to $29\frac{10}{30}$. All Day fair and pleasant Weather with the foresaid Brize. At Night calm, the Mercury falling almost to 29.

δ. 29th. A gray Morning, with a close Horizon, and a small Brize about East-North-East, the Mercury at $29\frac{2}{30}$. Calm all the Forenoon, in the Afternoon pleasant Weather, with a small Gale of South-East, the Mercury at $29\frac{6}{30}$. At Night calm, the Mercury at $29\frac{7}{30}$.

κ. 30th. A gray cloudy Morning, and close Weather, with a fresh Gale at South-East, the Mercury at $29\frac{10}{30}$.

All Day cloudy and dark, the Gale freshning and veering to *East-North-East*, the Mercury rising to $29\frac{11}{10}$.

h. 31st. Gray cloudy Weather all Day, with a fresh Gale at *North-East*; in the Evening some Rain blowing fresh all Night.

JANUARY.

o. 1st. Variable Weather with small Gales at *North-East*.

c. 2d. Rainy thick Weather all Day and Night with little Wind at *North-East*.

δ. 3d. Continual thick rainy Weather all Day and Night, the Wind at *North-East*.

ε. 4th. Fair Weather somewhat close, and calm all Day and Night.

4. 5th. Close Weather with some Rain and Calm this Forenoon; and in the Afternoon a small Brize at *west-North-west*. Departed from Emijy.

V. *Part of a Letter from Dr. David Gregory, to Dr. Sloane, dated Oxford, October 12. 1699. containing his observations of the Eclipse of the Sun on the 13th of September last.*

I Send you a Scheme of the Phases of the late Eclipse of the Sun, (*see the Table*) as I observ'd them. I did not see the beginning of it: But the end happened here, precisely Twenty four Minutes and Nine seconds after Ten a Clock in the Morning, apparent Time, and all the Times marked in the Figure are such: The greatest Observation, which was Ten Digits and a Quarter, was about Seven Minutes after

ter Nine. The Scheme shews the rest of the Phases.

Of the Origin of white Vitriol and the Figure of its Crystals, not yet accounted for, by Dr. Martin Lister, F. R. S.

Amongst the *Desiderata*, relating to *Fossil Salts*, the Origin that I know of *white Vitriol* is obscure, and its Crystals undescribed.

All I can find of this matter is out of *Borrichius de Docimaestice metallica*, that it is produced from a certain Lead Ore, boiled raw. (*Plumbi nigri vena vitriolum album producit, etiam non cremata*) none, that I know of, of our English Lead Ores gives us any suspicion of any such Vitriol. It is true, I have by me some Sorts of *white Lead Ore Spar-like*, plentifully yielding Lead: But I cannot say that either those or any coloured Lead Ores, did give me any reason to suspect, after diverse experiments upon them, that yielded white Vitriol.

As to the Crystals of white Vitriol, they are very difficult to describe, and seem to me to be a congeries of infinite small Needles, for which reason it is of a most speedy Operation, and irritates the Stomach suddenly, before they can be well dissolved or broken.

I recommend the inquiry of both these particulars concerning white Vitriol, to the Industry and Diligence of the Curious.

*A Letter Communicated from Mr. Thoresby F. R. S.
to John Evelyn Esquire, concerning the Cures
done by Mr. Greatrix the Stroke.*

SIR,

AS to Mr. *Greatrix's* Cures, because I was not willing to trust too much to my own Memory at that distance of Time (it being near 20 Years since I saw him stroke any) I have not writ of any, but such as I have still some Friends living who were Eye-witnesses as well as my self, with whom I have compared Notes Yesterday, and give you nothing but what they think exactly true. The first I shall mention was my own Brother *John D--n*, which both my Sister and my self remember to have been seized with a violent Pain in his Head and Back, when about 14 Years of Age, one of my Sisters at that time had the Small Pox, and my Mother judging that he was taken with the same Distemper, used no means to remove it, till by accident Mr. *Greatrix* coming to our House, and hearing of his Illness, desired to see him, he ordered the Boy to strip him to his Shirt, which he did, and having given present Ease to his Head by only stroking it with his Hands, he fell to rub his Back, which he most complained of, but the Pain immediately fled from his Hand to his right Thigh, he followed it there, it fell to his Knee, from thence to his Leg, but he still pursued it to his Ankle, thence to his Foot, and at last to his great Toe, as it fell lower, it grew more violent, especially when in his big Toe it made him roar out, but upon rubbing it there it vanished, and the Boy cried out, 'Tis quite gone. It never troubled him after, but he took the Small Pox
above

above 3 Weeks after. The next Instance was Mrs. D-- who was my Uncle P-----s Daughter, she was seiz'd when a Girl, with a great Pain and Weakness, in her Knees, which occasioned a white Swelling; this followed her for several Years, and having used diverse means to no effect, after 6 or 7 Years time, Mr. *Greatrix* coming to *Dublin*, and lodging at my Fathers, my Aunt (who is still living and well remembers it) brought her to him, where he stroked both her Knees, the Pain flying downwards from his Hand, it drove it out of her Toes, he gave her present Ease, and the swelling in a short Time wore away and never troubled her after. I had also a Comerade one Mrs. L---e who after a Feaver was much troubled with a Pain in her Ears, and very Deaf, she came to Mr. *Greatrix*, when at my Fathers, I remember he put some of his Spittle into her Ears, and turning his Finger in her Ears rubbed and chafed them well, which cured her both of the Pain and Deafness, Mrs. H---y my opposite Neighbour told me Yesterday, that her Uncle Mr. *Charles L---n*, who was Secretary to the Commissioners, was cured by him of the same Malady, having much lost his hearing by some accident, till Mr. *Greatrix* by stroking restored it. Mr. H---s Daughter in law Mrs. S---n told me her self, that she was, when a Child, extreamly troubled with the Kings Evil, her Mother sent her to be strok'd in King *Charles* the 2ds Time to *London*, but she was nothing the better, but Mr. *Greatrix* perfectly cured her. A Smith whose Name was *Pierson* near us had two Daughters extreamly troubled with the Evil, the one in her Thigh, the other in her Arm, he cured them both at my Fathers, one of them lives still in Town, I was with her Yesterday, she is a healthy Woman, the Mother of several Children, she shewed me her Arm, where the scars the Evil-fore left still remain, 3 in one Arm, though

'tis 20 Years since they were cured, since when she never had any symptoms of it.

I could add many things of this Nature, both of what I have seen and heard from my *Mother*, who was much more with him than my self, but wanting room shall only tell you, that where he stroked for Pains, he used nothing but his dry Hand, if Ulcers or running Sores he would use Spittle on his Hand or Finger, and for the Evil if they came to him before it was broke, he stroked it, and ordered them to poulters it with boild Turneps, and so did every Day till it grew fit for lancing, he then lanc'd it and with his Fingers would squeeze out the Cores and Corruption, and then in a few Days it would be well with his only stroking it every *Morning*, thus he cured many who keep well to this Day, but if it were broke before he saw them, he only squeezed out the Core, and healed it by stroking; such as were troubled with Fits of the Mother, he would presently take off the Fit, by only laying his Glove on their Head, but I never knew any that he cured of that Distemper, for their Fits would return, but I have heard he cured many of the falling Sickness, if they stay'd with him, so that he might see them in 3 or 4 Fits, else he could not cure them, I have been too tedious, and therefore shall not add, but that I am.

Sir,

Dublin May 2d. 1699.

Your humble Servant,

M. M.

Geo-

I.

An account of Books, Geography Anatomiz'd, or the Compleat Geographical Grammar. Being a short and exact Analysis of the whole Body of Modern Geography, after a new and curious Method. The Second Edition, much improv'd and enlarged. By Pat. Gordon. M. A. F. R. S.

THE principal Design of this excellent Treatise, is (in the Words of its Ingenious Author) *To present the younger sort of our Nobility and Gentry with a Compendious, Pleasant, and Methodical Tract of MODERN GEOGRAPHY, that most useful Science which highly deserves their Regard in a peculiar manner.* It consists of two Parts, whereof the first gives a *General*, and the second a *particular View* of the *Terraqueous Globe*.

In the *General View*, the Author has (1.) Illustrated, by way of Definition, Description, or Derivation, such *Terms* as are necessary for a right Understanding of the Globe, adding Analytical Tables of the following Treatise. (2.) He hath given in such pleasant *Problems*, as are performable by it, and the manner of their Performance. (3.) He hath subjoyn'd divers plain Geographical *Theorems*, clearly deducible from the foregoing Problems. (4.) He has advanc'd some *Paradoxical Propositions* in Matters of Geography, yet equally certain with the Theorems. Lastly, He has taken a Transient Survey of the whole Surface of the Earth, as it consists of *Land* and *Water*. Next in the *particular View* he

has given the Maps, and a clear Prospect of all remarkable Countries, and their Inhabitants, particularly as to their.

1. *Situation*, both for Latitude and Longitude, for the more readily knowing them.

2. *Extent*, or true Dimension in *English Miles*, from *East to West*, and from *South to North*.

3. *Division*, into the more general Parts, and how such Parts are readily found.

4. *Sub-division*, into particular Provinces, how these are most readily found.

5. Chief Towns, giving their modern Names, and how those Towns are most readily found.

6. *Names*, as called by the Ancients, or by some more Modern, with the Etymology of the *English Name*.

7. *Air*, as to its Temperature, as also the *Antipodes* of that part of the Globe.

8. *Soil*, and proper Climat of the Country; its natural Product, and the length of the Days and Nights.

9. *Commodities*, there produced.

10. Rarities, either of Nature, or of Art, especially Monuments of Antiquity.

11. *Arch-bishopricks*, their Number and Names.

12. *Bishopricks*, their Number and Names.

13. *Universities*, their Number and Names.

14. *Manners*, that is, the natural *Genius* and Temper of the People, and their most noted Customs.

15. *Language*, its Composition and Propriety, and in many the *Pater Noster* as a *Specimen* thereof.

16. *Government*, its Nature or Constitution, and the publick Courts of Judicature.

17. *Arms*, how Blazoned, and the proper *Mottos*.

18. *Religion*, the chief Tenets thereof, and when, and by whom Christianity was planted, if at all.

To these two Parts is annex'd an *Appendix*, comprehending the *European Plantations*, and *Factories* in *Asia*, *Africa*

frica, and America; as also some reasonable Proposals concerning the Propagation of the blessed Gospel in all Pagan Countries.

I I.

The Celestial World Discover'd, or Conjectures concerning the Inhabitants, Plants, and Productions of the Worlds in the Planets. *Written in Latin by Christianus Huygens, and Inscribed to his Brother Constantine Huygens, late Secretary to His Majesty King William. in 8vo. with 5 Copper Cuts of Illustration.*

THE Ingenious Author of this Discourse, having spent much Time, and taken great Pains in making Celestial Observations and Discoveries by Telescopes of the largest Sizes, and other Instruments, and having moreover acquainted himself with the latest and best Observations and Discoveries made by other Modern Astronomers; and having well weighed and considered the Import and Significancy of them, comes in this Book to acquaint his Brother the Heer *Constantine Huygens*, (who was also a great lover of these Inquiries, and who was the Person that furnisht him with the excellent Telescopes he made use of, Wrought with his own Hand, wherein he had for his Diversion acquired an extraordinary Art and Dexterity, unknown to any besides himself) and by the Publication of it, if he thought fit, likewise to acquaint the Learned World, what upon the Result of all, his Opinion and Belief was con-

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cer-

cerning the Form, Structure, and Fabrick of the Universe, or the whole visible World, and the Reasons and Arguments that induced him thereunto, which he hopes may seem reasonable enough to Men Skilled in Geometrical, and Astronomical Sciences; such as he wishes his Readers may be. But because he was well aware that many of them might be Persons of differing Qualifications, and such as could not, or would not understand the Cogency of them, or from Prepossession would endeavour to Carp at, and make Arguments against the whole Doctrine there delivered, therefore he endeavours to Enumerate and Obviate such as are most likely to be produced for that end: The first of which he conceives, may be of such as are ignorant of Mathematical Knowledge, who will be apt to represent it as a Whimsy only of a disturbed Brain, they thinking it impossible to measure, or any wise to be ascertain'd of the Magnitudes and Distances of the Celestial Bodies, and as to the Earth's Motions they look on them as Fictions, and not capable of being proved: To such he answers, that he does not assert those things as absolutely demonstrated, but rather as probable Conjectures, and that he leaves every one free to judge of them as they please. And to such as may think them useless, since they are only Conjectural, he answers, upon the same account, all other Physical Knowledge may be rejected, since that also for the most part is but Conjectural; and yet we know the Studies of those things are very commendable, and afford great Pleasure, Satisfaction, and Benefit, even to such as think them Contradictory to Holy Writ, to suppose other Worlds, or Animals then those of the Earth; because such are not mention'd in the History of the Creation. He thinks there has been enough said to shew that the Description of the Creation in the Bible, was only with Relation to the Earth, and not at all with Respect to the other Parts of the World, then what were here
visi-

visible; nor can it be Detrimental to Religion, but will, be rather, as he conceives, a means to make Men have a lesser Esteem of these Earthly Things, since they are but small, with Respect to the other World, and to have a greater Veneration and Adoration of that wonderful Wisdom and Providence which is universally displayed through the whole Fabrick of the Universe. As to the Form and Disposition of the Whole, and of the Parts of this Universe, he agrees with the System of *Copernicus*; for the better Explication of which he hath added two Figures, the first of which shews their Order and Positions, and the second their Comparative Magnitudes. And because by reason of the smallness of these Figures, the true Proportions could not be sufficiently express'd, he has added a particular Explication, expressing in Numbers the Distances of their Orbs from the Sun in the Center, and the Times of their Periods in them: Next of their particular Magnitudes, and so of their Proportions to each other, and to the Body of the Sun. And since it hereby appears that the Earth is moved about the Sun, as well as the other Planets, (which all the best of the Modern Astronomers do now believe, and none but such as are of a more dull Apprehension, or are otherwise over-powered by their Superiors, do deny, or make any scruple positively to assert) and that those Planets are Enlight'ned by the Sun in the same manner as the Earth is, and some of them as h and z have their own Moons, or Secondary Planets moving about them, sometimes Eclipsing them, and Eclipsed by them as the Earth also is by its Moon, and that some of them are much bigger, as well as some others smaller than the Earth; and so that the Magnitudes are not proportion'd, either according to their Order or their Distance; since also they are observed to have the same kinds of Motion, both Annual and Diurnal, therefore he thinks it very probable that they do resemble the Earth also in other Qualifications; for that

we have no Argument to the contrary why they should not, nor is this way of Reasoning from the Agreement in some to alike Agreement of other precarious, since 'tis the most usual Method of discovering the insensible Parts of the World by their Similitude to the more Sensible, as in Anatomy we judge of the Parts of a Creature, by the Similitude we find they have to the Parts of some other before known. From this Topic therefore he thinks we may safely conclude that the other Planets have solid Bodies, and Gravity towards their Centers, as the Earth hath since, we find them to have the same Figure, and the same Motions, and the same Concomitants, and that they have Atmospheres and Air, and Water, &c. And since it would be too great a Depreciating of them, and a too much Over-valuing of the Earth, to suppose them not to be likewise Adorned with the more admirable Productions and Fabricks of Plants, and Animals, which more evidently manifest the Wisdom and Design of the Divine Architect, which we find the Earth to be Enriched and Beautified with. But to suppose them only lifeless Lumps of Matter; as Earth, Water, &c. Or vast Deserts, barren Mountains, Rocks, &c. This he says would sink them too much below the Earth in Beauty and Dignity, which this Method of Reasoning will in no wise permit. He conceives therefore we must suppose, and believe them to have Animals as well as the Earth; and so of necessity Plants for their Nourishment. And these possibly not much different from those we have, both as to their outward Form, and as to their internal Structure, and as to their Method of Production, or Propagation, and their Increase or Growth. And that if there be any Difference, most probably it must arise from the differing Distances of those Globes from the Sun, which is more likely to affect the Matter than the Form. Wherefore though we cannot

not be ascertain'd what these Differences are, yet we may reasonably conclude, that they are Composed of Solids and Fluids; for that the Production and Nutrition of these Animals must be made by Fluids; and thence also that the Parts of them for Motion must be somewhat like those of Terrestrial Animals; whether Beasts, Fishes, Birds, or Insects; that is, they must have Legs, Finns, Wings, &c. Though not exactly the same with ours, since the Fluids may be more various, as to their Number, and as to their Density, and as to their Rarification and Conglaciation, some of these Globes being much further off, and somewhat nearer to the Sun, and its powerful Rays. And so the Fluids of \bar{h} and $\bar{4}$ may not be so apt to be Frozen, nor those of \bar{q} and \bar{q} to be Rarified into Vapours, neither of which would destroy the Form and Use of Water for the Vegetation of Plants.

And because though we should allow these Globes these Ornaments and Furniture, yet though we suppose them deprived of the principal Production and Master-piece of all, and for whose Use and Benefit all the rest seem to be made, we should too much Exalt and Over-value this Globe of the Earth, and too much Depreciate all the other. Therefore he thinks we must suppose them to have Rational Animals also, and that those have all those Senses, and other necessary Organs for Reasoning that Men have here, and that they do use them, and have procur'd thereby the same Advantages, and Improvement of that Faculty, that in the like Cases Men have done here upon the Earth. And since we find that Fire in many Cases is of great Use, he thinks that we must suppose it common to all the other Globes also. But to judge of the Magnitude, or exact Shape of those Animated Bodies in the other Planets, by the Magnitude of those Globes, he thinks we have no Medium

to direct us, since we find that Nature does not restrain it self to such Rules of Measure as might seem the best to us. But since the Principal Use of Reason, which he supposes to be the same as here seems to be for the Contemplation of the Works of the Creatour, and the Improvement of Arts and Sciences, he conceives that those Inhabitants do not only Contemplate and observe the Stars, but that they have also made an Astronomy, and Cultivated such Arts as conduce thereunto; as those of Geometry, Arithmetick, Opticks, &c. and that of Writing, by which they may Register their Observations to their Posterity. And thence he concludes they must have Hands and Legs, or such like Limbs, and an erect Face by which they may be enabled to perform such Actions as are necessary for those Purposes, and in general he thinks it probable that they may have many Arts and Sciences, the same with ours, though possibly not all, but yet others instead thereof, not less Valuable. Nor would they seem less Wonderful and Pleasant to us, could we be Transported thither by some powerful Genius, which since he despairs of, he endeavours in his second Book to give us his Judgment concerning the Phænomena of the Heavens, what they might appear to one of us supposed to be there in one of them, which he Finds on the Knowledge we now have of them, as to Magnitude, Distance, &c. And here, after he has Censured Father *Kircher's Iter Extaticum* (a Book Publish'd on the like Subject) he begins to tell what must be the Phænomena of the Sun, and Planets, seen in ☿, and next what the same must be seen in *Venus*, which since with a sixty Foot Telescope, and all his Diligence, he could never discover to have Spots, or differently illuminated Parts, as are visible in *Mars*, *Jupiter*, and *saturn*: He Conjectures that the Reflection of Light from it is made by the Atmosphere about it, and not by the Body it self. *Thirdly*, What they are in *Mars*, which he makes much

less

then *Venus*, or the Earth, tho' without a Moon, and further distant from the Sun. And *Fourthly*, What in *Jupiter* and *Saturn*, which so vastly exceed all the other three, both for their Magnitude, and for their Concomitants, *Jupiter* having 4, and *Saturn* 5, together with a Ring, whereas the Earth has but one, and the other 3 none at all. Upon Explaining the Phenomena of these, he more largely insists, and has therein Summ'd up all the latest and best Phenomena that have been observed concerning them, as to the 5 Moon's about τ , tho' he confesseth that he had not seen the 2 innermost of them, yet he Confides in the Observations of Monsieur *Cassini*, and suspects also that there may be more yet discovered, when the Glasses of 170, and 210 Foot made the most Accurate by his Brother, shall come to be used for that Purpose. But what to determin concerning the Furniture, or Nature of all these Moon's, though he thinks them to be much the same with that of our Moon, Yet as he conceives, being not sufficiently inform'd by Observation, that the Moon has the like Furniture as the Earth has, he is at a stand, and knows not well what to determin concerning them. He grants we can plainly discover that the Moon has Mountains and Valleys, and other Asperities as the Earth has; but as he conceives there are no Seas nor Rivers, for that he thinks it more probable that those Spots which others have supposed Seas, are only great Plains of a darker Colour, his Reason is, for that there are divers inequalities to be discovered in them the same as in other Parts of its Surface, and from thence he imagines there can be no Rivers, and consequently no Water, nor any Atmosphere, or Air. These are the Difficulties which perplex him, which if he could have removed, and that he could have been assured there had been Water, he could have allow'd it all the other Priviledges, and with *Xenophanes* have furnish'd it with Inhabitants, Cities, &c. But as he conceives of

t, he can neither allow it to have Animals, no, nor Plants. And yet at last he says, 'tis not improbable but that it may have Plants and Animals too, but they must have another sort of Nourishment. Now by this Censure of the Moon he has pass'd the same upon all the other Moons, to wit the Concomitants of μ and η , which he judges to be of the same Nature, and to expose the same part always towards their primary Planet, as the Moon does to the Earth, by a Phenomenon of one of the Moons of η , the Consideration of which Suggested to him that the Phenomena of the Heavens must be to their Inhabitants, if they could have any, and for all the rest gives an Instance of those of the Moon. Then he proceeds to consider the Sun and the fix'd Stars, promising the Magnificence of the Solar Systeme; this he does by Words, because Schemes he could not render 'em large enough to represent the proportionate Magnitudes of the Orbs to the Minuteness of the Plenary Bodies; for the Orb of *Saturn* would require an Area of 360 Foot in Diameter, and that of the Earth, one of 36 Foot to draw them proportionate to the Globes, for the Orb of the Earth is 12000 times the Diameter of the Earth's Ball. And consequently the distance of the Earth from the Sun will be above 17 Thousand, or 17 Millions of *German* Miles. To make the vastness of these Distances the more conceivable, he Computes them by the Times that a Cannon-bullet (suppos'd to pass a hundred Fathom in a second of Time) would spend in passing those Spaces, whence he concludes it would be 25 Years passing to the Sun from the Earth, 125 from μ , and 250 from η . Then he proceeds to consider the Body of the Sun, where he is *nonplus'd*, as about the Moon; for he is not satisfi'd whether it be a solid, or fluid Body, but he inclines to think it a Fluid. Next, he knows not what to think of Animals, or Vegetables in it, since there can be nothing like any thing we know, by reason
of

of the continual Fire and Heat which would consume all such as we have here. He thinks therefore it might be made for the Illuminating and Enlivening of the Parts of the other Planets. And as for the fix'd Stars he conceives them to be so many Suns, and to be dispers'd in the vast Expanse of Heaven at various Distances, and each of them to have a proper System, and Planets moved about them. And tho' it be impossible for us ever to see those Planets, by reason of their vast Distance, yet from the Analogy that is between the Sun and Stars, we may judge of the planetary Systems about them, and of the Planets themselves too, which probably are like the planetary Bodies about the Sun, (that is) that they have Planets and Animals, nay, and Rational ones too, as great Admirers and Observers of the Heavens as any on the Earth. This Represents to us a wonderful Scheme of the prodigious vastness of the Heavens; so that the distance between the Earth and the Sun, though of 17 Millions of *German Miles*, is almost nothing to the distance of a fix'd Star. And because of the Difficulty in making Observations for this Purpose, in the common Ways, he therefore proposes a new Method of his own for this Purpose, which he also explains, and by that one may the better conceive the vastness of the distance of one of the nearest, as for Instance from the Sun, which by this way he proves to be 27664 times the Distance of the Sun from the Earth; and to make this Distance yet more comprehensible, he makes use of the former Explication, by the time that a Cannon-bullet moved as swift, as hath been just now Explained. Wherefore multiplying 27664 by 25, he finds that a Cannon-bullet moving a hundred Fathom in a Second would be 700000 Years in its Journey betwixt us and the fix'd Stars; here by the way he makes some Reflections on *Des Cartes's Vortices*, and explains his own Sentiments concerning the Present State of the Universe, nor will

he trouble his *Mind* about their beginning, or how made, as knowing it to be out of the reach of human Knowledge or Conjecture.

Upon the whole *Matter* you will here find the Ingenious Author's Opinion concerning the Universe with all the Arguments for it drawn from the most accurate Observations that have been hitherto made that are Pertinent thereunto. The only Failure, seems to some to be in his Opinion concerning the *Moon* and Secondary Planets. Upon which Subject, there may perhaps be shortly Published a Brief Discourse of one who is of a somewhat differing Sentiment.

III. *Orang-Outang, sive Homo Sylvestris: Or the Anatomy of a Pygmie, compared with that of a Monkey, an Ape, and a Man. To which is added a Philological Essay concerning the Pygmies, the Cynocephali, the Satyrs and Sphinges of the Ancients, &c.* By Edward Tyson, M. D. Fellow of the Colledge of Physicians, and of the Royal Society, &c. London, in 4to. 1699.

THE Ingenious Author of this Treatise, having often obliged the World with his Anatomical Discoveries and Observations on several curious Subjects, of which there is a Catalogue at the end of this Tract, has here given us a very Ample, as well as Accurate Account of this strange, and indeed surprizing Animal, a Creature rarely, if ever seen by our World, at least in this Age, of which I shall give a short, and but imperfect Abstract; for to take notice of all that is Remarkable, were to Transcribe the whole, and refer the more Curious to the Perusal of the Discourse it self, well Meriting

ting the Time of the most Knowing and Learned Reader, who will find ample Satisfaction therein.

And first in the Preface our Author gives an Account of his Undertaking, *viz.* To give a Comparative Survey of this Animal, with a *Monkey*, an *Ape*, and a *Man*, shewing wherein they agree, and in what Particulars they differ from each other, and in the Philological Essay, he proves there were such Creatures as the Ancients called *Pygmies*, *Cynocephali*, &c. And that these were all either Apes or Monkies, and not Men. As to this *Grang-Outang* which was brought from *Angola* in *Africa*, but taken up higher in the Country, he begins with the several Names by which it has been called by several Writers, and observing the great Confusion in Authors Treating of the Ape, or Monkey-kind, he obliges himself to give a more particular Description of this, and tho' he observes it in many things more agreeable to a Man, than any of the Ape kind, yet he by no means allows it to be Humane, but a Brute-animal, *sui generis*. And before he comes to the particular Description of it, he presents us with a Text in *Aristotle*, describing the Ape kind, which he *Englisbes*, and gives a Comment thereon, shewing wherein the present Subject agrees, or differs from it, and then proceeds to give an exact Account of the outward Shape and Size of the Creature dissected, which was 26 Inches high, and in this he is very particular in the Proportions of every part, and takes notice of the Figures and Descriptions given by *Tulpius*, *Bontius*, *Gesner*, &c. Wherein they agree, or differ from this, all which Figures he gives us a Copy of, and quotes at large several Authors, Ancient and Modern that have mentioned, or treated of it, and so comes to the Anatomy of its several Parts. I shall remark some few, of them I thought more observable, as that its Skin was whitish, and adhered pretty firmly, and had the *Membrana Adiposa* next to the Skin, as in Man, and under that the
Carnos

Carnosa. The Seminal Vessels passed between the two Coats of the *Peritonaum* to the *Scrotum*, as in Man, whence our Author Argues, Nature designed this Creature to go erect, since 'tis otherwise in all *Quadrupedes*. The *Omentum* was fastened as in Man, different from what the *Parissians* found in the Monkey. Treating of the *Ductus alimentalis*, which he makes the *Proprium quarto modo* of an Animal; he takes occasion to recommend the more Nice Examination of the intermediate Species of Beings between Plants and Animals, as the *Zoophite*, of which he once met with one that had a sensible Contraction, or Motion of some Parts, but nothing like the Structure of any Parts or Organs like an Animal. The Stomach was like a Man's, there was no *Bezoar* Stones in it, which *Bontius* says are sometimes found in the Stomach's of Apes. The Word *Bezoar* he observes comes from the *Persian Pa-zabar, contra venenum*, and recommends it as an excellent Medicine, and quotes the same *Bontius* for the Stone bred in the Bladder of Men, as an extraordinary Diuretic, and Sudorific. Treating of the Intestines he finds the *Apendicula Vermiformis*, as 'tis in Men, tho' 'tis wanting in Apes and Monkeys. The *Liver* likewise the same as in Man, and different from the *Monkeys*, as was also the *Ductus Hepaticus*, the *Spleen*, *Pancreas*, *Glandulae Renales*. And speaking of the *Kidneys*, he hints at the Reason why Bleeding has been Successful in a Suppression of the Urine, the *Tubuli Urinarii* being overpressed by the Fulness of the Blood-vessels that run between them. The *Aorta*, and *Cava* were as in Man. The *Testes* were not in a *Scrotum*, but more Contracted by the outward Skin nearer to the *Os Pubis*, by the sides of the *Penis*, whence he queries whether the having them so placed, may contribute to the Salaciousness of the Ape-kind, of which he gives a remarkable Relation or two, and proceeds to the several Parts and Vessels of the *Testes*, which were conformable to those in Man. The *Penis* dif-

differed, had no *Frænum*, nor is he certain whether it had any *Glans*.

As to the middle *Venter*, the *Lungs* had five Lobes in Colour, Substance, Situation, and all Circumstances like a *Man's*; as was the *Tracheæ*, and the *Pericardium* was fastened to the *Diaphragm*, just as 'tis in *Man*, which is usual in Brutes. Whence he raises another *Argument* that Nature designed it a *Biped*, and gives the Reason why 'tis so fastened to assist the *Diastole* of the *Diaphragm* in Expiration, which otherwise the Liver and Stomach would draw down too much into the *Abdomen*. The *Heart*, &c. much the same as in *Man*. The *Larinx*, *Cartilages*, *Muscles*, *Os Hyoides*, and all the Organs of Speech the same exactly, as 'tis in *Man*, excepting the Tongue, and the Rough of the *Mouth*.

Coming to the Head, he observes the *Brain* in all Respects, exactly resembling a *Man's*. From the Agreement of which Parts he argues that the nobler Faculties in the Mind of *Man* must have a higher Principle, and that Matter Organized could never produce them.

In the next place our Author examines the *Bones*, and by the way touches at the Dispute between *Vesalius*, and others in Relation to *Galen*, whether he ever dissected human Bodies, or only Apes. Then he Inserts *Riolanus's* Treatise, Intituled, *Simia Osteologia*, &c. Upon each Chapter, whereof he makes his particular Remarks, shewing wherein the *Orang-Outang* agreed more with a *Man* than a *Monkey*, in more than 20 Particulars, and ends this Discourse with an account of the *Muscles*, for which he owns himself obliged to *Mr. Comper*, as likewise for the designing all the Figures which are done with the greatest Accuracy, and curiously Engraved on eight large Plates, Representing the Creature both before and behind, then 2 Fig. likewise with the Skin off, shewing all the *Muscles*; then the *Skeleton*, and lastly the several *Viscera*.

He concludes this Discourse with a Recapitulation of 48 Particulars, wherein the *Orang-Outang* more resembled a Man than Apes and Monkeys do, and 34 wherein it differed from a Man, and more Resembled the Ape and Monkey-kind.

We come now to the *Philological Essay* concerning the *Pygmies* of the Ancients, wherein our Author shews that in all Probability this Creature gave the first Occasion of this Story, which he traces up to the Original, and finds *Homer* to be the first that mentions it, and their fighting with the Cranes, of which *Geranomachia* he gives the Reason. He Cites the several Authors, Ancient and Modern, that have any where mentioned them, and upon the whole concludes that the *Pygmies* were not a diminutive Race of Mankind, as has been generally thought but this Creature, which he proves at large, Instancing and Explaining the several Accounts of them in *Homer*, *Athenaus*, *Ælian*, *Pomponius Mela*, *Pliny*, *Onesicritus*, *Ctesias*, *Herodotus*, *Hellanicus*, *Aristotle*, *Strabo*, *Nonnosus*, *Albertus Magnus*, *Isaac Casaubon*, *Gesner*, *Jo. Talentonius*, *Olaus Magnus*, *Bartholine*, &c. Commenting upon the particular Treatise of the last upon this Subject. In the next place, coming to Treat of the *Cynocephali* of the Ancients, he shews these likewise to have been Apes only, and not Men, and in this, as well as the *Pygmies*, and other Particulars shews *Ctesias* to be a very fabulous Writer, giving the History of this Animal from the Ancients, with his own Remarks thereon, and so proceeds to Treat of the *Satyrs*, *Pan*, *Ægypan*, *Sylvanus*, *Silenus*, and the *Nymphæ*, all which he shews were several Species of Apes, or Monkeys. In the last place he speaks of the *Sphinges*, which he says are a sort of Ape, or Monkey bred in *Æthiopia*; these he describes out of *Pliny*, *Agatharchides*, *Diodorus Siculus*, *Philostorgius*, and *Phil. Camerarius*, who saw one of them at *Verona*, and so Concludes this Learned and Ingenious Treatise.

London, Printed for S. Smith, and B. Walford at the Feathers in St. Paul's-church-yard, 1699.

PHILOSOPHICAL TRANSACTIONS.

For the Month of *October*, 1699.

The CONTENTS.

- I. **A** *N* Experiment of the Refraction of the Air made at the Command of the Royal Society, Mar. 28. 1699. By J. Lowthorp. A. M.
- II. *An Extract of two Letters, from Dr. John Wallis, (Professor of Geometry in Oxford.) The One to his Grace the Lord Archbishop of Canterbury. The Other to the Lord Bishop of Worcester.*
- III. *The Report made by the Lord Treasurer Burleigh to the Lords of the Council, of the Consultation had, and the Examination of the Plain and Brief Discourse by John Dee for the Queen's Majesty. 25 Martii 1582.*
- IV. *Reflexions made on the foregoing Paper by Mr. John Greaves, Savilian Professor of Astronomy in the University of Oxford. 1645.*
- V. *Analysie Geometrica, sive nova & vera Methodus Resolvendi, tam Problematum Geometrica, quam Arithmetica. Questions. Pars prima, de Planis; Authore D. Antonio Hugone de Omerique Sanlucarense. Sold by Sam. Smith and Benj. Walford at the Prince's in St. Pauls Church-yard London.*

I. *An Experiment of the Refraction of the Air made at the Command of the Royal Society, Mar. 28. 1699. By J. Lowthorp. A. M.*

WE took a Cylinder of Cast Brass Fig. I. ABCD; and cut one end of it CD perpendicular to the Axis *ax*, the other end AB enclin'd to it at an Angle of about $27^{\circ} 30'$, and therefore the Perpendicular to this enclining plain, *pc*, and the Axis of the Cylinder *ax* comprehended an Angle *psa* of about $62^{\circ} 30'$. These ends were ground very true upon a Glass-Grinder's Brass-Tool, and each of them was compact about with a narrow Ferule of thin Brass *bbbb*. Into the upper side of the Cylinder at E was solder'd the Brass pipe EF, and into the under side at G the other Brass pipe GH; the former of these Pipes being about 3 inches long and the late 6 inches. Upon the plate *ddd* were fixt two other plates LL Perpendicular to it and parallel to each other. Each of these two plates had an Arch of a Circle (equal to the Circumference of the Cylinder) cut out of its upper Edge, so that when the pipe GH was let through a hole near the middle of the plate *ddd*, the Cylinder fell into the Arches; and being

Eee fasten'd

fasten'd there with Soder, the Axis *ax* laid Parallel to the Plate *ddd* and about an inch and half above it. The Perpendicular End of the Cylinder *DC* was clos'd with an Object Glass of a 76th. Foot Telescope, *oo*; and the other End *AB*, with a well polish'd flat Glass *ff*; which was carefully chosen to transmit the Object distinct enough notwithstanding its Obliquity to the Visual Rays. The Ferules were well fill'd with Cement round about the Edges of the Glass, and they laid flat and every where toucht the smooth Ends of the Cylinder, that they might firmly resist the pressure of the Excluded Air.

Instead of a Cistern (as in the Torricellian Experiment) we made use of the Inverted Siphon of Brass Fig. II. *MNO*, solder'd to the Plate *ggg*. One of the sides *MN* stood Perpendicular to the plate, and the other side *NO* Enclin'd to it, and was supported near the upper End *O* with a little prop *kk*.

We then plac'd the Cylinder (as in Fig. III.) upon a Table which was well fasten'd to a firm Flore; The pipe *GH* was let through a Hole, and the Axis laid almost parallel to the sides of the Table, and the Plate *ddd* was nail'd down to it. The Tube of the Telescope *ff* with the Eye glass was apply'd to the Object Glass, and a Hair fixt within it at the common Focus of both glasses in the Axis of the Cylinder continu'd, *x*. Upon the floore (under the Cylinder) we nail'd the plate *ggg* with the inverted Siphon upon it, and join'd *M* to *H* by the Infection of the Glass Tube *T*. The joints were very carefully clos'd with Cement: And then they were cover'd over with pieces of a bladder and wrapt hard with strong thread. There was also a bladder ty'd below each joint at *ms*, and when it was fill'd with Water it was ty'd above it at *n*; So that no Air could come to the Cement or insinuate it self through it's pores or fissures if any happen'd to be left unclos'd.

It is not (I think) an unnecessary trouble, that in this account of the Apparatus I have mention'd so many minute Circumstances, for we found it difficult enough to exclude the Air, and almost Impossible to discover the very little holes through which so subtil a fluid would freely enter and possess the spaces deserted by the subsiding Mercury. But with all this precaution the experiment succeeded at last, as I wish, after this manner.

We plac'd the Object *a* (which was a black thread sliding in a little frame over a piece of white paper) in the Axis of the Cylinder *ax* continu'd to it; We fill'd the Pipes and Cy-

linder with Mercury; and having stop't the uppermost Pipe at F with the little Iron stopple K and clos'd it at the other joints, we let the Mercury run out gently at O into the bladder *v*, till it remain'd suspended at the usual height (as in the Barometre) leaving the space above it between the glasses *oo* and *ff* void of Air. We then found the Object, which before appear'd in the Axis at *x*, rais'd considerably above it, and we reduc'd it to appear at *x* by removing it from *a* to *x*. The Axis therefore, of the visual Ray *xa* (which was also the Axis of the Cylinder) *xa*, falling Perpendicularly on the void space in the Cylinder past through it without any Refraction: But emerging obliquely into the Air, it was Refracted towards the Perpendicular *pc*, and there receiv'd a new direction to *x*. And therefore the space *ax* subtended the Angle of Refraction *acx*; which we measur'd and found as follows.

The height of the Object above the Axis } inches depth
of visual Ray *ax* the unrefracted — } 0, 425

The Distance of the Object from the Refracting }
Plain, &c. about 51 feet or } 612

Therefore the Angle of Refraction *acx* was 0. 2'. 23"

The Angle of Emersion *pca* (by the construction }
of the Cylinder) was } 62. 30.

Therefore the Angle of Incidence *pcx* = }
(= *pca* + *acx*) was } 62. 27. 37.

And therefore universally (according to the known Laws of Refraction)

The sines of the Angles of Incidence being 100000

The sines of the Angles of Emersion are 100036

And the Refractive Power of the Dense Air 36

By the Refractive Power of a Pellucid body I mean that Property in it whereby the Oblique Rays of Light are diverted from their direct Course; and which is measur'd by the Proportional Differences always Observ'd between the sines of the Angles of Incidence and Emersion.

This Property is not always proportional to the Density (at least not to the Gravity) of the Refracting Medium. For the Refractive power of Glass to that of Water is as 55 to 34. whereas its Gravity is as 87 to 34; that is, the squares of their Refractive Powers are (very near) as their respective Gravities. And there are some fluids which tho' lighter than Water

yet

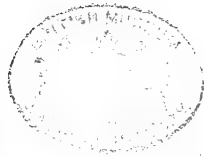
yet have a Greater Power of Refraction ; thus the Refractive Power of Spirit of Wine (according to Dr. *Hook's* Experiments) *Microg.* p. 220) is to that of Water as 36 to 33 and it's Gravity reciprocally as 33 to 36 or $3\frac{1}{2}$. But the Refractive Powers of Air and Water seem to observe the simple Proportion of their Gravities ; directly ; as I have compar'd them in the following Table. The Numbers there Expressing the Refraction of Water are taken from the mean of

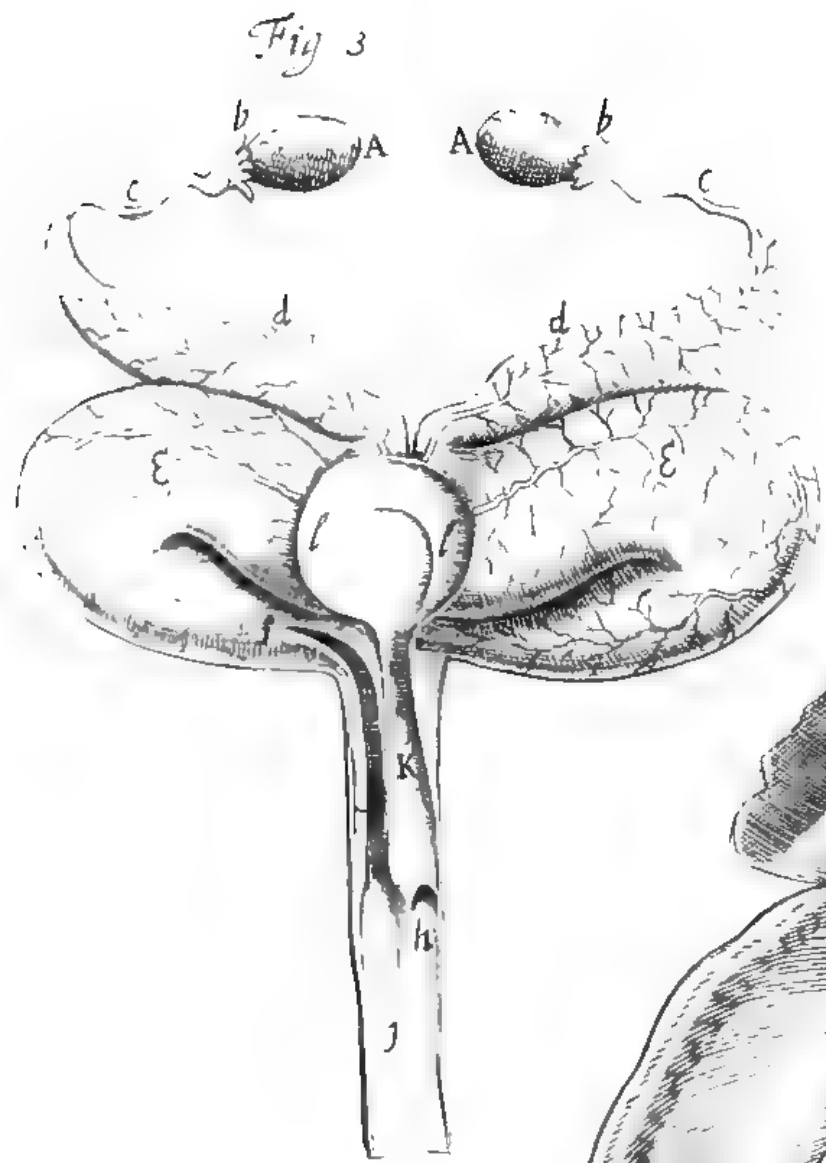
* 9 Observations at so many several Angles of Incidence made Jan. 25. 1647 by Mr. *Gascoigne* the Ingenious Fire Inventor of the Micrometer, and the ways of measuring Angles by Telescopes and those of Air are produc'd by the Experiment above related, &c.

* I am Indebted for them to Mr. *Flamsteed*, who had cover'd them with his Observations, and several passages relating to them, from his Letters to Mr. *Crabtree* which were happily preserv'd in the time of our Civil War by Sr. *Jonas Moor* and Mr. *Christophes Towneley* ; and are now in the Hands of Mr. *Richard Towneley* of *Towneley* in *Lancashire*, by whom they were imparted to him.

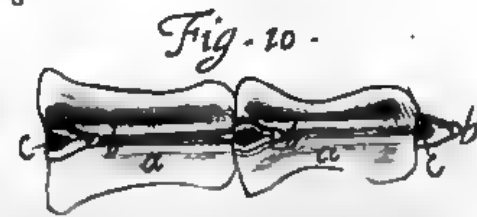
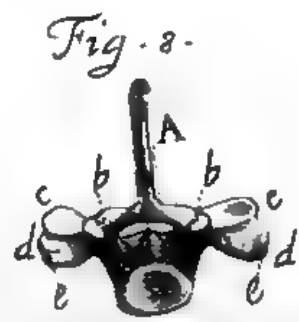
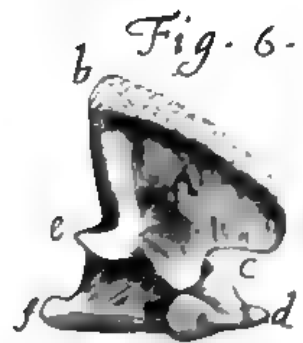
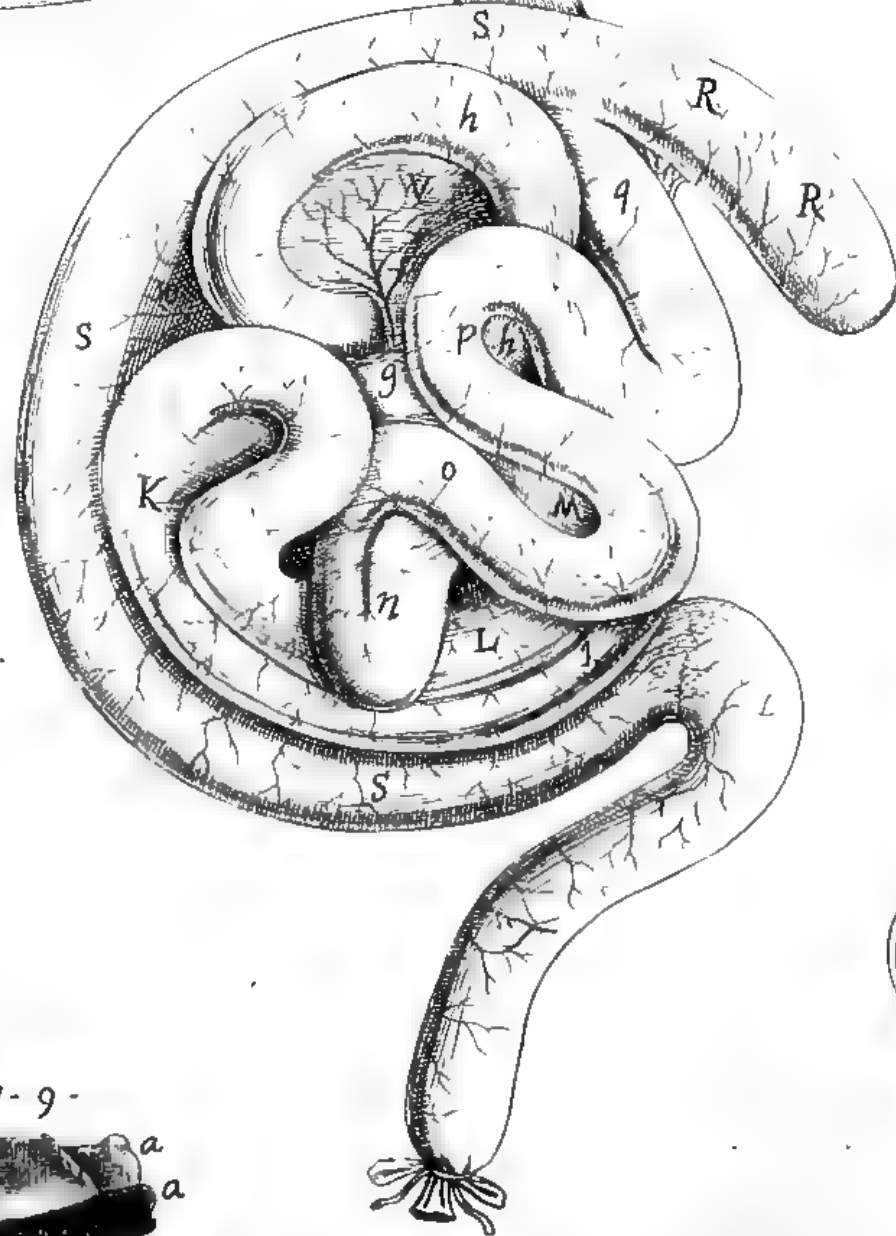
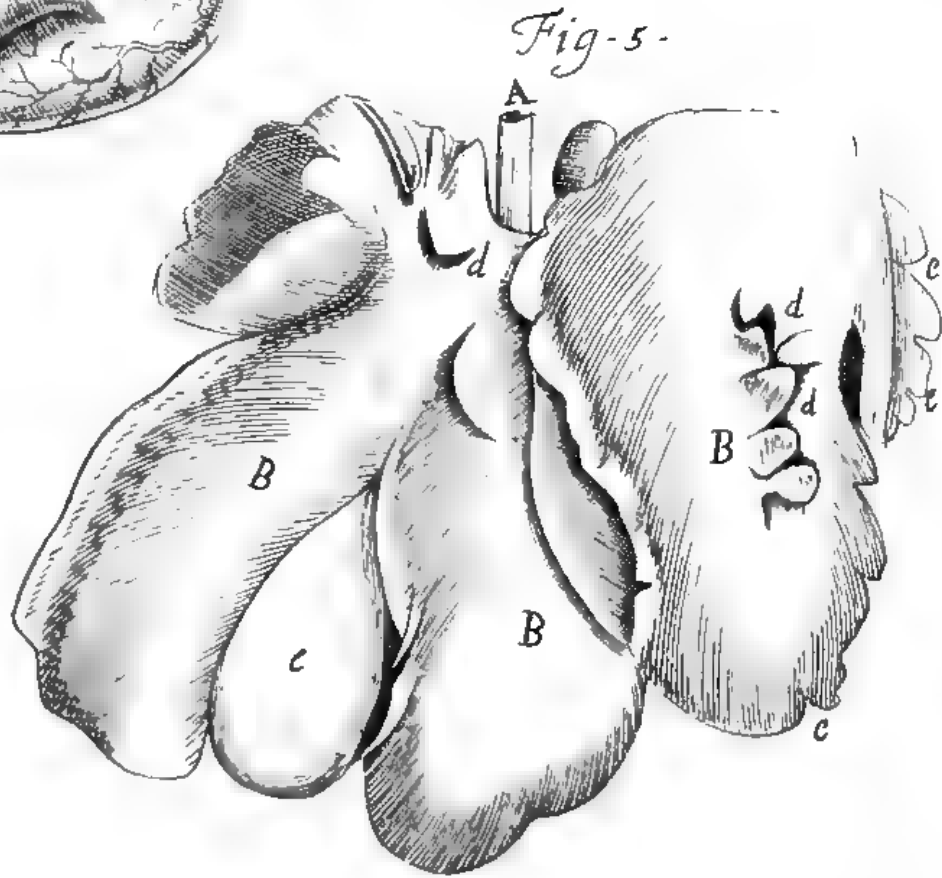
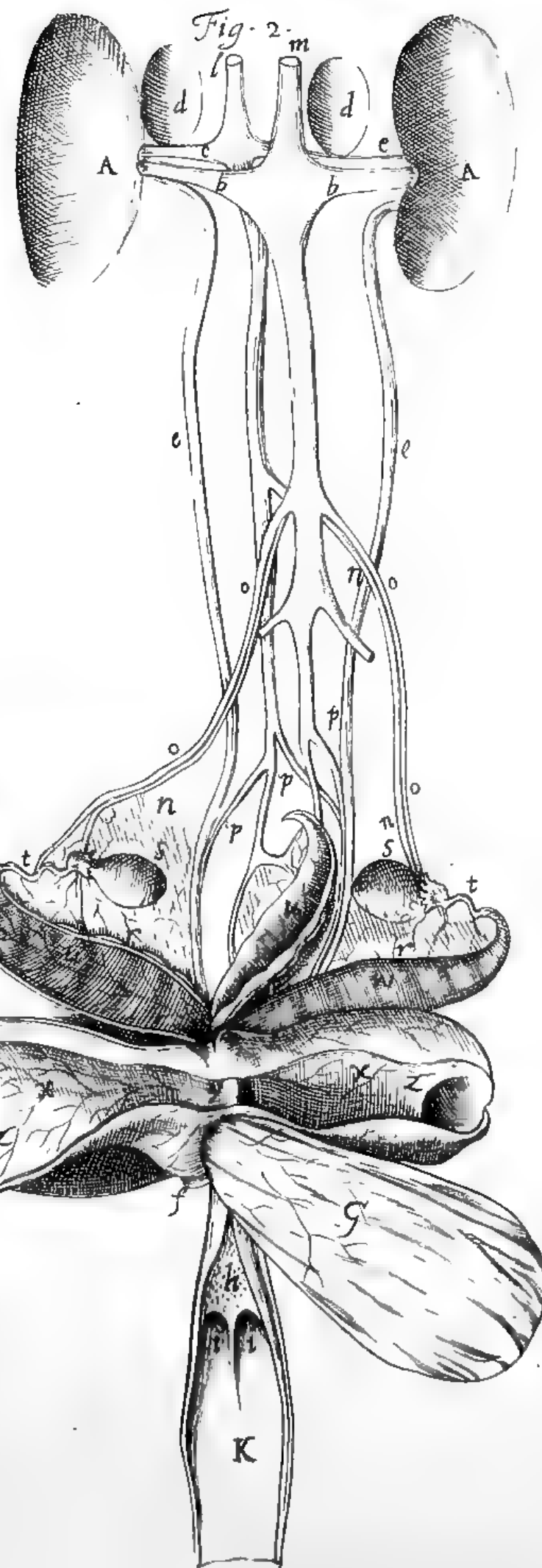
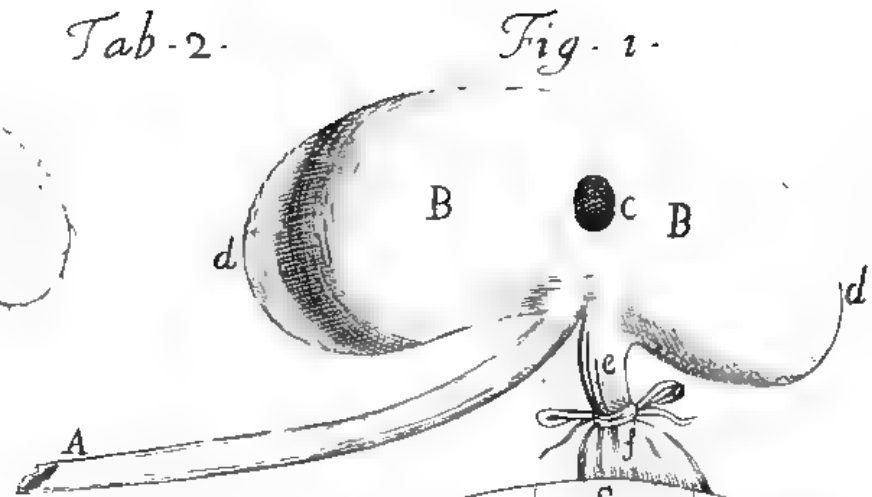
	<i>Water.</i>	<i>Air.</i>
The (assum'd) sines of the Angles of Incidence through	} 100000 : 100000	
The sines of the correspondent Angles of Emerision out of		
The Refractive power of	} 34400	} 36
The Specifick Gravity (if as 900 to 1) at the time of the Experiment) of	} 34400	} 38
or (if as 850 to 1) of		} 40

From hence it seems very probable that their Respective Densities and Refractive Powers are in a just simple proportion: And if this should be confirm'd by succeeding Experiments made at different Angles of Incidence and with Cylinders continuing Exhausted through several Changes of the Air it would be more than probable that the Refractive Powers of the Atmosphere are every where, at all heights above the Earth, proportional to it's Densities and Expansions. And here it would be no difficult matter to trace the Light through it, thereby to terminate the shadow of the Earth ; and (together with proper Expedients for measuring the Quantity of Light Illuminating an Opaque Body) to Examin at what distances the Moon must be from the Earth to suffer Eclipses of the Observ'd Duration. This Limitation is considerable enough in Astronomy, abundantly to recompense the trouble of Prosecuting such a New Experiment.





Tab. 2.



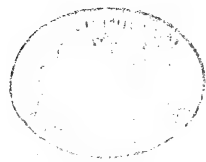


Fig. 2.

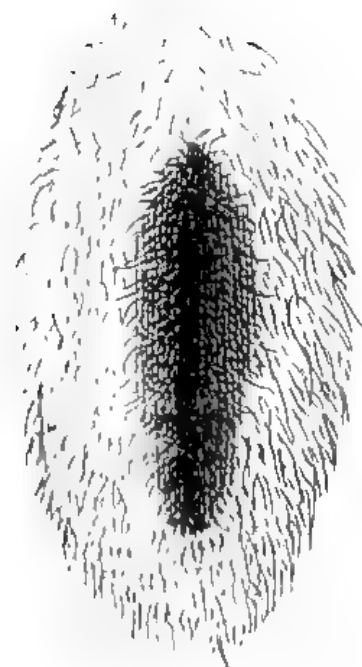
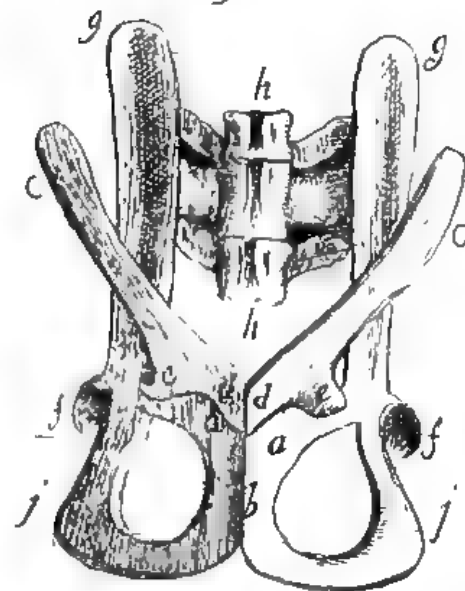


Fig. 5.



Tab. 1.

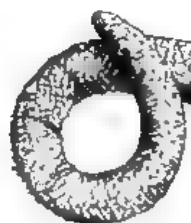


Fig. 1.



Fig. 3.

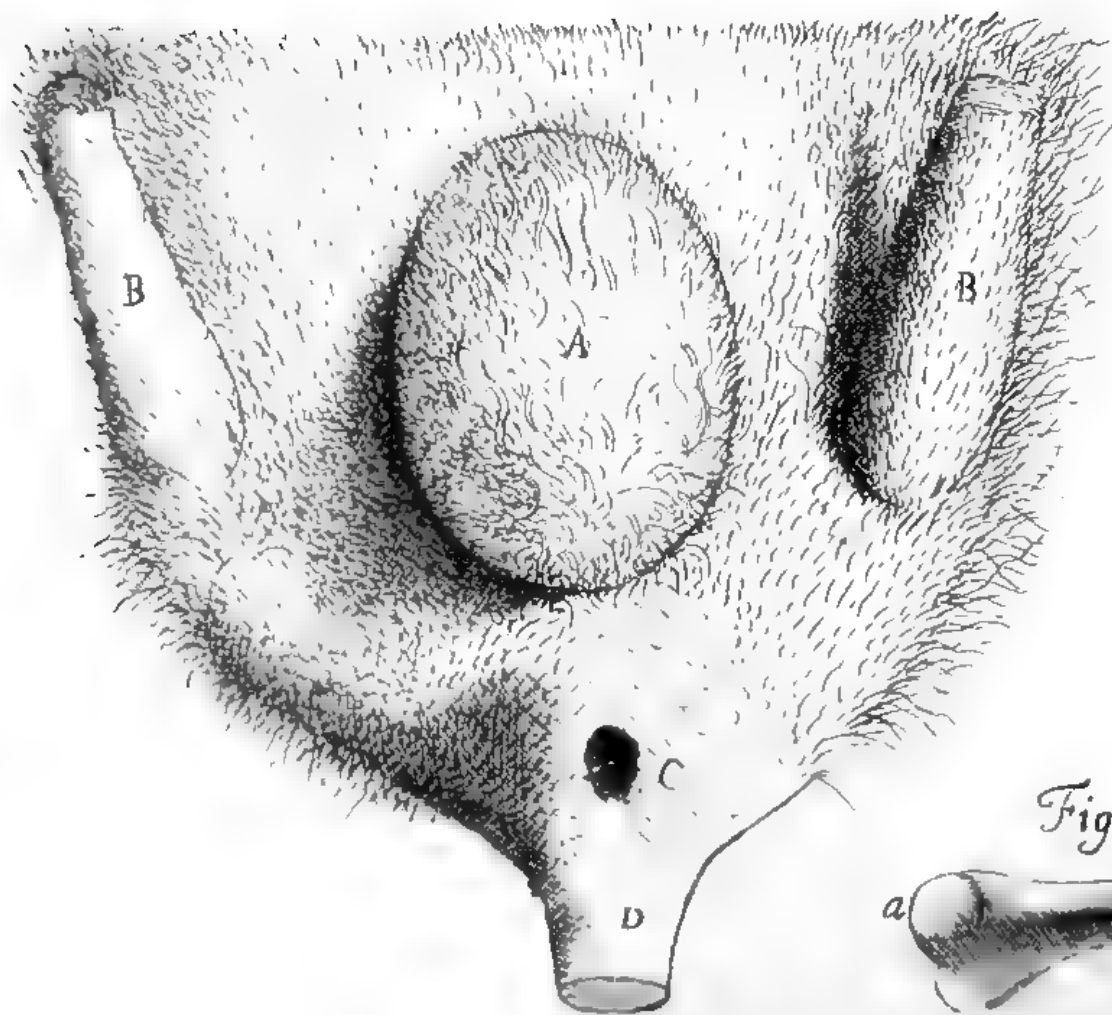


Fig. 4.

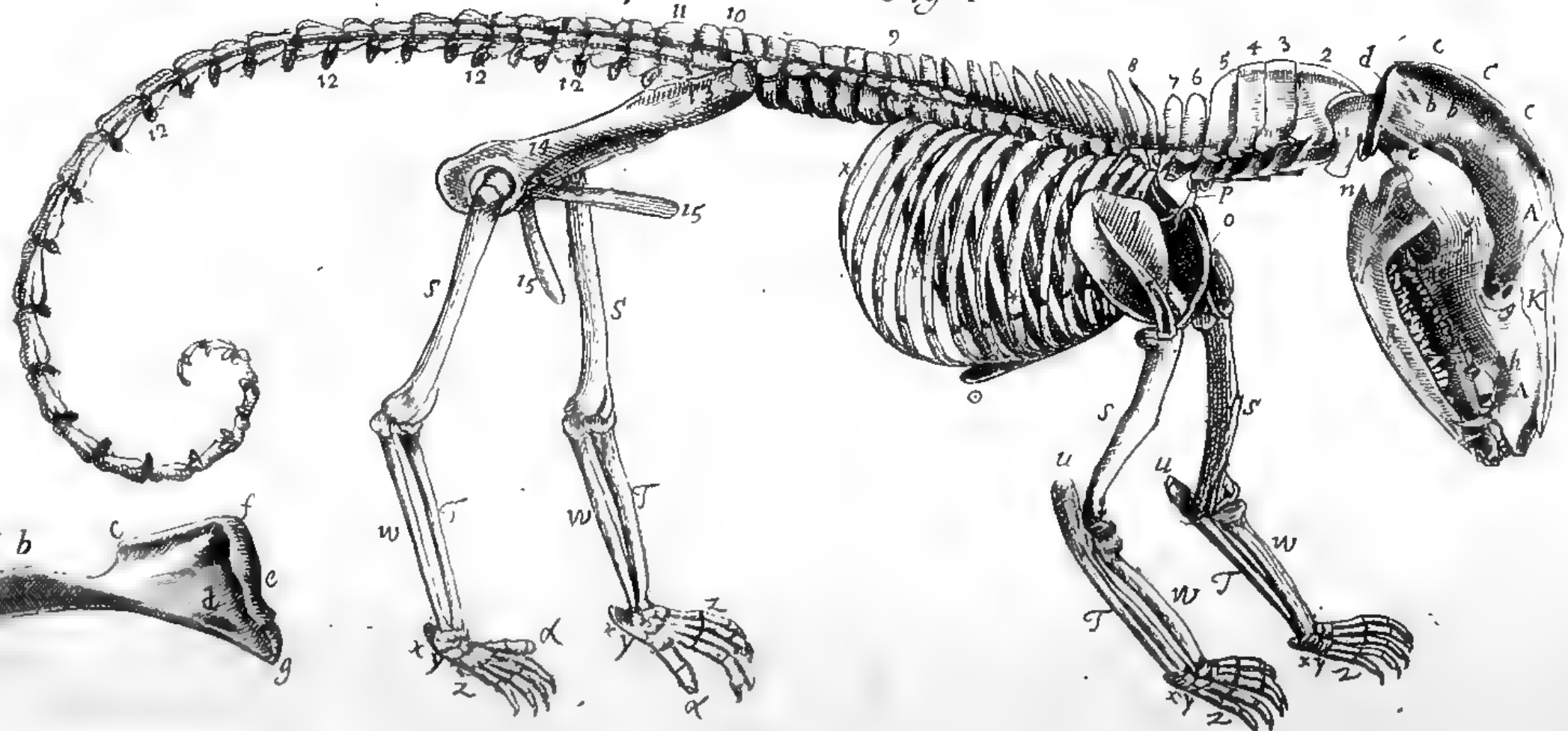
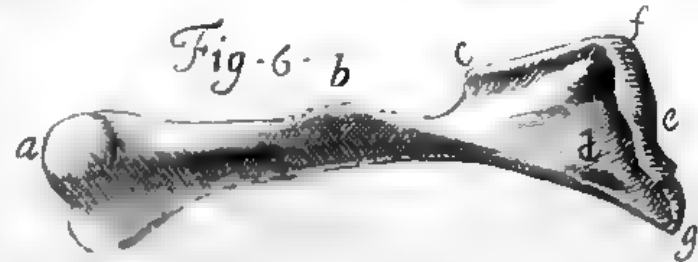


Fig. 6. b



II. *An Extract of two Letters, from Dr. John Wallis, (Professor of Geometry in Oxford.) The One to his Grace the Lord Arch-Bishop of Canterbury. The Other to the Lord Bishop of Worcester.*

Concerning the Alteration (suggested) of the *Julian* account for the Gregorian.

F O R

The most Reverend Father in God, Thomas Lord Arch-Bishop of Canterbury, his Grace at Lambeth.

Oxford June 13. 1699.

May it please your Grace,

AS to what your Grace mentions (in the close of your Letter which I had the honour to receive) about altering the Annual Stile. I am at a loss what to say. That there is, in our *Ecclesiastical* Computation of the *Paschal* Tables, somewhat of Disorder, is not to be deny'd. But I am very doubtful, that, if we go to alter that, it will be attended with greater Mischief, than the present Inconvenience. It is dangerous removing the Old Land-marks. *Κακὸν εὖ κείμενον ἔστι κινητέον.* A thing (of moment) when once settled

Fff

(though

(though with some Inconvenience) should not be rashly alter'd. Such changes may have a further prospect than Men at first sight are aware of, and may be attended with those Evils which are not presently apprehended.

In the business of *Geography*; upon removing the *First-Meridian* (upon some plausible pretence) from where *Ptolomy* had plac'd it (though a thing at first purely arbitrary) it is now come to pass, that we have (in a manner) no *First-Meridian*, at all; that is, none Fixed; but every New Map-maker placeth his *First-Meridian* where he pleaseth: which hath brought a great Confusion in *Geography*.

And, as to the point in question, the Disorder in the *Paschal Tables* was a thing noted, and complained of for three or four hundred years, before Pope *Gregory* did (unhappily) attempt the Correction of the Calendar. But it was, all that time, thought adviseable, rather to suffer that Inconvenience, than, by correcting it, to run the hazard of a greater Mischiefe.

And it had been much better, if it had so continued to this Day, rather than Pope *Gregory* (upon his own single Authority) should take upon him to impose a Law on all the Churches, Kingdoms and States of Christendom, to alter both their *Ecclesiastical* and *Civil* year, for a worse form, than what before we had.

Or if merely upon account of the *Paschal Tables* (for he made no other pretence) it were thought necessary to make a Change; he might have corrected the *Paschal Tables* (or given us New *Paschal Tables* instead of those of *Dionysius*;) without altering the *Civil year*. Which hath introduced the confusion (which we now complain of) of the Old and New *Stile*. And which now can never be remedied, unless all Nations should, at once, agree upon one; which is not to be supposed.

I say, *at once*; for if some sooner and some later do alter their Stile, the Confusion (in History) will yet be greater than now it is.

'Tis true, that upon pretence of the Popes (usurped) Supremacy in Spirituals (and in Temporals also in order to Spirituals) most Popish Countries (but I think, not all) have submitted their Civil year (as well as their Ecclesiastical) to the single Authority of the Pope's Bull.

But your Grace knows very well, that the Church of *England* had (long before this pretended Correction) Renounced the *Pope's Supremacy*; and (that being supposed) there is no pretence for the Pope of *Rome's* imposing a Law on the Church and Kingdom of *England*, to change our Ecclesiastical and Civil year; more than, in *Us*, for that in *Rome*.

And, upon this account, the Church and Kingdom of *England*, did at first not admit of that change, and have hitherto retained our Old Constitution of the *Julian* year; notwithstanding the Pope's (pretended) Supremacy; and I see not why we should now admit it, after having so long renounced it.

And really, though it may not yet appear and be owned above board; and, those who now press for an alteration, be not aware of it, and be far from any Popish design, I cannot but think there is, at bottom, a latent Popish interest, which (under other specious pretences) sets it on foot; in order to obtain (in practise) a kind of tacit submission to the Pope's Supremacy, or owning his Authority. And though they be so wise as to say nothing of it at present (for the Bait is designed to Hide the hook till the Fish be caught,) they will please themselves to have gain'd *de facto*, what in words we disclaim. For there is nothing but the Pop's Bull, which should induce the Change of the (*Civil*) *Julian* year (which is much better) for the

New Gregorian. For the Equinox going backward, (for 10 or 11 Minutes each year,) is very inconsiderable, and which in Celestial Computations, is easily rectified; as are many other inequalities of much greater concernment.

And I think it was never pretended that the *Civil* year must needs agree (exactly to a minute) with the *Celestial*. And, if never so much affected, is impossible to be had: For the *Solar* year, and the *Sidereal* year, differ more from each other, than the *Julian* from either, which is a middle betwixt them.

And the Seat of *Easter* (which only concerns the Ecclesiastical not the *Civil* year) may easily be rectified, if need be, without affecting the *Civil* year at all.

Or, if not rectified; the Celebration of *Easter* a Week or Month sooner or later, doth not influence at all our solemn Commemoration of *Christ's Resurrection*.

And 'tis agreed by most (if not all) Chronologers, that as to the Year of our Lord, the *Annus Vulgaris* is not the *Annus verus* (though it be not agreed how much it differs:) But it would be a horrible Confusion in History, if we should now go about to alter the *Vulgar Account*.

All the pretence that I can understand for altering our *Stile*, is only, that in so doing we should agree with some of our Neighbours with whom we now differ: But it will then be as true, that we shall differ from others with whom we do now agree. We should agree with *France*, but differ from *Scotland* (which, as to us, is more considerable) and with all others who yet follow the old *Stile*.

If it be said, that they, in time, may come so to do by our Example. This would but make the Confusion yet the greater. For then we must be obliged, not only

only to know what places do use the new Stile, but; from what time they began so to do, if we would understand their Dates.

And, if we should, by a new Law alter our Stile in *England*; this would not comprise *Scotland*: And we cannot promise our selves that they would presently comply also. For (according to the present Constitution of that Church) they are not so pliable to comply with the *Modes* of *Rome* as some in *England* are.

And the business of *Easter* (which has the sole pretence of the first alteration) would, to them, signifie nothing: Who (according to their Constitution) observe no *Easter* at all, but do rather declare against it.

And when all is done, there will still be a necessity of keeping up the distinction of old Stile and new Stile (which Pope *Gregory's* pretended Correction hath made necessary;) and with that distinction things may be now as well adjusted, as if we should now change our Stile.

I forbear to discourse at large (that I be not too tedious) how much a better Constitution the *Julian* Year is, and more advisable, than the new *Gregorian*. Which is a thing so notorious, that no Astronomer, (who understands the Methods of Astronomical calculations) though a Papist, can be ignorant of; however they may please to dissemble it. Infomuch that (in their Astronomical Calculations) they are fain first to adjust their Calculations to the *Julian* Year, and thence transfer them to their New *Gregorian*.

And consequently how unreasonable it is for us to exchange our better *Julian* Year for one that is so much worse.

It would be much more reasonable (save that they will never be induced to part with ought, which may favour their Usurpation, how absurd soever,) that the
Papists

Papists should quit their new *Gregorian*, and return to their old *Julian* Year.

But I forbear to enlarge on this, (and many other things which might be alledg'd;) and humbly beg your Graces Pardon for having already given you the trouble of too long a Letter. And am,

My Lord,

*Your Graces very humble
and obedient Servant*

John Wallis.

A POST-SCRIPT

*To be added to a former Letter to the Lord Archbishop
of Canterbury.*

Post-script, Aug. 31. 1699.

OF what Mr. *Lock* hath done in this matter, I know nothing but from your Graces Letter of *Aug. 27. 1699.* It seems he advises, that, for Eleven Leap-years, we should omit the Intercalation of *Febr. 29.* and thenceforth go on with the *Gregorian* Account: The last of which 11 Leap-years should be 1744. But, if we begin in the Change (as it is suggested] at the Year 1700. the last of those Eleven Leap-years must be 1740. not 1744.

This

This Expedient is the same that was (during our Civil-wars) suggestedly those then at *Oxford* in the Year 1645. *viz.* That, from thence forward, we should omit ten such Intercalations.

Against which there seems to me this great Objection.

In the time of *Julius* and *Augustus Cæsar*, there was a Year which was called *Annus confusionis*: Upon the settling, unsettling, and resettling the *Julian* Year. (Of which *Kepler* gives an Account, with the Mischiefs of it, in his *Tabula Rødolphina*, with the Title *Typus Anni confusionis*.) And the like in the Year 1582. when Pope *Gregory* did at once strike out Ten Days of that Year.

But, if this Advice should take place; we should now, instead of one *Annus confusionis*, have a *Confusion* for *Four and Forty* Years together, wherein we should agree neither with the *Old* nor with the *New* Account. But be sometimes 10 Days, sometimes 9 Days, sometimes 8 Days, (and so forth) later than the One, and sooner than the other account. And a Forreigner would not be able to judge of an English Date, without knowing in which of these Years, we vary 10, 9, or 8 Days (and so forth) from either of these Accounts. And this, for 44 Years together. Which seems to me a much greater Confusion, then if (as in 1582) we should (once for all) cast out 11 Days. But I cannot think it advisable to do either.

FOR

*The Right Reverend Father in God William
Lord Bishop of Worcester at Whitehall.*

Oxford June 30. 1699.

May it please your Lordship,

IN a late Letter which I had the honour to receive from my Lord Archbishop's Grace of *Canterbury*, His Grace was pleas'd to intimate, as a thing now under Consideration, about changing the Stile of our Civil Year.

It may perhaps be presumption in me to interpose my thoughts with your Lordship in a Business of that Nature. But I must needs think it a tender point to touch upon: and which, if we attempt it, may be attended with greater Mischiefs, than we may at first be aware of. I adventured to say somewhat to that purpose in a Letter to his Grace: But more may be said.

That the difference of Stiles doth create some Confusion in History is not to be denied. (And 'tis very unhappy that Pope *Gregory XIII.* did in the last Century attempt it.) But it is now unavoidable and cannot be remedied.

For 'tis not *England* only, that useth the *Julian Year*. But all the Three Kingdoms of *England*, *Scotland*, and *Ireland*; and all our *Foreign Plantations*, which are not a few; and the two Kingdoms of *Denmark* and *Sweden*; the *Protestant Cantons* of *Switzerland*; and Four of the Seven united Provinces; and how many more of the Protestants in *Germany* I cannot presently say. And if we should now change our Stile in compliance with some of our Popish Neighbours from whom we differ;

differ; we should then vary from the Protestants with whom we now agree.

And particularly from *Scotland*, (with whom we are more concerned to agree than with *France*.) For we are not to presume that they will presently change at the same time with us. 'Tis happy that they did comply with us in the late Revolution; (to be under the same *King* with us:) We cannot presume they will be so fond of Compliance in all the *Modes* of *Rome*: As is very evident in their not admitting *Episcopacy*, nor the Observation of *Easter*; (which latter was the only pretence of first introducing the *Gregorian Year*.)

So that there will still be as great necessity of SV. and SN. (Old Stile and New Stile) as now there is, (*without which* we shall be at a loss, in History to judge distinctly of Dates; and, *with it*, we are now as easy as if we change.)

If it be said, that other Protestants may, in time, be induced to follow our Example: Perhaps some may (not all:) But this would but make the confusion yet greater: For thenceforth, we must be obliged (if we would be at a certainty in History) not only to know *what Countries* do use this or that Stile; but, from *what time* they began so to do.

It would be much more advisable (if the Papists would be as compliant as they would have us to be) for the Papists to *return* to their *Old Julian Year*, than for us to *embrace* their *New Gregorian*. And, it might much easier be effected; For, if the Pope could be persuaded to grant a Bull to that purpose; all the Papists would, at once, be as much obliged so to do, as by Pope *Gregory's* Bull to vary from it. If it be said; there is no hopes of that; Then the Argument stands: If the Pope will not leave his pretended Supremacy, then we must admit it.

That the *Julian* Year is, in it self, a better form, and more advisable, than the *New Gregorian*, is undeniable; and, all Astronomers, even Papists themselves (if not otherwise Bigoted in favour of the Pope's *Supremacy*, and the *Infallibility* of the *Roman* Church) cannot but know it: Insomuch, that in many cases they are fain (or find it advisable) first to Adjust their Calculations to the *Julian* Year, and thence transfer them to the *Gregorian*.

And there is no Inducement for our changing our Better Year, for a Worse, but only in compliance with the Pope's pretended *Supremacy*, not only over all Churches and Kingdoms, but even the Celestial Motions, (as Pope *Gregory*, in his Bull, doth wisely pretend.)

Now 'tis well known, that, long before Pope *Gregory's* Bull, *England* had renounced the *Pope's* *Supremacy* (and are therefore unconcerned in that Bull;) and I see no reason why (after so long a Disclaimer) we should be now fond to readmit it. But what greater Evidence (of owning that Authority) can (in practice) be expected, than obeying their Commands, in things (otherwise) unadvisable? *Hoc Itacus velit, & magno mercentur Atrida.* And no doubt but the *band of Joab* is in the matter, though perhaps we do not see it.

As to our selves; this cannot be done, without altering the *Act of Uniformity*, and altering the *Common-Prayer Book*; (For, at least, all the Calendar must be new fram'd:.) And your Lordship knows how warm some were a while since, against touching that in the least, (or so much as considering (on the King's Commission for that purpose,) whether ought in it might be changed for the better.

If yet your Lordship think it necessary, that the *Seat of Easter* should be rectify'd; that may easily be done, without altering the *Civil* Year: For if, in the *Rule for Easter*,

Easter, instead of saying *next after the One and Twentieth of March*, you say, *next after the Vernal Equinox*; the work is done. (And we might be excused the trouble of *Paschal Tables*; and the intricate Perplexities of the *Gregorian Epacts*.) For then every Almanack will tell you, *when it is Equinox, and when it is Full Moon*, for the present year, (without disturbing the Civil Account.) And this *Pope Gregory* might as well have done, without troubling the Account of Christendom.

But, if he would needs disturb the *Civil Year*; He should have rectified it (not to the time of the *Nicene Council*, but) to the time of our *Saviour's Birth*. For our *Epocha* is not from the *Nicene Council*, but from the *Birth of Christ*. We do not say, *Anno Niceni Concilii*; but *Anno Domini*. And most certain it is, that, at our *Saviour's Birth*, the *Vernal Equinox*, was not on the *One and Twentieth of March*, (as this *New Account* would suppose,) but *nearer* to the *Five and Twentieth*.

It is alledged as an Argument, why *Now* to change, because the difference, which this Year is but *Ten Days*, will next Year be *Eleven Days*.

But, My Lord, we must be very weak Disputants, to be caught by such a Fallacy, (which is barely begging the Question.) The Point in Question, is not *why Now*; but *why at all*. It is not We that have departed from them; but They from Us. The *Julian Year* was their Year, as well as Ours, till the year 1582. when a Fancy took *Pope Gregory* to Exchange a Better year for a Worse, and disturb the Christian World. And then the Argument (if it signifie any thing) stands thus: *The farther they be gone astray; the more reason there is that we should follow them*. I should rather argue, *The more Reason there is why They should return* (to that from whence they went astray.) *we are as we were*, (and as They were till that time.) And the

reason why we did not *then* change, remains still good why we should not make *that* change, *at all*.

If this Point had been started in our late King *James's* time; I desire your Lordship to consider, with what Face it would have looked. And, if the Mask be taken off, the Face is still the same.

I find, it was started in the time of our Civil Wars (about the year 1644) by those about the King, when *Oxford* was the King's Head-Quarters; but the project did not then succeed, by reason that the King's Party (in that contest) were not prevalent. And your Lordship knows very well; how much it was to the prejudice of the King's Cause, that those on the other side would suppose him to be too much influenced by Popish Councils; of which this was a great Instance.

And no doubt they will be as ready to push it forward, (upon any the least pretence) whenever they find us soft enough to receive the impressiion. Not perhaps under the names of *Julian* and *Gregorian*, (for the word *Gregorian* speaks too plain,) but (under the softer terms) of *Old and New Stile*.

Otherwise, so much weight would not be laid upon so slight a pretence. For the Addition of *Old Stile* or *New Stile* will certainly determine the difference of *Eleven Days* in the next Century, as of *Ten* in this, if nothing else were in the wind. We have been too often caught in such Snares.

I forbear to say more (though more might be said) that I may not too much presume on your Lordship's Leisure. But am,

My Lord,

Your Lordship's very humble
Servant,

John Wallis.
The

IV. *The Report made by the Lord Treasurer Burleigh to the Lords of the Council, of the Consultation had, and the Examination of the Plain and Brief Discourse by John Dee for the Queen's Majesty.*
25 Martii 1582.

IT was agreed by Mr. Digges, Mr. Savile, and Mr. Chambers, that upon their severall Perusal of the Book written by Mr. Dee, as a Discourse upon the Reformation of the vulgar Calendar for the Civil Year, that they do allow of his Opinion; that whereas in the late Roman Calendar reformed there are Ten Days cut off to reduce the Civil Year to the State it was established in at the Council of *Nice*, the better Reformation had been to have cut off Eleven Days, and to have reduced the Civil Year, according to the State as it was in at the Birth of Christ. And so they all agree, that such a Reformation had been more agreeable to the Account of Christ. And so they do also assent that having Regard to the Council of *Nice*, the Subtraction of Ten Days is agreeable to Truth. And therefore the better to agree with all Countries adjacent, that have received their Reformation of subtracting Ten Days only, they think it may be assented unto without any manifest Error: having Regard to observe certain Rules hereafter, for omitting some Leap-Years in some Hundred Years. And for the subtracting of Ten Days, Mr. Dee has compiled a Form of a Calendar, beginning at *May*, and ending at *August*, wherein every of these Four Months, *May*, *June*, *July*, *August*, shall have in the ends of them some Days taken away without changing of any Feast or Holy Day, moveable or fixed, or without altering the Courses of Trinity Term: That is to say,

May

May to consist of 28 Days, taking from it 3 Days: *June* to have 29 Days, taking from it but one Day: *July* to consist of 28 Days, taking from it 3 Days: *August* to consist of 28 Days, taking from it three Days: All which Days subtracted make Ten Days. In the which Four Months no Festival Day is changed, but remain upon the accustomed Days of their Months.

And because the Roman Calendar hath joined to it a great Company of Rules, of which only are capable the skilful Computists or Astronomers, it is thought good to make a short Table like an Ephemerides, to continue the certainty of all the Feasts moveable, depending only upon *Easter*, and agreeing with the Roman Calendar: which may serve for an Hundred or Two Hundred Years, and so easily renewed, as we see yearly Almanacks are, if the Sins of the World do not hasten a Dissolution.

Whereupon her Majesty may please upon Report to commit it to Consideration of Council, whether she will have this Reformation published: which if she will, it were expedient, that it were done by Proclamation from her Majesty, as thereunto advised, and allowed by the Archbishops and Bishops, to whose Office it has always belonged to determine and establish the Causes belonging to Ecclesiastical Government.

III. *Reflexions made on the foregoing Paper by Mr. John Greaves, Savilian Professor of Astronomy in the University of Oxford. 1645.*

THis Reformation of the Roman Calendar, Proposed by Mr. *Dee*, as I cannot wholly approve, so I cannot altogether disapprove. For I like the Subtraction of Ten Days, as the Church of *Rome* has done, beginning the Computation from the Council of *Nice*:
though

though it cannot be denied, but that the Reformation from the time of our Saviour had been much better. But since the Fathers of the Council of *Nice* thought it more Wisdom to look forwards, than to look backwards, and to have greater Care of avoiding Distractions in the Church, about the Celebration of *Easter* for the future, than to remedy the Errors past: I think we shall do well, with the Church of *Rome* to follow their Example. And whereas some have thought of a more exact Calculation, than this Emendation, introduced by Pope *Gregory* the *xiiiith*. which they ground upon the late Astronomical Observations of the learned *Tycho Brahe*: yet since the Difference is not so great, as to make any sensible Error in many Ages, and since that Error may be easily corrected by the Omission of an intercalary Day, I think it not fit for so small a nicety to make a new Dissension in the Church. Much less am I of their Opinion, who think this Correction of the Year therefore to be rejected, because it comes recommended by the Church of *Rome*: which were all one to refuse some wholsom Potion, because it is prescribed by a Physician whose Manners we approve not of. And thus far I assent to Mr. *Dee*.

But I cannot subscribe to his Opinion, that this Reformation should be made by the subtraction of ten days out of one year alone. For tho' I grant, that this were a quick cure of a lingering Disease, yet it is against all Rules of Art in curing one malady to make Ten. For it cannot be, but that the Defalcation of Ten Days in one Year must be of infinite Disturbance in the Commonwealth in all Contracts, where necessarily a certain time is defined. And therefore when *Julius Caesar* the Dictator corrected the Roman Year by the help of *Sosigenes*, a Mathematician, after this manner, that is, by Subtraction of Days, that Year, in which he did it, was called by the Antients *Annus Confusionis*: by Reason of the great
Con-

Confusions and Inconveniences, which thereby hapned : and I doubt not, but that the Year 1582. in which the Defalcation of Ten Days was made by the Bull or Edict of Pope *Gregory*, might justly also be styled *Annus Confusionis*. But such Examples, as these, are not to be imitated. For what *Cæsar* did as Dictator, or what *Gregory* the xiiiith. did as Pope, the one by the Power of the Temporal Sword, the other of the Spiritual Sword, is not to be practised by Gracious Princes.

I shall therefore humbly recommend to His Majesty's Wisdom, and favourable Consideration, that Course, which was long since proposed by many able Mathematicians to Pope *Gregory*, upon the first Notice of his Purpose of Correcting the Calendar; which if it had been known, either to Mr. *Dee*, or to his Learned Judges, or to the Wise and Honourable Lord *Burleigh*, the Reformation with us had long since been finished, and not one Man prejudiced in his Estate. The manner was this; that for Forty Years space there should be no Bisextile or intercalary Years, or as we call them Leap-years, inserted in the Calendar. By which course it is most evident, that ten Days will be Subtracted in forty Years, and these forty Years will be each of them *anni æquabiles*, consisting of 365 Days, as our common and ordinary Years do, without any alteration in the whole Year. And this being beyond all Exception, had been readily entertained by Pope *Gregory*, had not his Ambition been greater than his Judgment; for he was willing to have the Honour of this Emendation, and not to leave it to his Successors; whereby the Year ever since has been called *Annus Gregorianus*. My Opinion therefore is, that by His Majesty's Letters Patents, some Skilful Astronomer should be appointed to have the Compiling and Publishing, within His Majesty's Dominions, of all Calendars and Almanacks for forty Years, in which space, by omitting the Intercalations, we shall at length
come

come to agree with the account of the Church of *Rome* : and every Year, during this time of Forty Years, shall be as this present Year 1645. and as those of 1646. and 1647. will be in the usual and ordinary computation.

III. *A Calculation of the Credibility of Human Testimony.*

Moral Certitude Absolute, is that in which the Mind of Man entirely acquiesces, requiring no further Assurance : As if one in whom I absolutely confide, shall bring me word of 1200 *l* accruing to me by Gift, or a Ships Arrival ; and for which therefore I would not give the least valuable Consideration to be Ensurd.

Moral Certitude Incomplete, has its several Degrees to be estimated by the Proportion it bears to the *Absolute*. As if one in whom I have that degree of Confidence, as that I would not give above One in Six to be ensurd of the Truth of what he says, shall inform me, as above, concerning 1200 *l* : I may then reckon that I have as good as the Absolute Certainty of a 1000 *l*, or five sixths of Absolute Certainty for the whole Summ.

The *Credibility* of any Reporter is to be rated (1) by his *Integrity*, or Fidelity ; and (2) by his *Ability* : and a double *Ability* is to be considered ; both that of *Apprehending*, what is deliver'd ; and also of *Retaining* it afterwards, till it be transmitted.

“ What follows concerning the Degrees of Credibility, is divided into *Four Propositions*. The *Two First*, respect the *Reporters* of the Narrative, as they either *Transmit Successively*, or *Attest Concurrently* : the *Third*, the *Subject* of it ; as it may consist of several *Articles* : and the *Fourth*, joins those three Considerations together, exemplifying them in *Oral* and in *Written Tradition*.

PROPOS. I.

Concerning the Credibility of a Report, made by Single Successive Reporters, who are equally Credible.

LET their Reports have, each of them, Five Sixths of Certainty; and let the first Reporter give me a Certainty of a 1000 *l*, in 1200 *l*: it is plain that the Second Reporter, who delivers that Report, will give me the Certainty but of $\frac{5}{6}$ ths, of that 1000 *l* or the $\frac{5}{6}$ th of $\frac{5}{6}$ ths of the full Certainty for the whole 1200 *l*. And so a Third Reporter, who has it from the second, will transmit to me but $\frac{5}{6}$ ths of that Degree of Certainty, the Second would have deliver'd me &c.

That is, if, *a*, be put for the Share of Assurance a single Reporter gives me; and, *c*, for that which is wanting to make that Assurance compleat; and I therefore suppos'd to have $\frac{a}{a+c}$ of Certainty from the First

Reporter; I shall have from the Second, $\frac{a^2}{a^2+c^2}$; from the

Third, $\frac{a^3}{a^3+c^3}$.

And accordingly if, *a*, be = 100; and *c* = 6, (the number of Pounds that an 100*l*, put out to Interest brings at the Years end,) and consequently my Share of Certainty from One Reporter, be = $\frac{100}{106}$; which is the present value of any Summ to be paid a Year hence: The Proportion of Certainty coming to me from a Second, will be $\frac{100}{106}$ multiplied by $\frac{100}{106}$ (which is the present Value of Money to be paid after two Years,) and that from a Third-hand Reporter, = $\frac{100}{106}$, thrice multiplied into itself; (the Value of Money payable at the end of Three Years,) &c.

Corollary.

And therefore, as at the Rate of 6 per Cent. In-

Interest the present Value of any Summ payable after Twelve Years, is but half the Summ: So if the Probability or Proportion of Certitude transmitted by each Reporter, be $\frac{100}{103}$; the Proportion of Certainty after Twelve such Transmissions, will be but as a halt; and it will grow by that Time an equal Lay, whether the Report be true or no. In the same Manner, if the Proportion of Certainty be set at $\frac{100}{101}$, it will come to a half from the 70th Hand: And if as $\frac{100}{100.5}$, from the 695th.

PROPOS. II.

Concerning Concurrent Testifications.

IF Two Concurrent Reporters have, each of them, as $\frac{1}{2}$ ths of Certainty; they will both give me an Assurance of $\frac{3}{4}$ ths, or of 35 to one: If Three; an Assurance of $\frac{7}{8}$ ths, or of 215 to one.

For if one of them gives a Certainty for 1200 *l*, as of $\frac{1}{2}$ ths; there remains but an Assurance of $\frac{1}{2}$ th, or of 200 *l* wanting to me, for the whole. And towards that the Second Attester contributes, according to his Proportion of Credibility: That is to $\frac{1}{2}$ ths of Certainty before had, he adds $\frac{1}{2}$ ths of the $\frac{1}{2}$ th which was wanting: So that there is now wanting but $\frac{1}{4}$ th of a $\frac{1}{2}$ th, that is $\frac{1}{8}$ th; and consequently I have, from them both, $\frac{7}{8}$ ths of Certainty. So from Three, $\frac{215}{216}$, &c.

That is, if the First Witness gives me $\frac{a}{a+c}$ of Certainty, and there is wanting of it $\frac{c}{a+c}$; the Second Attester will add $\frac{a}{a+c}$ of that $\frac{c}{a+c}$; and consequently leave nothing wanting but $\frac{c}{a+c}$ of that $\frac{a}{a+c}$, $\frac{c^2}{a+c}$. And in like manner the third Attester adds his $\frac{a}{a+c}$ of that $\frac{c^2}{a+c}$, and leaves wanting only $\frac{c^3}{a+c}$, &c.

Corollary.

Hence it follows, that if a single Witness should be only so far Credible, as to give me the Half of a full Certainty; a Second of the same Credibility, would (joined with the first) give me $\frac{3}{4}$ ths; a Third, $\frac{7}{8}$ ths; &c: So that the Coattestation of a Tenth, would give me $\frac{1023}{1024}$ ths of Certainty; and the Coattestation of a Twentieth, $\frac{2097000}{2097000}$ ths or above Two Millions to one. &c.

P R O P O S . III.

Concerning the Credit of a Reporter for a Particular Article of that Narrative, for the whole of which he is Credible in a certain Degree.

LET there be Six Particulars of a Narrative equally remarkable: If he to whom the Report is given, has $\frac{3}{4}$ ths of Certainty for the whole, or Summ, of them; he has 35 to one, against the Failure in any One certain Particular.

For he has Five to One, there will be no Failure at all: And if there be; he has yet another Five to One, that it falls not upon that single Particular of the Six. That is, he has $\frac{3}{4}$ ths of Certainty for the whole: and of the $\frac{1}{4}$ th wanting he has likewise $\frac{3}{4}$ ths, or $\frac{3}{8}$ ths of the whole more; and therefore that there will be no Failure in that single Particular, he has $\frac{3}{4}$ ths and $\frac{3}{8}$ ths of Certainty, or $\frac{39}{64}$ ths of it.

In General, if $\frac{a}{a+c}$ be the Proportion of Certainty for the whole; and $\frac{m}{m+n}$ be the chance of the rest of the particular Articles m , against some one, or more of them n ; there will be nothing wanting to an absolute Certitude, against the not failing in Article, or Articles, n , but only $\frac{nc}{m+n \times a+c}$.

PROPOS. IV.

Concerning the Truth of either Oral or Written Tradition, (in Whole, or in Part,) Successively transmitted, and also Coattested by several Successions of Transmittents.

(1) **S**upposing the Transmission of an *Oral* and *Narrative* to be so performed by a Succession of Single Men, or joined in Companies, as that each Transmission, after the Narrative has been kept for Twenty Years, impairs the Credit of it a *th* part; and that consequently at the Twelfth Hand, or at the end of 240 Years, its Certainty is reduced to a Half; and there grows then an even Lay (*by the Corollary of the second Proposition*) against the Truth of the Relation: Yet if we further suppose, that the same Relation is Coattested by Nine other several Successions, transmitting alike each of them; the Credibility of it when they are all found to agree, will (*by the Corollary of the first Proposition*) be as $\frac{1023}{1024}$ of Certainty, or above a Thousand to One; and if we suppose a Coattestation of Nineteen, the Credibility of it will be, as above Two Millions to One.

(2) In Oral Tradition as a Single Man is subject to much Casualty, so a Company of Men cannot be so easily suppos'd to join; and therefore the Credibility of $\frac{1023}{1024}$ ths, or about $\frac{12}{13}$ ths, may possibly be judged too high a Degree, for an Oral Conveyance, to the Distance of Twenty Years. But in *Written Tradition*, the Chances against the Truth or Conservation of a single Writing are far less; and several Copies may also be easily suppos'd to concur; and those since the Invention of Printing exactly the same: several also distinct Successions of such Copies may
be:

be as well suppos'd, taken by different Hands, and, preserv'd in different Places or Languages.

And therefore if Oral Tradition by any one Man or Company of Men might be suppos'd to be Credible, after Twenty Years, at $\frac{10}{100}$ ths of Certainty; or but $\frac{2}{10}$ ths; or $\frac{1}{10}$ ths: a Written Tradition may be well imagin'd to continue, by the Joint Copies that may be taken of it for one Place, (like the several Copies of the same Impression) during the space of a 100, if not 200 Years; and to be then Credible at $\frac{100}{101}$ ths of Certainty, or at the Proportion of a Hundred to One. And then, seeing that the Successive Transmissions of this $\frac{100}{101}$ of certainty, will not diminish it to a Half until it passes the Sixty ninth Hand; (for it will be near Seventy Years, before the Rebate of Money, at that Interest, will sink it to half :) It is plain, that written Tradition, if preserv'd but by a single Succession of Copies, will not lose half of its full Certainty, until Seventy times a Hundred (if not two Hundred) Years are past; that is, Seven Thousand, if not Fourteen Thousand Years; and further, that, if it be likewise preserv'd by Concurrent Successions of such Copies, its Credibility at that Distance may be even increas'd, and grow far more certain from the several agreeing Deliveries at the end of Seventy Successions, than it would be at the very first from either of the Single Hands,

(3) Lastly in stating the Proportions of Credibility for any Part or Parts of a Copy, it may be observ'd, that in an Original not very long, good Odds may be laid by a careful Hand, that the Copy shall not have so much as a Literal Fault: But in one of greater Length, that there may be greater Odds against any Material Error, and such as shall alter the Sense; greater yet, that the Sense shall not be alter'd in any considerable Point; and
 still

still greater, if there be many of these Points, that the Error lights not upon such a single Article; as in the *Third Proposition*.

IV. *Part of a Letter from Dr. Hotton to Dr. Tancred Robinson, Concerning the late Swammerdam's Treatise de Apibus; the Ahmella Ceylonensibus, and the Faba Sti. Ignatii.*

IT A est, damnabat sua studia ὁ μακαρίτης Swammerdamius noster; erat enim Sectæ Antonie Bourignon addictus: id verò doleo non prodiisse Amici hujus nostri *Commentarium de Apibus*, omnium quæ unquam elaboravit Castigatissimum; hoc opus vernaculo Sermone scriptum cum Iconibus quamplurimis eò spectantibus plus semel apud eum vidisse me satis memini; at ubi jam latitat ignoro prorsus.

Nuperis Annis magnam celebritatem nacta est ob vim Lithontripticam quæ ipsi ascribitur, Herba quædam à *Ceylonensibus Ahmella* dicta. An jam uspiam exstet nescio; sed eam colui, cum versarer in Præfecturâ *Horti Amstelod.* Flores fundit in summis caulibus persimiles *Chrysanthemo Curassav. alato caule flo. Aurantiis Par. Bat.* Semen ei bidens, caules quadrati, fol. Lamii vel Urticæ (quæ subacria sunt) conjugatis amicti; undè manifestè liquet ad *Cannabinæ* Genus, quod bidens vocat *Casalpinus*, eumque sequutus *Tournefortius*, spectare; neque fortè inconcinne nuncupari posse *Cannabinam aut bidentem Urticæfoliam Indicam Lithontripticam*.

Novissimè quoque increbuit usus *Fabæ*, quam vocant, di *Sto. Ignatio*; dicitur & *Higosur* & *Faba di St. Nicolas* & *de Cava longa*. Semen est amarissimum, quod nullam
Fabæ

Fabæ præ se fert similitudinem, ut ex ipso semine adjecto videbis. Ad movendos sudores & debellandos Febres præcipuum creditur; & Diarrhœæ, Dysenteria, colicis doloribus, motibus convulsivis, ipsique epilepsiæ mederi, & externè admotum scabiei; celebratur cum primis & ejus Virtus Alexipharmaca. Provenit in *Philippinis* quas vocant, iisque vicinis *Insulis*. Cujus Generis stirps sit ignoratur; id tantum didici ex *D. Rafaele de Roa*, Hispano viro egregio & erudito, qui in iis *Insulis* diu vixit, convolvulaceam esse Plantam Arbores altissimas scandentem, fructumque ferre Mali Punici magnitudine, quo complura Semina reconduntur, ex quibus deciduis novæ Plantæ subnascuntur. Fortè erit ut ejus mentio fiat in *Historia Naturali Insularum Molucarum*, Opere grandi & insigni, quod ad Societatem nostram Indicam nuper misit ejus Auctor *Georgius Rumphius*. Hoc si aliquando publicetur (ut credibile est) materiam præbere poterit Quarto Volumini *Histor. General. Plantar. D. J. Raii*.

V.

Analysis Geometrica, sive nova & vera Methodus Resolvendi, tam Problemata Geometrica, quam Arithmeticas Quaestiones. Pars prima, de Planis; Authore D. Antonio Hugone de Omerique Sallucarense. Sold by Sam. Smith and Benj. Walford at the Prince's in St. Paul's Church-yard London.

THE Author of this Book being of opinion that the Method of deducing Geometric Demonstrations from an Algebraic Calculation, is forc'd and unnatural, has studied how to find an Analysis purely Geometrical, from which a Synthesis might easily be deriv'd, according to the Method of the Antients.

He begins with an Introduction consisting of about twenty Geometric Propositions; which are so many Lemmas, in order to make his Analysis the more easy, the chief Proposition of his Introduction, and which he has occasion to use most, is this: *To find two lines whose sum or difference is given, that shall be reciprocal to two given lines*; this comprehending the Construction of Quadratic Equations. He divides the rest of his Book into Four Parts. In the First he considers those Problems that are solv'd by simple Proportions. In the 2^d. he considers those that are solv'd by using Compound Ratio. In the 3^d. he resolves those wherein it is necessary to consider Quantities connected by the Signs + and —, And in the 4th. he considers Indeterminate Problems.

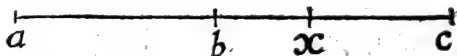
He Prefixes to his First Part some General Rules how to proceed in a Geometric Investigation; and because these Rules contain what is most material in his Method,

we think it not improper to relate 'em as he has laid 'em down himself.

10. An unknown Line is always terminated in an unknown Point, hence to avoid confusion, the unknown Points ought to be Denoted with the last Letters of the Alphabet *v, z, y, x, &c.* to distinguish 'em from the known Points *a, b, c, d, &c.* and if there is occasion, one and the same Point may be denoted with two Letters, when a known and unknown Line concur in it.

First Definition.

Additive Ratio is that whose Terms are dispos'd to Addition, that is, to Composition. *Subtractive Ratio* is that whose Terms are dispos'd to Subtraction, that is, to Division.

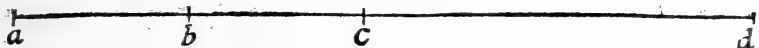


Let the Line *a c*, be divided in the Points *b*, and *x*, the Ratio between *ab*, and *bx*, is *Additive*; because the Terms *ab*, and *bx*, compose the whole *ax*; but the Ratio between *ax* and *bx* is *Subtractive*, because the Terms *ax*, and *bx*, differ by the Line *ab*.

20. The same order of the Letters which is in the Figure, ought to be kept in your Analysis, that so by meer Inspection you may know whether the Ratio is *Additive* or *Subtractive*; and consequently whether you ought to Compose or Divide.

30. When you are to argue by Proportions, and the Proportion lies in a Right Line, you have no other way to proceed on but by Composition or Division: Therefore if both Ratios are Additive, you must argue by Composition; if both Subtractive, by Division; so as always to use that way of arguing which is the fittest for the preservation of those Terms that are known; but when one Ratio is Additive and th'other Subtractive, the Additive must either be made Subtractive, or the Subtractive Additive; Now this change is wrought by repeating either Term.

For



For if we design to change the Additive Ratio of ab to bd , into Subtractive, let bc be made equal to ab , and thus the Ratio of bc to bd , that is, of ab to bd , will be Subtractive; and likewise, if the Subtractive Ratio of bd to bc was to be made Additive, it is but making ab equal to bc .

40. This is always to be observed, when the Terms of the Ratio which is to be reduc'd, are known; but if they are unknown, and their Sum or Difference is known, it is often convenient to use the 7th. and 8th. Proposition of the Introduction by means of which the difference of the Terms of an Additive Ratio, or the sum of the Terms of a Subtractive one, may be express'd, whence you may argue by Division or Composition. Now the 7th. Proposition of the Introduction is this; If a Right Line is Divided into two equal Parts, and into two unequal Parts, the middle part is the half difference of the unequal parts. The 8th. Proposition is this; If a Right Line is Divided into two equal parts, and a Right Line is added to it, that which is compounded of the half and of the Line added, is the half sum of the Line that is added, and of that which is compounded of the whole and the Line added.

Second Definition.

That Ratio we call Common which is Common to two Proportions whether it be Direct or Reciprocal; Let there be two Proportions $a b :: d, e$, and $b, c :: e, l$, having the same Terms b and e , and constituting a Direct Ratio, this Ratio we call Common, because it is Common to both Proportions: In like manner let there be two Proportions $a, b :: e, l$ and $b, c :: d, e$, each having the same Terms b and e which constitute a Reciprocal Ratio, this Ratio we call Common, because it is Common to both Proportions.

50. Therefore if two Proportions have a Common Ratio, we may argue by Equality; but if a Common Ratio is wanting, it must be introduc'd, that we may proceed farther, which will be done by the Reduction of some Ratio into another equal to it.

Likewise if a Proportion lies in a Triangle or any other Figure, you must use a new Proportion by repeating some Angle, that is, by changing its Position, that so you may have two equal Terms in two different Proportions, and so may argue by Equality: Hence it is evident that, that Angle ought to be transposed, which together with the other Angles and Sides of the Figure, shews the most convenient similitude of Triangles.

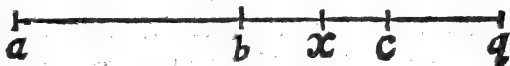
60. Now what is sought being assum'd as granted, all our endeavours must be to retain in arguing those magnitudes which are already known, and to extinguish as much as we can the unknown Point, and the Analyst understanding where to use Additive or Subtractive Ratio in one Proportion, and how to Introduce a Common Ratio in two Proportions, if it be wanting, will come to the end of this Resolution by necessary consequences: Now this end is obtain'd when the unknown Magnitude is found equal to some known Magnitude, or the unknown Point is in one Term, which is a 4th. Proportional, or in two Terms either Means or Extreams whose sum or difference is known, for a 4th. Proportional, or two Reciprocals will do it.

70. The Analysis being ended, the order of the Construction and Demonstration is evident, for nothing else is required for the Construction, but what has, or is suppos'd to have been done in the Analysis, and for the Demonstration, nothing but to begin from the end of the Analysis and proceed to the beginning of it, observing that where the Analysis argues by Alternate or Inverted Propositions, the Synthesis argues by the same,
and

and that where the Analysis Compounds, the Synthesis Divides, and *vice versa*.

But to make those Rules more useful, it won't be amiss to shew the applications he has made of 'em in the solution of some Problems, and because there is a great variety of 'em in his Book, we will chuse a few of the most remarkable as Rules in cases of the like nature.

P R O B L E M.



The Line *ac* being divided at pleasure in *b* to divide it again in *x* between *b* and *c* so that *ax* *xc*, *bx* be proportional.

Analysis.

Let therefore	$ax, xc :: xc, bx.$
and <i>Componendo</i>	$ac, xc :: bc, bx.$
and <i>Alternando</i>	$ac, bc :: xc, bx.$
Let <i>cq</i> be made = <i>bc</i>	, cq
and <i>Componendo</i>	$aq, cq :: bc, bx.$

Therefore the Problem is solv'd.

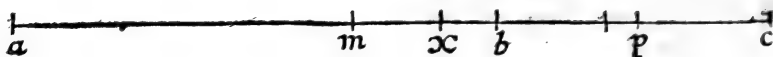
Construction.

Let the Construction be made as before.

Demonstration.

For since, by the Construction, *aq* is to *cq* as *bc* to *bx*. Therefore *Dividendo ac* is to *cq* that is to *bc*, as *xc* to *bx* and *Alternando ac* is to *xc*, as *bc* to *bx*. Therefore *Dividendo ax*, is to *xc* as *xc* to *bx*, which was to be done.

PROBLEM



P R O B L E M.

The Line ac being Divided in b to Divide it again in x between a and b so that ax, xc, xb be Proportional. Now because in the Proportion $ax, xc :: cx, xb$, the first Ratio is *Additive* and the second *Subtractive* it is evident that the *Additive* must either be made *Subtractive*, or the *Subtractive Additive*. But because the Terms are unknown, let ac be bisected in m , and $2mx$ will be the Difference of the Parts ax, xc ; likewise let bc be bisected in p , and $2xp$ will be the sum of the Parts xc and xb ; whence one may proceed by Composition or Division.

Analysis.

Let	$ax, xc :: xc, xb$
Theref. <i>Componendo</i>	$ac, xc :: 2xp, xb$
and <i>half. the Antecedents</i>	$mc, xc :: xp, xb$
and <i>Convertendo</i>	$mc, mx :: xp, bp$

Therefore the Problem is solv'd. Because the Point x being only in the middle Terms, we can proceed no farther. And because there is nothing from whence we may infer which of the two mx and xp is the greatest, it will be in our choice to take mx either for the greatest or the least part, and there will be two Solutions for which there is one Demonstration.

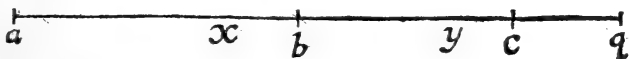
Construction and Demonstration.

Let ac be bisected in m and bc in p , and to mc and bp or pc let two Reciprocals mx and xp be found whose sum be mp , I say the thing is done.

For by the Construction $mc, mx :: xp, bp$, Therefore *Convertendo* $mc, xc :: xp, xb$ and doubling the Antecedents $ac, xc :: 2xp, xb$, but $2xp$ is the sum
of

of the Terms xc and xb , therefore *Dividendo* $ac, xc::$
 xa, xb , which was to be done.

P R O B L E M.



To Divide the given Lines ab bc in x and y so
 that ay be to xc as f to g and xb to yc as h to k .

Conditions.

$$ay \quad xc :: f, g$$

$$\text{and } xb \quad yc :: h, k.$$

Analysis.

Let therefore $ay, xc :: f, g.$
 and also $xb \quad yc :: h, k.$
 or $bc, cq.$

And as the sum of the Antecedents to the sum of the
 Consequents, so one Antecedent to its Consequent.

Therefore $xc, yq :: h, k.$
 or $g, l.$

Therefore by Equality $ay, yq :: f, l.$

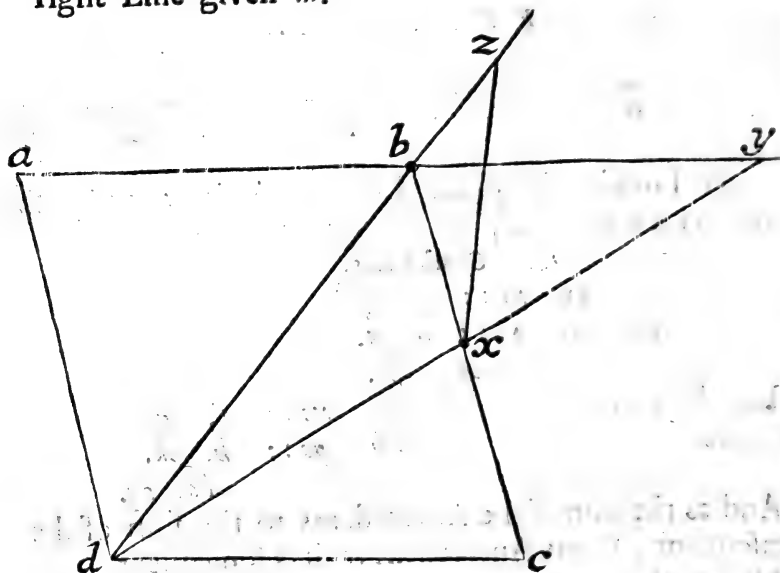
Construction and Demonstration.

Let h be to k , as bc to cq , and so g to l , Let aq be
 be Divided in y in the Ratio of f to l , and let ay be
 to xc as f to g . I say that $xb, yc :: h, k$. for since
 by the Construction $ay \quad yq :: f, l$; and ay to xc as f
 to g : by Equality xc will be to yq , as g to l that is
 as bc to cq and because the difference of the Antecedents
 is to the difference of the Consequents, as one Antecedent
 to its Consequent, xb will be to yc as bc to cq , that is, as
 b to k , which was to be done.

P R O B L E M.

A Square or Rhombus $a b c d$ being given to
 draw

draw from the Angle d to the opposite side produc'd ab a right line dxy , and to make xy equal to a right Line given m .



Let therefore xy be equal to m .
 by the 2d. of the 6th. Book of Euclid $ab, dy :: dx, xy$.
 Let the Angle dxz be $= dby$.
 and because the Triangles dxz, dby are Similar,
 $db, by :: dx, xz$.
 Therefore by Equality $db, ab :: xy, xz$.
 But the Angle $xbz = dby$ or dxz .
 Therefore the Triangles dxz, xbx are Similar
 Therefore $dz, xz :: xz, bz$.

Construction and Demonstration.

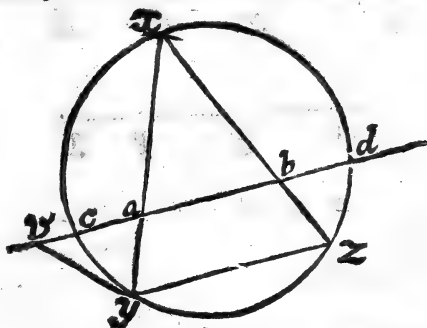
Let db be to ab , as m to g , and let dz, bz whose difference is db be found reciprocal to g . Set off from the point z the Line zx equal to g , and through x draw dxy , I say that xy is equal to the given line m .

For since by the Construction dz is to g as g to bz , that is dz is to xz as xz to bz :, The Triangles dxz, bxz will

will be Similar, Therefore the Angle dxz will be equal to the Angle xbz , that is, to the Angle dbz (for the Angles dbz and xbz are equal, because dbc in a Square or Rhombus is equal to the Angle abd , or its equal ybz , hence adding the common Angle xbz , the Angles dbz and xbz will be equal.) Therefore since the Triangles dxz , dbz have the Angles dxz and dbz equal, and the Angle bdx common, they will be similar, and therefore db will be to bx as dx to xz that is to g ; but because ad , bx are parallel, ab will be to bx as dx to xy . Therefore by Equality ab is to db as g to xy . But by the Construction ab is to db as g to m , Therefore xy is equal to m . Which was to be done.

P R O B L E M.

A Circle xyz being given by Position, and two Points in it a and b being given, to draw the Lines ax , xb so that yz shall be Parallel to ab .



A N A L Y S I S.

Let therefore	yz be parallel to ab
Therefore the Angle	$abx = yzx$
Let the Angle	ayv be made $= abx$
Therefore the Angle	$ayv = yzx$
Therefore	x, v, y, b , are in a Circle
Therefore the Rectangle	$vay = xay$
But the Rectangle	$xay =$ any Rectangle through a
Theref. the Rectangle	$vab =$ any Rectangle through a .

Construction and Demonstration.

Let the Rectangle vab be made equal to any Rectangle through a such as cad , let the Tangent vy be drawn through

through *a* let the line *yx*, and through *b* the line *xe* be drawn, let *yz* be join'd, I say that *yz* is parallel to *ab*.

For since the Rectangle *vab* has been made equal to *cad*, and *xay* is equal to the same, the Rectangles *vab xay* will be equal: Therefore the points *x, v, y, b*, will be in a Circle, and the Angles *ayv, abx* upon the same Line *xv* will be equal, but because *vy* touches the Circle *xyz* and *xy* cuts it, the Angle *ayv* is equal to *yzx*. Therefore the Angles *yzv abx* will be equal, Therefore the Lines *yz ab* will be parallel, which was to be done.

The following Problem is taken out of the second Book.

P R O B L E M.

The Line *ad* between *b* and *c* being Divided in *b* and *c*, to Divide it again in *x* so that the Rectangle *axb* be to the Rectangle *dxc* as *mp* to *gp*.



A N A L Y S I S.

Let therefore $axb \quad dxc :: mp, \quad gp$
 Therefore if you make $ax, \quad xd :: mp, \quad py$
 And also $bx, \quad xc :: py, \quad gp$

The Problem will be solv'd, for the products of the Analogous Terms will restitute the Proportion.

Let therefore $ax, \quad xd :: mp, \quad py$
 and *Componendo* $ax, \quad ad :: mp, \quad my$

Let *mg, mp, ad, ak* be proportional $ak \quad mg$

Let also $bx, \quad xc :: py, \quad gp$

and *Componendo* $bc, \quad xc :: gy, \quad gp$

Let *bc, cf, mg, gp* be proportional $cf \quad mg$

Therefore *Componendo* $xf, \quad xc :: my, \quad mg$

and by equality $xf, \quad xc :: ak, \quad ax$

and *Convertendo* $xf, \quad cf :: ak, \quad xk$

The following Problem is taken out of the third Book.

The

PROBLEM.

The Line ac being divided any where in b , to divide it again in x between b and c so that the Rectangle axb shall be equal to the Rectangle bxc together with the double square of xc .



ANALYSIS.

Let therefore $axb = bxc + 2xcx$
 But by 3. 2. El. $bxc = bxc + xc^2$
 Therefore $axb = bxc + xc^2$
 Let cd be made $= bc$, theref. $bxc = dcx$
 Therefore $axb = dcx + xc^2$
 that is by 3. 2. El. $axb = dxc$
 Therefore $ax, xc :: xd, bx$
 and *Compendo* $ax, xc :: db, bx$
 Let cf be made $= bd$ cf
 and as the sum of the Antecedents, to the sum of the Consequents. So one Antecedent to its Consequent.
 Therefore $af, bc :: cf, bx$
 Therefore the Problem is solv'd.

Construction and Demonstration.

Let cd and df be made equal to bc , and let af, bc, cf, bx be proportional, I say the thing is done.

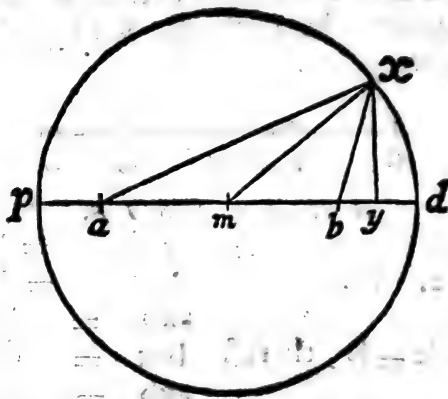
For since $af, bc :: cf, bx$, and the difference of the Antecedents to the difference of the Consequents as one Antecedent is to its Consequent, ac will be to xc , as cf or bc to bx , and the Rectangle axb will be equal to the Rectangle dxc , that is, to the Rectangle dcx together with the Square of xc or (because bc and cd are equal) to the Rectangle bxc with the Square of xc ; But the Rectangle bxc is equal to the Rectangle bxc and the Square of xc : Therefore the Rectangle axb is equal to the Rectangle bxc , and the double Square of xc . Which was to be done.

The following Proposition is taken out of the 4th. Book.

PROBLEM.

Two Points a and b being given, to draw the two Lines

Lines ax xb , whose Squares together shall be equal to the Square given gg .



Let axb whose height is xy be the Triangle required. Bifect ab in m : and draw mx .

A N A L Y S I S.

Let therefore $axa + xbx = gg$

But by the 13th of the Introd. $axa + xbx = 2ama + 2mxm$

Therefore $gg = 2ama + 2mxm$

or $gg - 2ama = 2mxm$

Therefore the Problem is solv'd, but the Length of mx being given and not its Position, it is evident that it may be the Semidiameter of a Circle whose Circumference shall be the *Locus* of the point x .

Construction and Demonstration.

From the Square given gg Subtract the double Square of am , the Square root of half the remainder shall be the line mx , with the Center m and distance mx , describe the Circle pxd , I say that any point x taken in its Circumference resolves the Problem.

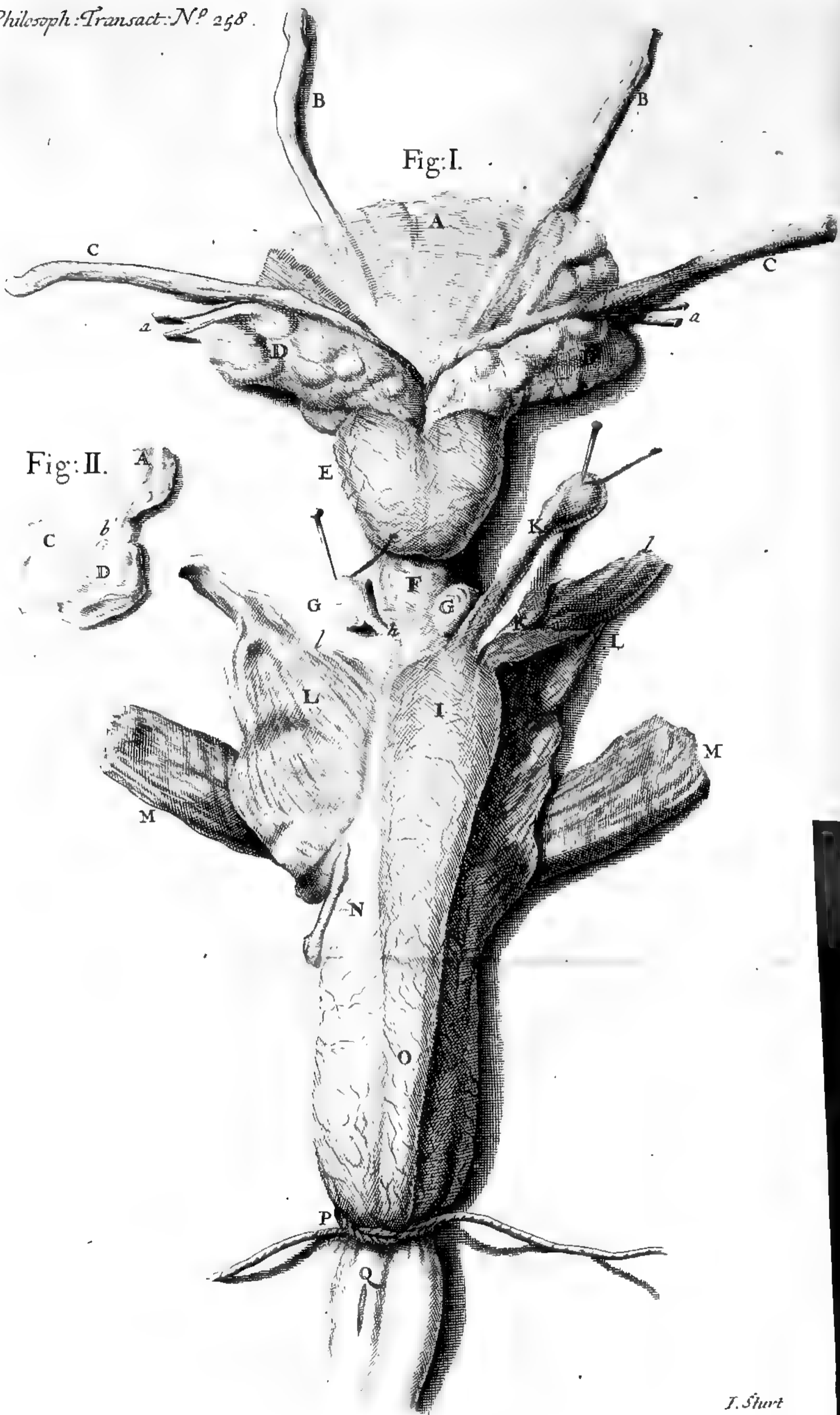
For since the double of the Squares of am and xm is equal to the Square gg , by the Construction, and by the 13th. Proposition of the Introduction to the Squares ax and xb : The two Squares ax and xb together will be equal to the Square gg . Which was to be done.

F I N I S.

E R R A T A.

Page 355. l. 1. for IV. r. III. p. 356. l. 26. for III. r. IV. and for subtraction, &c. r. substract, &c. p. 357. l. 33. r. Sofigenes.





PHILOSOPHICAL TRANSACTIONS.

For the Month of *November*, 1699.

THE CONTENTS.

- I. **A** *N Account of two Glands and their Excretory
Ducts lately discover'd in Human Bodies. By
Mr. William Cowper. F. R. S.*
- II. *Epistola D. Raymundi Vieuffens, M. D. & S. R. S.
ad Societatem Regiam Londinensem missa, de Organo
auditus.*
- III. *A Letter from Dr. William Musgrave to Dr. Sloane,
being an Argument for the more frequent use of La-
ryngotomy, urg'd from a remarkable Cure in Chi-
rurgery; perform'd by Mr. John Keen of Roch in
Cornwal.*

I. *An Account of two Glands and their Excretory Ducts lately discover'd in Human Bodies. By Mr. William Cowper. F. R. S.*

Notwithstanding the general application of the Learned in this Age to Anatomy, and the success wherewith they have cultivated it, there remain undoubtedly many considerable Discoveries to be made, many useful Organs to be detected, of great consequence to the right understanding of the **Animal Economy**; for the knowledge of which perhaps Posterity shall be obliged to the successful Labours of those that shall come after us, and wonder how they escap'd our Observation, as we have done by those that preceded us. Of this the Discovery of two Glands (not before that we know taken notice of in a Humane Subject) may be an Instance, especially since they are found in a part that has not only been accurately described by others, but frequently and carefully examin'd by my self before I took notice of them. This may encourage us not to despond, if we don't find all our Enquiries attended with Discoveries, nor to set an over-value upon our selves for those which our good Fortune may present us with; since it is sometimes the misfortune of Men of greater Application and Sagacity than our selves to meet with Disappointments.

About a quarter of an Inch below the Prostate Glands (Fig. 1. E.) I found two other small Glands (*ib.* G G) placed on each side the *Urethra* (*ib.* F) a little above the

the Bulb of its Cavernous Body : (*ib. I.*) These Glands are of a depressed Oval Figure, not exceeding the magnitude of a small *French Bean*. After those parts of the *Musculus Accelerator* (*ib. II*) are removed, which pass over these Glands, you may feel them placed like two hard Bodies on each side the *Urethra*. They incline to a yellowish colour like that of the Prostates. Their Excretory Ducts appear on their internal Surface (Fig. 2. A. b) next the inner Membrane of the *Urethra* (Fig. 2. C) whence they descend about half an Inch in length before they grow less and pierce that Membrane obliquely at their opening into the *Urethra*, (*ib. D.*) in which they discharge their separated Liquor. After opening the upper part of the *Urethra* towards the *Dorsum Penis* and expanding its inner Membrane, if you compress these Glands, you may see their Liquor issue from two distinct Orifices, which is very Transparent and Tenacious: these two Orifices open into the *Urethra* just below its bending under the *Ossa Pubis* in the *Perinaeum*.

The Artifice of Nature is very extraordinary in thus placing these Glands and their Excretory Ducts, since on the Erection of the *Penis* and the distension of the Bulb of the Cavernous Body of the *Urethra*, they are thereby necessarily compressed, and the Liquor contain'd in their Excretory Ducts forced through their two Orifices into the Cavity of the *Urethra*: besides this, that part of the *Musculus Accelerator* (mention'd above) which passes over these Glands, contributes to this Compression. It seems requisite such Agents should Conspire in Compressing these Organs, since the Liquor they separate is so very Tenacious; which consistence of it is absolutely necessary for the Uses it is employed in.

The main design of Nature in framing these Glands seems to respect the grand Work of Generation, which will be more evident if we examin the Analogous Organs in other Animals. In Rats these Glands are remarkably large, and are so placed that upon the Ere-
ction of the *Penis* they are compress'd by its Turgescency and apposition of the *Ossa Pubis*; the like may be observ'd in other Animals, particularly in Hedg-hogs.

Boars have these Glands very large, and the Matter they separate is more tenacious, and not so transparent as in all other Creatures I have examin'd; there is something peculiar in the contrivance of them in this Animal, each Gland being cover'd with a peculiar Muscle not unlike the Gizzards of some Fowl; which Mechanism seems contriv'd for more forcibly compressing of them, to discharge their very tenacious Contents into the *Urethra*, and that not only in the time of Coition, but at any other time; which seems to be more peculiarly required in those Creatures, because the passage of their Urin is very long, and therefore stands in need of more of this Glutinous Matter to besmear it, whereby it is defended from the injuries that may arise from the Salts of the Urin. As the Urin of different Animals is more or less impregnated with pungent Salts, so the proportion of these Glands differ as well as on the account of the various lengths of their *Urethra's*. It is remarkable we don't find these Glands in Females like those in Males, tho' they have something Analogous to them, which are described in Women by *De Graaf*, and call'd *Prostata Mulierum*; but the Orifices of their Excretory Ducts opening at the exit of the *Urethra*, they serve to defend the *Nympha* and *Labia Pudendi* only from the Urinous Salts, and discharge their Liquor *in Coitu*, as I have elsewhere taken notice; the whole *Urethra* in them being so short, that the contra-
ction

ction of the Sphincter Muscle of the Bladder is sufficient to expel any remains of Urine from that passage.

The Use of the Glands (I have now Described) is twofold; first on the Erection of the *Penis* there is so much of their Liquor discharged into the *Urethra* as suffices to drive out any remains of Urine, and prevent its mixing with the *Semen*; and at other times the continual discharge of some part of their Liquor into the *Urethra*, defends that passage from the Salts in the Urine: the like continual exsudation cannot happen either from the excretory Ducts of the Prostates or those of the *Vesiculae Seminales*, because the nearness of the Sphincter Muscle so corrugates the inner Membrane of the *Urethra*, as prevents an easie passage of the Liquor by the *Ostiola* of the former: nor can the *Semen* run out of the latter, since the *Caruncula* or *Caput Gallinaginis* is contriv'd on purpose to prevent it: wherefore the *Diaphragme*, Abdominal Muscles, and *Levatores Ani* are employed in compressing those parts to discharge their Contents.

It is not improbable that the Matter which flows at the latter end of the Cure of Venereal Diseases, and is called a *Gleet*, proceeds from these Glands, and not from the *Prostata* or *Vesiculae Seminales*, as is commonly supposed; which may afford us no mean Argument for the Use of Injections in such Cases; instead of which some Practitioners persecute their Patients with violent Purges, and cram them with vast quantities of Astringent Medicines. We may easily conceive how such Gleets become sometimes very Obstinate, if not Incurable, by supposing the Ulcer in that Contact to happen upon the *Ostiola* of these Secretory Ducts.

F I G. I.

- A, A Portion of the Bladder of Urine.
 BB, Parts of the Ureters.
 CC, Parts of the *Vasa Deferentia*.
 DD, The *Vesicula Seminales* somewhat distended with Wind by blowing into the *Vasa Deferentia*.
 aa, The Blood Vessels of the *Vesicula Seminales*.
 E, The *Glandula Prostatæ*.
 F, The *Urethra* expanded after opening its superior and fore part to see the *Ostiola* of the Excretory Ducts of the following Glands.
 GG, The two Glands above described, which from the Liquor they separate may be call'd *Glandula Mucosa*.
 h, The Excretory Duct of one of the last mention'd Glands, before it passes under the Bulb of the Cavernous Body of the *Urethra*.
 I, The Bulb of the Cavernous Body of the *Urethra* partly distended with Wind, and devested of the Accelerator Muscle to shew its External Membrane, which is very thin, whereby the last nam'd Muscle does more adequately compress that Bulb, and drive its contain'd Blood towards the *Glands* when the *Penis* is Erected.
 K, The third Pair of Muscles of the *Penis*.
 LL, The Accelerator Muscle divided in its middle Seam on the Bulb, and afterwards freed from it, and Expanded.
 ll, The upper part of this Muscle which passes immediately over the Mucous Glands.
 MM, The *Musculi Directores Penis*.
 NN, The Cavernous Bodies of the *Penis*.
 O, The Cavernous Body of the *Urethra*.

P, The

P, The Ligature made to prevent the Wind from passing out of the Cavernous Body of the *Urethra* and its Bulb.

Q, The Aperture by which the Inflation was made.

F I G. II.

One of the Mucous Glands after being Macerated in Water, and its Excretory Duct fill'd with Quicksilver.

A, The Mucous Gland somewhat distended;

b, Its Excretory Duct.

C, A Portion of the Internal Membrane of the *Urethra* Expanded.

D, The *Ostiola* of the last mention'd Excretory Duct,

II. *Epistola D. Raymundi Vicuffens, M. D. & S. R. S.
ad Societatem Regiam Londinensem missa, de Or-
gano auditus.*

Viri Clarissimi,

CUM nihil mihi jucundius atque gloriosius esse pos-
sit quam vobiscum colloqui, nè miremini quæso
quòd vos supplex rogare ausim, ut meam hanc Episto-
lam de meis circa organum auditus animadversionibus
benevolo, gratoque animo accipiatis, & vestrum, cum
libuerit, de illa judicium ad me mittatis, quò deinceps
eam typis excudendam tradam, si vobis Digna videat-
ur, quæ aliquando publici juris fiat. Clarissimus,
D. Duverney vir non modò anatomicarum, sed & phy-
sicarum, medicarumque rerum peritissimus de hac cor-
poris nostri parte de qua hic dicturus sum, eximiè sanè
scripsit; verùm ut ut accuratè illam descriperit, ad-
vertetis tamen, ni fallor, viri spectatissimi, me nova
quædam in structura interiori ejus detexisse, quæ vo-
bis forsan, ut & mihi, per necessaria videbuntur ad fa-
ciliorem explicati onem auditus, imò & morborum,
quibus hæc ipsamet pars obnoxia est; quapropter hæc
breviter & nitidè, quantum fieri poterit, hic vobis ex-
ponam, & postmodum nervos septimæ conjugationis
describam.

Imprimis, Animadverti membranam tenuissimæ, ra-
ræque admodum texturæ intra cavitatem tympani esse:
hanc, habita ratione loci quem occupat, interiorem
membranam tympani nuncupo, ut ab ea distinguatur,
quæ meatus auditorii finem extremum obturat, & quam
exteriorem ipsiusmet tympani membranam nominare
placet,

placet, quò scilicet idea unius nunquam cum idea alterius confundi queat, hæcce membrana peritis omnibus anatomicis nota, & à nullo, quod sciam, rectè descripta, si attentè perspiciatur, in utraque aure vasis capillaribus penè infinitis apparet irrigata, quæ carotis arteria, & vena jugularis utriusque lateris ipsi largiuntur. Hinc fit, ut vasculis, quibus irrigatur, sanguine supra modum turgentibus tota ferè rubra videatur, cum radiorum solarium interventu, ac præsertim microscopio intermedio exploratur. Ejusmodi vascula impediunt nè membranæ, qua suffulciuntur, partes, superna scilicet & laterales, in semetipsas corruant, & complicentur, uti proculdubio corruerent & complicarentur, nisi eas suspensas tenerent ; quoniam per se ipsas interiori superfici ei hujus, qua continentur, cavitatis immediatè non adhærent.

Hæc ipsamet membrana, quæ est productio membranæ tenuis interiora aquæductus investientis, os speciei cujusdam specus occludit, quæ itur ad foveolas intra mastoïdem apophysin excavatas ; proindeque impedit nè conclusus in iis aër, liberè saltem, cum aëre tympanum subeunte communicet ; ac præterea tenuissima ejus productio una stapedis aperturam, altera verò foramen vulgò rotundum nominatum obturat, & ulterius extensa toti supersternitur interiori superfici ei exigui hujus spatii cavi, quod à foramine rotundo extenditur ad extremum usque finem ductus semi-ovalis spiralis cochleæ, & usque ad rimulam incisam basi conchæ. Ita ut interior tympani membrana hac productione sua intermedia, qua scilicet extremitatem ductus semi-ovalis spiralis cochleæ, & rimulam basi conchæ insculptam extrinsecus occludit, communicet cum hac portione membranæ nerveæ interioribus conchæ parietibus superstratæ, quæ baseos conchæ ejusdem rimulam intus claudit, & cum extremitate laminæ nerveæ spiralis,

quæ

quæ intra ductum semi-ovalem spiralem cochleæ reconditur.

Præterea membrana, de qua nunc agitur, subtus illam sui partem, qua externam tympani membranam respicit, sat amplum relinquit spatium vacuum, quod aquæductu ad se delatum aërem extrinsecum admittit: interea hæc in semetipsam ita convolvitur, & complicatur, ut intra eam tres formentur cavitates. Prima hujusmodi cavitatum occupat spatium, quod externæ incudis apophysi, & huic interjicitur specui, quæ itur ad foveolas apophyseos mastoidis, ut supra dixi: secunda primæ & tertię intermedia, iisque minor præcisè basi conchæ substernitur, & malleoli caput, necnon fermè totum incudis corpus intra se recondit: tertia omnium amplissima internum aquæductus orificium respicit, & intra se continet ventris primi auris internæ muscoli & incudis portionem unà cum binis illius apophysibus, stapedem, os Lenticulare, tendinem secundi auris internæ muscoli, & cervicem unà cum manubrio malleoli.

Demum membrana, de qua nunc loquor, in quibusdam tantum hominibus ita conformatur, ut parva illius portio in membranulam tenuissimam abeat, qua dimidium circiter spatium tertiã necnon maximã cavitatum ejus comprehensum in duas partes velut septo intermedio dividitur. Ejusmodi membranula à nullo anatomico, quod sciam, hætenus descripta, & à me viris Clarissimis, D. D. Barbeyrac, Joly, Marcot, Verny Doctoribus medicis peritissimis, & quam pluribus aliis medicis, & medicinæ studiosis in musæo meo ostensa in omnibus ferè hominibus desideratur, & in iis, in quibus reperitur, superna sua parte basi conchæ, & inferna exteriori tympani membranæ meatus auditorii finem extremum occupanti, & obturanti alligatur, eamque in binas partes fermè æquales ex transverso secare videtur

videtur ad extremum usque finem manubrii malleoli, cui adhærescit, imò & paulo ultra. Ita ut membranula ista unà cum extremo fine manubrii malleoli mediam partem exterioris membranæ tympani versus interiora cavitatis ejus attrahat, eamque ita inclinēt, ut è regione meatus auditorii parum concava, & è regione cavitatis tympani parum convexa sit. Hæc membranula apta nata est, quæ in hominibus in quibus non desideratur, impediāt nē validioribus muscoli monogastrici auris internæ contractionibus exterior tympani membrana supra modum distendatur, vel extremitate manubrii malleoli dilaceretur, cū prædictus musculus convulsione, vel motu convulsivo afficitur. Ita ut hæc membranula vices quodammodò supplere videatur musculi antagonistæ musculi monogastrici, de quo nunc dixi, si spectetur quatenus tendine suo gracili & longo agens, ut ex dicendis in sequentibus patebit.

Siquis horum omnium perspiciendorum jucunda curiositate frui velit, os petrosum secernat à reliqua calvaria, hominis strangulati, vel phrenitide, aut apoplexiâ perempti, si fieri possit: os illud à reliqua calvaria seceretum per biduum in loco sicco servandum, ut per id tempus membrana, quam nunc describo, parum exsiccet, adeoque in semetipsam contrahatur, ut, quantum par est, secedat ab interna superficie cavitatis, intra quam continetur, nē ab anatomico illius texturam penitus exploraturo dilaceretur. Postea os sat tenue, quod supernam tympani partem constituit, frustulatim cultro peritè secandum, & auferendum est. Et verò cum primùm superna tympani pars secta & ablata fuit; membrana, de qua nunc, intra cavitatem illius antea latens oculis subjicitur, & adeò numerosis vasis capillaribus irrigatam sese prodit, ut hæc, cū singula ejus vasa repleta sunt sanguine, speciem quamdam retis mirabilis repræsentet.

Membrana jamjam descripta mirabilibus fanè munis præstandis, & mox designandis dicata est. Imprimis hæc quâ tenui productione sua occludens labyrinthi januam impedit, nè naturalis purissimus ac subtilissimus aër intra diversas cavitates, diversosque illius mæandros latens communicationem, saltem valde liberam, habeat cum aëre crasso, qui tympani cavitatem aquæductu subit.

Secundò hæcce membrana miti calore sanguinis vasorum, quibus adornatur, ossæam, labyrinthi totius basin leniter calefacit, & uno eodemque tempore fovet atque conservat motum aëris in binis vestibulis, flexuosisque omnibus illius ductibus conclusi. & Lymphæ defæcatissimæ animali spiritu imprægnatæ, qua singulæ nervi mollioris auris propagines inferius describendæ imbuuntur.

Tertiò eadem membrana intra cavitates suas aërem benigno calore sanguinis vasorum suorum maximè rarefactum continet, qui utpotè maximè rarefactus, atque adeò tenuissimus, & magnâ æthereæ materiæ copiâ imprægnatus valde aptus est, qui corporum omnium sonorum impressiones facillè recipiat, easque citissime ad aërem, & singulas propagines nervi mollioris auris interiora labyrinthi adornantes, necnon ad ovale cerebri centrum transmittat.

Ex iis, quæ modò diximus, planè sequitur membranam, de qua nunc agitur, auditui producendo mirum in modum conducere: ita fanè hæc ut potè valde tenuem, raramque texturam habens liberum in cavitates suas introitum, pariterque liberum ex iis egressum præbet sonorum objectorum impressionibus, quæ cum primùm aëri caput ambientæ communicatæ fuerunt, æthereæ, qua gravidus est aër, materiæ motu, & membranæ exterioris tympani innumeris foraminibus insensibilibus perviæ, necnon aquæductus interjectu ad ipsam

fam transmittuntur. Ac re quidem ipsa quævis, nisi mea me fallit opinio, objectorum sonorum impressiones aëris intra cavitates membranæ supra descriptæ contenti, aut ipsam extrinsecus ambientis quæ scilicet æthereâ gravidâ materiâ interventu momento citius interiora labyrinthi per portam & fenestram illius subeunt, & ex eodem labyrintho interjectu spiritus animalis, cui inibi communicantur, etiam momento citius ad ovale usque cerebri centrum transmittuntur; ibique loci pro diversis sonorum objectorum impressionibus diversæ excitantur in anima idæ, diversas soni species designantes, quæ diversis nominibus exprimi solent. Eorum, quæ modò diximus, veritas experientiâ confirmatur; quoties enim pus abscessus intra mastoideam apophysin, vel intra tympanum ipsum producti hanc, de qua nunc, membranam dilacerat, prorsusque rodit, toties auditus ita læditur, ut multum imminuatur, si non prorsus aboleatur, ut in observationibus meis anatomico-practicis explicabitur.

Ex supra dictis clarè intelligitur, Viri Clarissimi, intra tympanum necessario excitandum esse tumultuosum quemdam motum præternaturalem sonum producentem, quoties immodico cibi, potusque usu, vel obstructionibus imi ventris, vel longis, plurimumque laboriosis animi contentionibus, vel aliâ quapiam causâ nimia sanguinis supra modum rarefacti, & vaporosi quantitas ad vascula superius descriptæ membranæ amandatur. Is enim sanguis nimiam copiam nimiaque rarefactione sua eas, quibus devehitur, arteriolas magis, quàm par est dilatat necnon pulsatur, & tum nimia hujusmodi vasorum dilatatione atque pulsatione, tum nimio halituum copiosiorum, quas emittit, motu hanc membranam ita concutit, ut tumultuosus aliquis strepitus intra tympani cavum necessario excitetur; præsertim si vapores illi propter aquæductus obstructionem,

nem, vel propter nimis compactam texturam exterioris membranæ tympani faciliè transpirare nequeant. Tumultuosi autem hujusmodi strepitus impressio ad ovale usque cerebri centrum translata hanc in anima excitat ideam, quæ murmuris auris nomine vulgò exprimi solet. Hujusce murmuris tres sunt species omnibus notæ, & à nemine, quod sciam, planè ac distinctè explicatæ; bombus scilicet, sibilus, & tinnitus.

Quoties vapor supra modum copiosus, & exagitatus, qui murmur aliquod in auribus excitat, ita humidus est, ut ad naturam aquæ fat propè accedat, interiorè, faciliè-que mobilem membranam tympani relaxat, & uno eodemque tempore ipsam movet variè-que flectit. Hinc fit, ut hæcce membrana nonnihil relaxata, motuque sibi communicato variè ac velut undatim flexa cùm ambientem, tum intra cavitates suas reconditum aërem ita exagitet, ut vibrationes debiles lentè necnon flexuosè, ac velut undatim sese invicem excipientes patiatur, quales ferè patitur, dum vel ab aqua è loco sublimi delabente, & cum primùm delapsa est, undatim defluente, vel quamplurimis ab apibus simul congregatis, & partim sursum, partim deorsum, partim obliquè, partimque in orbem motis agitur. Istæ autem vibrationes spiritus animalis nervi mollioris auris textum interius occupantis interjectu ad ovale usque cerebri centrum delatæ hanc excitant in anima ideam, quæ sonum tumultuosum gravem bombi nomine vulgò expressum designat.

Ubi vapor murmuris cujusdam in auribus excitandi capax particularum aquosarum tam inops est, ut potius exhalationis siccæ, quàm meri vaporis naturam re-
 doleat, atque adeò flatulentus sit; is membranam interiorè tympani, dum huic alliditur, quadantenus exsiccat, illam expandit, atque distendit. Inde fit, ut hæcce membrana communicato sibi motu nonnihil exsiccata, & expansa, adeoque plurimùm distenta tum
 ambien-

ambientem, tum intra cavitates suas latentem aërem ita concutiat, ut in eo vibrationes validas excitet, quæ successivè sanè, sed tamen cito, & rectis vel fermè rectis lineis sese invicem consequuntur. Ita ut ejusmodi vibrationes his ferè similes sint, quas patitur, quoties mero flatu supra modum exagitur; proptereaque illæ ad ovale usque cerebri centrum eâ, quâ supra explicatum fuit, ratione transmissæ hanc excitant in anima ideam, quæ sonum tumultuosum sat acutum sibi nomine vulgò expressum designat.

Quoties interior membrana tympani, aut aliqua pars illius ab arteriis ipsam irrigantibus solito frequentius, validiusque succussibus sese velocissimè excipientibus ob sanguinis fluxum tunc in his aliquatenus impeditum quatitur, toties illa (si tunc temporis præcalido & exsiccante quodam halitu ita distendatur, ut immisos sibi succussus validè repercutiat) tum ambientem, tum intra cavitates suas reconditum aërem ita exagitat, ut eisdem aut ferè eisdem patiatur vibrationes, quas pateretur, si vibrationes illius argenteo malleolo excitarentur, quo scilicet parvis ictibus iteratis citissimè sese excipientibus incus parva percuteretur, quæ ex argento, vel alio quodam metallo valde sonoro, proindeque ad incussas sibi ictus validè repercutiendos apto conflata esset. Unde mirum non est, quòd ejusmodi vibrationes, cum ad ovale usque cerebri centrum pervenere, hanc excitent in anima ideam; quæ sonum præternaturalem tinnitus auris nomine vulgò expressum denotat.

Dissensus Anatomicorum tum veterum, tum recentiorum de numero, & usu muscutorum auris internæ veri eorum numeri, verique usus inquirendi mihi ansam præbuit, Viri spectatissimi; eos igitur multis abhinc annis sæpissimè indagavi, & partem hanc duobus tantum instructam esse semper observavi: hi nervulos

penè insensibiles à nervis quintæ conjugationis recipiunt, & vasculis sanguiferis etiam penè insensibilibus irrigantur, quæ sunt arteriæ carotidis, & venæ jugularis internæ propagines; illorum primus crassior & longior unicum ventrem, bina capita, binosque tendines habet; unde proculdubio factum est, ut Anatomici quamplurimi, qui oculatissimi habentur, eum duos musculos ab invicem distinctos esse putaverint. Verùm cum musculus iste unicum habeat ventrem, illum musculum unicum esse asserere ausim, quem, utpotè unico ventre instructum, musculum monogastricum nominare lubet.

Primum musculi monogastrici auris internæ caput vaginulâ membranaceâ vestitum è sinu exiguo osseo supra partem supernam aquæductus excavato emergit; secundum verò, quod merè carnosum apparet, non procul à latere externo exigui sinus ossei, de quo mox dictum, suam ducit originem. Fibræ carneæ bina diversa capita musculi, de quo nunc agitur, componentes invicem strictissimè uniuntur paulo antequam tympani cavitatem subeant, & tunc in ventrem vaginâ membranaceâ sat validâ undequaque cinctum unius & ejusdem musculi desinunt. Deinceps ipsæmet fibræ carneæ, de quibus jam loquor, versus tympani cavum sese porrigentes, paulo postquam illud subierunt, ab invicem separantur, & in binos tendines vaginulâ membranaceâ validâ indutos abeunt; horum primus secundo longior necnon gracilior, postquam sese parum sursum erexit, parvæ trochleæ membranosæ interventu huic ossis petrosi parti alligatur, cui insculptum est initium aquæductus Fallopii, seu canaliculi ossei, qui nervum durum auris admittit; ita ut officioso hujusce membranosæ trochleæ ministerio liberè motus omnes edat, quibus edendis dicitur: tendo iste deorsum reclinatus super gracilem malleoli apophysin ad perpendicularum descendit, eique
 annecti-

annectitur sese parum expandendo ; unde fit, ut ejus nexus ad cervicem usque ipsiusmet. malleoli extendatur.

Secundus musculi, quem jam describo, tendo primo brevior & crassior, multumque crassâ vaginâ membranaceâ vestitus in cavitatem tympani rectâ fere porrigitur, & mediæ capitis malleoli parti annectitur, ibique ita explicatur, ut ejus nexus ad corpus usque incudis protrahatur, adeoque binis ejusmodi ossibus invicem necitendis inserviat : tendo iste ossi, cui superfertur membranaceæ vaginæ suæ interventu alligatur.

Secundus auris internæ musculus ab Anatomicis quamplurimis rectè descriptus emergit è tubulo osseo excavato in parte infima ossis, quod portæ labyrinthi, & illius fenestræ interjicitur. Musculus iste musculo monogastrico supra descripto multò minor & brevior est. Hinc fit, ut illum musculum minorem auris internæ nominem. Ventrem carnosum sat crassum habet, & tendine suo maxime gracili capiti stapedis inferitur.

Dum musculus monogastricus auris in semetipsum contrahitur, longior illius tendo caput malleoli & corpus incudis parum sursum tollit. Dixi tendinem longiorem musculi monogastrici auris caput malleoli unâ cum incude parum solummodò sursum tollere ; quoniam tendo brevior ejusdem musculi, utpote capiti malleoli extremo suo fine annexus, quemadmodum longior illius apophysi gracili, atque cervici annectitur, longiori renititur, dum sese contrahit ; quia vaginâ suâ ossi alligatur, cui superjacet, ut supra notatum, & propter ejusmodi nexum versus superiora multum tolli nequit ; unde fit, ut tendinis longioris sese contrahentis nisi quodammodò resistat, & impediat nè caput malleoli unâ cum incude versus superiora multum tollat, ut supra mox notavi.

Ubi malleoli caput sursum tollitur, extremitas manubrii ejus necessario deorsum inclinatur, adeoque partem

tem mediam, cui adhærescit, exterioris membranæ tympani ex interioribus ejusdem tympani versus exteriora pellit, atque adeo illam tendit, ejusque superficiem planam, aut saltem ferè planam reddit,

Dum tendo muscoli monogastrici auris, de quo nunc, & malleolus hæc, quæ modò dixi, munia præstant, hanc extendunt membranulam supra descriptam, quæ membranam externam tympani ex transverso secare videtur, cum non desideratur. Ita ut ejusmodi membranula muscoli antagonistæ muscoli monogastrici auris vices quodammodò supplere videatur; quoniam vi sua elastica naturalem tensionis suæ statum recuperat, & eodem, quem tunc edit, nisu exteriori membranæ tympani ad statum naturalem tensionis, & figuræ suæ restituendæ conducit, cum hæc extremo fine manubrii malleoli premi cessat.

Quemadmodum elatione capitis malleoli versus superiora extremitas manubrii ejus parum deorsum inclinatur; sic etiam elatione incudis versus superiora extremitas internæ apophyseos illius paululum demittitur. Dixi modò elatione incudis extremitatem internæ apophyseos illius paululum solummodò demitti; quoniam incus ita sita est in fovea ossi marginem externam basios cavitatis tympani formanti incisa, ut corpus ejus fursum tolli nequeat, quin exterior illius apophysis extremitate sua citò innitatur ossi sibi subjecto, à quo hæc parum distat. Hinc fit, ut musculus monogastricus auris longiore tendine suo incudem versus superiora multum erigere nequeat.

Ex supra dictis clarè patet ut plurimum binas, & aliquando tres esse causas mechanicas propter quas musculus monogastricus longiore tendine suo incudem & malleoli paululum solummodò versus superiora tollit, adeoque internam apophysin ipsiusmet incudis, & finem extremum manubrii malleoli paululum tantummodò demittit.

Ubi

Ubi corpus incudis parum sursum erigitur, interna illius apophysis parum deorsum inclinatur, ut mox notatum fuit, & uno, eodemque tempore caput stapedis, cui lenticularis ossis interjectu annectitur, secum trahit, adeoque parum quoque illud demittit. Dum caput stapedis parum deorsum inclinatur, necessario superna pars baseos stapedis ejusdem à superna fenestræ labyrinthi parte, cui superjacet, nonnihil recedit, atque adeò illam paululum aperit & quodammodò pulsât, si ita loqui fas sit.

Ex his, quæ modò dixi, facilè intelligitur tendinem longiorem monogastrici aëris musculi auditui facilius ac perfectiùs excitando bifariam conducere. Primùm enim quatenus manubrii malleoli extremitate membranam anteriorem tympani tendit, & superficiem illius planam, aut fermè planam reddit ea ratione, qua supra explicatum fuit, efficit ut pororum ejus parietes nonnihil à se invicem diducantur, ac propterea materia ætherea, cùm ad hanc membranam appellit, incussis sibi ab objectis sonoris impressionibus onusta, illos ita patentes reperit, ut eos tympani cavum ingressura facilè permeet: Ubi verò tympani cavum ingressa est, levi suo pondere, licet sibi minimè incommodo (prædictis scilicet impressionibus) in ætheream sese exonerat materiam, quæ inibi conclusa aëris poros replet, quæque illas in labyrinthum per januam & fenestram illius transfert. Cum primùm objectorum sonorum impressiones ad interiora labyrinthi pervenerunt; eæ ibi loci spiritui animali intra diversas nervi mollioris auris propagines recondito, æthereaque materiâ gravido incutiuntur; spiritus verò animalis merum ipsarum characterem ad ovale cerebri centrum transmittit, ubi hanc excitat in anima ideam, cui ex placito Dei Optimi Maximi excitandæ aptus natus est.

Secundò longior musculi monogastrici auris tendo auditui faciliùs, ac perfectiùs producendo infervit, videlicet quatenus eâ, qua supra explicatum fuit, ratione supernam fenestrâ labyrinthi partem paululum aperit; quoniam dum hæc aguntur, pars una æthereæ materiæ incussas sibi ab objectis sonoris impressiones secum vehens secundum labyrinthi vestibulum faciliùs ingreditur, dum pars altera primum subit.

Iis, quæ contractionem tendinis longioris musculi monogastrici auris consequuntur, hæctenus explicatis, operæ pretium est, ut ea nunc explicemus, quæ contractione tendinis brevioris musculi ejusdem fiunt, ut commoda dignoscantur, quæ homini exinde nascuntur. Dum musculus monogastricus auris contrahitur, is brevioris suo tendine caput malleoli unâ cum incude versus seipsum parum obliquè trahit. Hinc fit, ut extremitas manubrii malleoli, & acumen internæ apophyseos incudis ex interioribus tympani versus exteriora necessariò inclinentur. Et verò dum finis extremus manubrii malleoli è cavo tympani versus meatum auditorium inclinatur, hic necessariò convexam partem, cui annexitur, exterioris membranæ tympani deprimit, adeoque naturali ejus tensioni augendæ, necnon utrique illius superficiæ planæ reddendæ plurimùm conducit. Ubi pars acuminata internæ apophyseos incudis ex interioribus tympani versus exteriora inclinatur, ut supra dictum fuit, hæc necessariò caput stapedis ossis lenticularis interventu sibi annexum secum trahit, atque adeò partem lateralem internam baseos hujusce ossiculi à parte quoque laterali interna fenestrâ labyrinthi nonnihil remonet, & tunc rimula interjicitur margini laterali ac interno baseos stapedis ipsius, & margini quoque laterali ac interno fenestrâ labyrinthi, quæ materiæ æthereæ incussis sibi ab objectis sonoris impressionibus onerata ac velut obsignata, & labyrinthum ingref-

ingressuræ aditum, sed arctum sanè, in concham præbet.

Ex his, quæ jamjam dixi, clarè patet binos muscoli monogastrici auris tendines iisdem muniis obeundis dicatos esse; licet motus eorum, utpotè in diversas loci partes prorogati, diversimodè fiant, quin sibi tamen ad-versentur, ut ex supra dictis facilè intelligi potest. Ac re quidem ipsa eorum unusquisque ratione sibi propria exteriorem membranam tympani tendit, planamque reddere nititur; atque adeò materiæ ætheræ incussas sibi ab objectis sonoris impressiones secum vehenti aditum in cavitatem tympani expeditiorem reddit: dum longior supernam fenestræ labyrinthi partem parum aperit, brevior ejusdem fenestræ partem lateralem internam nonnilil recludit, quò rimulà tunc ibi loci factâ ætheræ materiæ aliqualis portio concham subire queat.

Quod attinet ad actionem muscoli minoris auris internæ, hæc facillimè intelligi potest. Iste namque musculus, si originis & insertionis ejus ratio habeatur, in semetipsum contrahi non potest, quin stapedis caput, cui inseritur, ab exterioribus tympani versus interiora trahat, atque adeò partem lateralem externam fenestræ labyrinthi parum aperiat, ut materiæ ætheræ aditum in concham præbeat. Ex his clarissimè patet musculum minorem auris, de quo nunc, dum sese contrahit, & musculum monogastricum spectatum quâ tendine suo breviori agentem fenestram labyrinthi opposita prorsus ratione aperire. Hinc haud dubiè fit, ut propter oppositas motus naturales jamjam explicatos binorum ejusmodi musculorum labyrinthi fenestra nunquam multum aperiatur, imò & aperiatur tantum per latus suum externum musculo minore agente. Contra verò hæc ipsamet fenestra per superiora, & uno eodemque tempore per latus suum internum recluditur, ubi mus-

culus monogastricus sese contrahit, ut superius fuse atque nitide explanatum fuit.

Partes superius descriptas, quibus tympani cavum addornatur, muniis obeundis dicatas esse, quæ ab ipsis naturaliter præstari dixi, à nemine in dubium revocare potest; quandoquidem auditus toties læditur, quoties naturalis illarum status immutatur: neque tamen quempiam in hanc abire sententiam velim illas ad auditum excitandum absolutè necessarias esse; quia sæpe in sectione cadaverum humanorum observavi externam ut & internam tympani membranam, imò & aliquando majorem musculum illius portionem desiderari; quoniam hæ partes acri pure abscessus modò in foveolis apophyseos mastoidis, & modo in cavo ipsiusmet tympani producti corruptæ, prorsusque consumptæ fuerant; & tamen in omnibus his hominibus, quorum auris una vel altera abscessu pus emittente laboraverat, auditio in aure affecta prorsus abolita non fuerat, ut ab illis, dum erant in vivis, didici.

Singularum partium in cavitate tympani latentium (si officula quatuor non nemini nota excipiatis) structura, figurâ, mutua connexione, necnon genuinis unicujusque ipsarum muniis curiositate penè religiosa indagatis & explicatis, unum explicatu maximè difficile mihi perpendendum superest; videlicet an bini auris internæ musculi voluntariè, vel absque prævio ullo voluntatis actu motus illorum determinandi capace moveantur. Re attentè, quantum fieri potuit, perpensa, in hanc sententiam non abire non potui ejusmodi musculorum motum, utpote partim à voluntate, partimve ab impressionibus objectorum sonorum, insciâ, imò & aliquando reluctante animâ, determinatum, partim quoque voluntarium & partim involuntarium esse. Ac re quidem ipsa verosimillimum est hoc ipso voluntatis actu, quo ad aliquid facilè atque clarè audiendum determinamur,

terminamur, spiritum animale determinari ad fluendum versus musculos, de quibus mox dixi, ut motum illorum promoveat, cujus ope rei audiendæ perceptio expeditius & clarius fiat. Verum enimverò musculorum auris internæ motus merè voluntarius dici nequit; cùm nemo sit, qui propriâ experienciâ persuasum non habeat illos præter voluntatem sæpe moveri, ut jam dixi. Quæ cùm ita sint, extrinseca tantum causa detigenda superest, quæ ipsos ad sese movendos excitat, & ratio explicanda qua hæc causa suum producit effectum.

Quod ad causam extrinsecam attinet, quæ musculos auris internæ ad sese movendos determinat, nullam aliam excogitare licet quam materiam ætheream objectorum sonorum impressionibus onustam. Et verò hujusmodi causam ea, qua sequitur, ratione prædictos musculos ad motus suos obeundos excitare verisimillimum mihi videtur.

Dum materia ætherea repetitis vibrationibus suis, quæ sese modò citius modò tardius excipiunt, ad exteriorem membranam tympani appellit, tota ferè in concavam illius partem derivatur, & tum ad eam appellendo, tum ejus poros subeundo, & permeando illam percutit, & versus interiora capitis protrudit. Ubi autem concava pars exterioris membranæ tympani percutitur, & versus interiora capitis protruditur, annexam sibi extremitatem manubrii malleoli è meatu auditorio versus tympani. Cavum pellit, sursumque erigit, & uno eodemque tempore caput illius, eique alligatam incidem deorsum inclinat. Dum caput malleoli & incus deorsum inclinantur, binos tendines musculi monogastrici auris internæ ad se trahunt, totumque musculum extendunt, atque adeò illum ita disponunt, ut vim elasticam ipsius contractioni promovendæ aptam acquirat. Verùm cùm vibrationes aëris æthereâ materiâ imprægnati, utut citò

fiant & sese consequantur, exiguis quibusdam temporis intervallis semper ab invicem distinguantur, certo certius esse mihi videtur & temporis intervallo, quod inter primam, exempli gratia, & secundam vibrationem intercedit, prædictum musculus eâ, quam adeptus est, vi elastica, dum extensus fuit, lenique sua extensione determinari ad sese contrahendum, & spiritum animale avocandum, & reapse contrahi, juvante scilicet spiritu animali recens motricum fibrarum illius poros ingresso. Contractus autem musculus monogastricus stapedem ex interioribus tympani versus exteriora pellit, & sic musculus minorem auris internæ extendit. & ita disponit, ut vim elasticam ipsi contrahendo aptam adipiscatur, cujus ope determinatur ad sese contrahendum, & reverà contrahitur spiritu animali interveniente, statim atque musculus monogastricus rursus ea, qua mox explicatum fuit, ratione iterum extenditur.

Singulis partibus tympani cavum adornantibus descriptis, & mechanicis earum muniis accuratè, quantum fieri potuit, designatis & explicatis, partis alterius internæ auris, labyrinthi scilicet, exteriora & interiora lustranda veniunt, si priùs dixerim os, ex quo interiores singularum ejus cavitatum parietes conflati sunt, album, durissimum, necnon maximè compactum esse. Id autem à natura ita comparatum esse videtur, ut materia ætherea sonorum objectorum impressionibus onusta, dum prædictis impingitur parietibus, nihil aut saltem fere nihil motus sui amittat, atque adeò illum qualem ab objectis sonoris accepit, talem aut saltem fere talem communicet spiritui animali contento intra expansiones rami mollioris nervorum auris, quæ variis atque variis modis configuratæ variè atque variè interiora labyrinthi adornant, ut ex dicendis in sequentibus patebit.

In exterioribus labyrinthi, quem omnipotens intra petrosum os excavavit, & nunquam satis mirando modo effinxit tria tantum notatu digna sese offerunt, osseum nempe sepimentum supernam ejus partem occupans, quo intermedio ductus tres semicirculares illius ab invicem dispescuntur; & aperturae duae non procul ab invicem distitae, quae materiae aetherae aditum praebent è tympani cavo in labyrinthum. Portio illa ossis petrosi, quae ductibus tribus semicircularibus interjacet, ac proinde illos ad instar sepimenti ossei ab invicem dispescit, hoc peculiare habet, quòd textum interius ejus quamplurimis foveolis pervium sit, intra quas permultae capillares vasorum sanguiferorum propagines disseminantur. Et verò sanguis, quem ejusmodi vascula devehunt, miti calore suo naturalem fovet, atque conservat motum spiritus animalis in poris membranularum nervearum intra semicirculares labyrinthi ductus reconditarum hospitantis, atque adeò impedit nè supra modum condensetur, & auditui excitando ineptus evadat.

Binæ aperturae supra designatae in hac ossis petrosi parte sunt excavatae quae labyrinthi basim constituit: prima figuram habet ovalem, & situs ejus paulo altior est quam situs secundae: haec labyrinthi fenestra nuncupanda mihi videtur; siquidem conchae ac proinde labyrinthi interioribus inhiat. Hanc, de qua jam sermo habetur, aperturae interioribus labyrinthi inhiare non abs re dixi, cum haec parieti conchae incisa sit, quae pars illius est, cujus interventu reliquas inter partes ejus interiores communicatio quaedam habetur, ut infra dicitur. Huicce fenestrae stapedis basis applicatur, & illam claudit, quandiu auris internae muscoli otiantur; contra verò eam paululum recludit, quoties eorundem musculorum alteruter in semetipsum contrahitur, ut supra explicatum fuit.

Alteram binarum aperturarum, de quibus nunc agitur, ferè rotundam labyrinthi januam appello; quoniam hæc aditum præbet in parvam cavitatem fermè rotundam, qua itur ad labyrinthum. Etenim parva hæcce cavitas cum cochleæ extremitate ductus semi-ovalis spiralis illius, & cum concha rimulâ basi ejus incisâ, atque adeò cum ductibus semicircularibus in sequentibus describendis communicat, ut postmodum explicabitur. Quæ cum ita sint prædictam aperturam januæ labyrinthi nomine jure, meritoque à me insignitam esse nemo non videt. Janua ista membranulâ tenuissimâ velatur, & obturatur, quæ, utpotè rarissimam habens texturam æthereæ materiæ objectorum sonorum impressiones secum vehenti facilem in labyrinthum aditum præbet, ut superius dictum, explanatumque fuit.

Ex supra dictis intelligitur retro januam labyrinthi exiguam esse cavitatem, quæ primum illius vestibulum nominari posse mihi videtur; cum hæc eatur ad cochleam, & concham à clarissimo D. Duverney vestibulum labyrinthi nominatam. Ita ut tres semicirculares labyrinthi ductus, & cochlea sint veluti bini ejus andrones ab invicem conchâ distincti, & tamen ejus interjectu simul communicantes; proptereaque illam secundum labyrinthi vestibulum nuncupo.

Tenuissima hæc membrana, quam labyrinthi januam obturare superius dixi, in primum illius vestibulum exprorrigitur, totamque superficiem ejus interiorem cooperit, proindeque extrinsecus claudit rimulam basi conchæ incisam, & cochleæ finem extremum; ita ut hæc adhærescat tenuissimis membranis nerveis conchæ, & cochleæ interiora occupantibus, earumque interventu cum ramo molliori nervorum auris communicet.

Ut ordo, quem hæctenus in aure interna describenda servavimus, & postmodum servaturi sumus, auditus explicationem facilem planamque reddere queat, explorato

plorato primo labyrinthi vestibulo, secundum exploro. Vestibulum istud, quod idem ac concha veterum omnium anatomicorum sonat, multò magis amplum est quàm primum: cavitas ejus penè rotunda duarum circiter linearum diametrum habet; ita ut duo ferè tritici grana in tres vel quatuor portiunculas divisa in adultis continere possit, ut aliquoties expertus fui: in ea novem observantur aperturæ; bina nempe foramina exigua, penèque insensibilia, quæ in ipsam aditum præbent binis propaginibus exiguis rami mollioris nervorum auris inferiùs describendis; rimula sat longa nonnihil flexuata basi ejus incisa; ovalis apertura in pariete illiùs tympani cavum respiciente sculpta, & ab antiquis anatomicis fenestra ovalis nuncupata; & ostiola trium ductuum semicircularium, quæ quinque tantum sunt; quoniam ductus semicircularis superior, qua scilicet parte capitis posteriora respicit, inferiori cum ductu semicirculari ita coit, ut ambo sibi communi ostiolo unico conchæ interioribus inhient. Hinc fit, ut ostiolum istud unà cum recentioribus anatomicis portam communem nuncupem.

Singula ductuum trium semicircularium ostiola ita configurata sunt, ut ostium finem extremum tubæ occupans quadantenus referant. Ac re quidem ipsa semicircularium ejusmodi ductuum cavitatem, si attentè, quantum par est, exploretur, à media sui parte sensim ampliorem fieri ad binas usque suas extremitates oculis clarè patet, ac proinde illam ea fermè ratione utrinque finiri oportet, qua tubæ cavitas finitur: hæc, de quibus nunc sermo habetur, ostiola ita disposita sunt, ut duo summam, & duo imam conchæ partem occupent; quintum verò sat prope rimulam ipsiusmet conchæ basi incisam situm est.

In hoc secundi vestibuli labyrinthi latere, quod exteriora capitis respicit, exigui tres sunt canales rotundi, quos,

quos, utpotè in semicirculum inflexos, unà cum recentioribus anatomicis semicirculares appello. Et verò ut canales isti *ab invicem* distingui possint, illis distincta nomina ab eorum situ desumpta tribuam: *primum* superiorem nuncupabo, quòd arcuatum conchæ laquear *circumdet*: *secundum* inferiorem quòd imas ejusdem laquearis conchæ partes cingat: *tertium* verò, quippe qui inter primum & secundum situs est, medium nominabo.

Semicircularis ductus superior, cum primum è vestibulo prodiit, sursum tendit, sursumque tendendo paululum in semetipsum inflectitur; ubi verò paulo plusquàm dimidium circulum descripsit, & ad medium usque posticæ ossis petrosi partis sese parum incurvando exporrectus fuit, inferiori committitur canali, ut mox diceretur.

Secundus semicircularis ductus, quem inferiorem nominavi, ex ima conchæ parte prodiit, & decurso paulo majori quàm dimidii circuli spatio, ductui semicirculari superiori jungitur, ut modò dixi; itaque bini ductus isti in unum planè coalescunt, qui obliquè protenditur, donec in ostiolum illud desinit cæteris ostioliis paulo amplius, quod porta communis nuncupatum fuit.

Tertius ductus semicircularis, quem medium vocavi, separata duo habet ostiola, nec plusquàm semicirculum describit. Ductus isti, quorum superficies interior valde lævigata est, ut plurimum interiùs rotundi sunt, & aliquando figuram ovalem imitantur.

In hoc secundi vestibuli labyrinthi latere, quod tribus ductibus semicircularibus oppositum est, & capitis interiora respicit, alterum labyrinthi andronem cochleam dictum, collocavit natura. Cochleam in binas divido partes, quarum prima cochleæ nomen retinet, & cavitatem habet, quæ lentem crassiorem facile admittere

mittere posset : altera verò pars ductus semi-ovalis spiralis dicitur. Hâc rami mollioris nervorum auris portione, quæ per cochleam disseminatur, exemptâ, osseum mediæ illius basi adnatum corpus observatur lineâ circiter unâ longum, in spiram dispositum, & quadantenus pyramidale, ac proinde nucleus pyramidalis cochleæ nuncupatum. Hicce cochleæ nucleus circa mediam sui partem lateralem capitis interiora respicientem tenui laminâ ossêâ pellucidâ innititur, quæ marginem ostii ductus semi-ovalis spiralis partim constituit, imò & latus internum secundi gyri laminæ spiralis prædicto nucleo pyramidalis circumductæ partim format ; ita ut secundus ille gyrus laminæ spiralis, de qua jam dixi, partim osseus, partimve nerveus sit.

Intra medium nuclei pyramidalis textum unum excavatum est foramen valde sensibile. Non procul ab acumine nuclei pyramidalis jamjam descripti tenuissima in adultis observatur prominentia ossea in orbem disposita, & quarta circiter lineæ unius parte lata, quæ superficiem internæ cavitatis cochleæ adnata est, proindeque illam apophysin orbicularem cochleæ appello. In medio osse cochleæ extremitatem formante una excavata est foveola. Cæterùm tota superficies interior cochleæ valde lævigata est, & si microscopii interpositu inspiciatur, quamplurimis foraminibus exiguissimis pervia apparet, potissimùm in ea parte, quæ nuclei pyramidalis basi circumjacet.

Secunda cochleæ pars est ductus semi-ovalis spiralis, ut supra notatum, qui à basi cochleæ, ubi suum habet initium, ad supernam primi vestibuli labyrinthi partem, & rimulam usque basi secundi incisam protenditur: cavitas ejus ita conformatur, ut in semi-ovalem spiram disponatur, & circa finem paulo latior sit, quàm circa initium : hac rami mollioris nervorum auris portione semota quæ per eam disseminatur, in illa processus osseus

tenuissimus observatur, qui à latere interno baseos nucleï pyramidalis cochleæ ad extremitatem usque illius porrigitur. Hunc processum osseum, utpotè minimum, lineam osseam ductus semi-ovalis spiralis cochleæ nominare lubet. De cætero tota superficies interior ejusmodi ductus exiguissimis pluribus foraminibus pervia valde lævigata est, si hanc partem illius exceperitis, in qua linea ossea, de qua supra, prominet.

Totius auris internæ labyrinthi interioribus exploratis, & accuratè, quantum fieri potuit, descriptis, reliquum est ut varias rami mollioris nervorum ipsiusmet auris propagines, quæ per ea disseminantur, exactissimè describam. Ramus mollior nervorum septimæ conjugationis ramo duriore crassior, licet multò pauciores quàm in le fibras medullares à processu *annulari* recipiat, *internum* auris ductum ingressus in tres dividitur ramulos; *superiorem* nempe, *infimum*, & *medium*: superior conchæ cavitatem subit per foramen peculiare supernæ illius parti incisum; ibique in membranam tenuissimam rarissimam necnon mollissimam explicatur, quæ totam ejus superficiem cooperit, si fibrillam illius excipiat retinentem formam nervuli, qui innititur & adhæret exiguæ apophysi osseæ nonnihil acuminatæ marginem internum supra notati foraminis occupanti, & ob superficiem suam parum inæqualem, nerveâque membranâ albicante jamjam descriptâ coopertam exiguum apicem album quadantenus æmulanti. Nervulus ille mollissimus tenerrimusque arteriolam & venulam comites habens, quæ latera illius occupant & immediatè tangunt, ubi secedit ex apophysi ossea, cui eum-innixum & adhærentem esse modò dixi, mediam conchæ cavitatem instar funiculi tensi decurrit, & ad latus usque portæ ductui semicirculari superiori & ductui semicirculari inferiori communis porrigitur, eique adhærescit, ac deinceps portam communem subit, eamque subeundo

fubeundo in binas expanditur membranulas, quarum una superficiiei interiori cavitatis ductus semicircularis superioris, & altera interiori quoque superficiiei cavitatis ductus semicircularis inferioris superstermitur. Infimus ac minimus rami mollioris nervorum septimi paris ramulus unâ aut alterâ penè insensibili fibrillâ emissâ, quæ disseminatur intra textum interius hujus ossis petrosi partis intra quam semicirculares labyrinthi ductus excavati sunt, per exiguum foramen subit, cujus interventu in infimam conchæ partem sese insinuat, & inibi explicatum tenui huic membranæ formandæ impenditur, quam interiori conchæ ipsius superficiiei superstratam esse supra dixi, si portiunculam illius exceperitis, quæ ductum semicircularem medium ingreditur per foramen situm paulo subtus portam communem, de qua superius, ibique in membranulam tenuissimam expanditur, quæ interiori ductus illius superficiiei superstermitur.

Nervæ membranulæ tenuissimæ interiora ductuum semicircularium labyrinthi occupantes irrigantur vasis sanguiferis exiguissimis, & ut plurimum oculorum aciem fugientibus, dum scilicet nullum, vel paucissimum tantum sanguinem intra per exiguas cavitates suas continent. Ipsæmet membranulæ, utpotè limpidissimo ac subtilissimo liquore spirituosissimo imbutæ, præsertim in recens natis, adeò molles sunt, ut vix tangi possint, quin dilacerentur, ut ut leviter instrumento quovis tangerentur. Præterea illæ, si radiis solaribus excalescens aëri exponantur, citissimè exsiccantur, & ita friabiles evadunt, ut, si è sede sua dimoveantur, in frustula minima dividantur, terantur, & redigantur in pulverem subtilissimum, qui facillimè tenues evanescit in auras. Limpidissimus pariter liquor spirituosissimus, quo membranulas, de quibus nunc, semper imbutas esse dixi, & qui nihil aliud esse videtur quàm spiritus animalis ob nativam loci quem occupat frigiditatem nonnihil condensatus, ferè momento citius dissipatur, postquam ductus se-

micirculares labyrinthi aperti fuerunt, quos in recens natis ejusmodi liquore semper repletos observavi. Hoc autem aliter sese haberet necessariò, si quinque ostiola, quibus semicirculares labyrinthi ductus interioribus conchæ inhiant, membranâ nerveâ superius descriptâ naturaliter obturata non essent. Nequaquam tamen dubitandum mihi videtur, quin liquor, de quo modò locutus sum membranæ nerveæ conchæ poros sensim sine sensu subeat, & impediat ne supra modum exsiccet, hinc fit, ut nativam illius temperiem conservet; quæ scilicet auditui excitando conducit.

Ex supra dictis patet incisam conchæ basi rimulam, & ovalem illius fenestram, ut & quinque ostiola ductuum trium semicircularium labyrinthi nerveâ, tenuissimâque membranâ obturari, quæ conchæ interiora occupat, ut supra dixi.

Medius rami mollioris nervorum septimi paris ramulus juxta hanc ossis petrosi partem, quæ basis est nuclei pyramidalis cochleæ, plures emittit fibrillas, quæ cum primò cochleam ingressæ sunt arteriolis & venulis commitatæ suam inibi formam mutant, & sequenti ratione disponuntur, atque distribuuntur: Imprimis tenuis illarum membrana, quam piæ meningi acceptam referunt, ita explicatur ut desinat in membranulam tenuissimam, & numerosissimis vasculis sanguiferis irrigatam, quæ primò cooperit superficiem basæos nuclei pyramidalis cochleæ, & quicquid ab illa usque ad secundum gyrum laminæ spiralis ipsiusmet nuclei pyramidalis continetur, ac deinceps in Ductum semi-ovalem spiralem ejusdem cochleæ porrigitur, & ita expanditur, ut finem illius extremum obturet, & totam ejus superficiem, imò & utrumque latus laminæ spiralis semi-ovalis inibi reconditæ obducatur. Et verò hæc membrana, cum tenuissimæ, rarissimæque texturæ sit, non impedit quoniam materia ætherea continuò & expeditè è tympano in labyrinthum, singulosque illius recessus transeat, licet ductus
femi-

femi-ovalis spiralis cochleæ finem extremum obturet, ut supra notatum. Hinc fit ut sita retro labyrinthi januam cavitate ad labyrinthum ipsum iri supra dixerim.

Quod attinet ad substantiam medullarem fibrillarum nervearum, de quibus nunc sermo habetur, hujus portio una impenditur formando secundo gyro laminæ spiralis nucleo pyramidalis cochleæ circumductæ, cujus scilicet gyri latus internum merè osseum est, ut superius insinuavi: altera verò portio initium ejusdem laminæ spiralis primùm format, quod in dimidio tantùm gyro merè nerveo consistit, ac deinceps in ductum semi-ovalem spiralem cochleæ porrecta desinit in laminam spiralem semi-ovalem verè nerveam, quæ inibi reconditur, quæque crassiore sui parte lineæ ossæ hujusce ductus adhærescit. Ita ut initium laminæ spiralis nuclei pyramidalis cochleæ sit etiam initium laminæ spiralis semi-ovalis, quam modo descripsi. Ejusmodi autem lamina spiralis semi-ovalis ad extremum usque finem ductus, intra quem latitat, exporrecta nonnihil acuminata extremitate sua mediæ parti rimulæ basi conchæ incisæ adhærescit, adeoque ejusmodi ductum in partes binas dispescit, inter quas nulla est sensibilis communicatio: binæ istæ partes ductus semi-ovalis spiralis cochleæ ita dispositæ sunt, ut prima, quæ capitis interiora respicit, cum primo & secundo vestibulo labyrinthi communicationem habeat; secunda verò tympanum, proindeque capitis exteriora respiciens cum concha tantùm communicat.

Medius rami mollioris nervorum septimi paris ramulus, fibrillis tenuissimis modò descriptis emissis, foramen exiguum intra medium textum nuclei pyramidalis cochleæ incisum subit arteriolam, venulamque comites habens, & cum primùm ex illo egressus est, tenuissima ejus membrana ita explicatur, ut cooperiat quicquid à secundo gyro laminæ spiralis nuclei pyramidalis cochleæ partim osseo & partim nerveo, ut supra dictum, usque

ad extremitatem ejusdem cochleæ continetur; medullaris verò illius substantia desinit in tertium gyrum totum nerveum laminæ spiralis, de qua mox dixi, qui circumferentiâ sua innititur, & adhæret apophysi orbiculari cochleæ; demumque pars illius extrema in membranulam expanditur, quæ undequaque paululum in semetipsam inflexa margini foveolæ in media extremitate cochleæ excavatæ applicatur, & adhærescit, atque adeò parvam format cavitatem exiguum poculum clausum imitantem, cui innatus tantùm aër inest,

Ex jam dictis patet laminam spiralem intra cochleam reconditam dimidio uno gyro, & gyris duobus integris solummodò constare, qui exiguis cavitatibus innato aëre repletis, inter quas nulla est sensibilis communicatio, ab invicem distinguuntur. Hîc notandum venit quod lamina spiralis nucleo pyramidali cochleæ circumducta, & lamina spiralis semi-ovalis intra ductum semi-ovalem spiralem ejusdem cochleæ recondita, ut & membranulæ nerveæ interiori superficiei ductuum trium semicircularium superstratæ succo limpidissimo spirituoso, præsertim in recens natis, imbutæ sunt, qui apertâ cochleâ visu deprehenditur, & citissimè dissipatur. Interior verò, seu medullaris ac verè nervea substantia prædictarum laminarum brevi exsiccat, & valde friabilis evadit, si calido aëri aliquandiu exponatur, ut supra notatum.

Ex iis, quæ modò dixi de ramo molliore nervorum septimæ conjugationis, facillè intelligi posse mihi videtur binas superiùs descriptas laminas spirales nerveas unâ cum tenuissimis nerveis conchæ, & ductuum trium semicircularium interiora occupantibus immediatum atque completum auditus organum constituere; adeò ut pro diversis moribus, qui in eo, quem proprios intra poros recondunt, spiritu animali ab objectis prædicti sensus excitantur, & communi sensorio communicantur, diversæ in anima soni ideæ producantur.

Afferuit mihi, Viri Clarissimi, D. Baro de la Mousson vir nobilis istius urbis se Londini mense Julio anni proxime

proximè elapsi didicisse à clarissimis viris D. D. Briggs & Silvestre medicis celeberrimis vos pro ea, qua nati estis tum humanitate tum honestate summa me Regiam in societatem vestram cooptrasse. Si eò fœlicitatis pervenerim, ut me socium habere non dedigmeni, de cooptatione mea inexpectata amplissimas vobis gratias habeo; de mea, inquam, cooptatione vobis iterum gratias habeo, quæ, utpotè mihi perhonorifica, mihi quoque perjucunda non esse non potest. Cùm enim honor omnis jucundus semper accidit, tum verò ille jucundissimus, qui à talibus, tantisque Viris profectus est, quales vos, ego, quantosque esse intelligo. Ad vos, nobilissimi viri, binas de sanguine dissertationes intra paucos dies mittam, quæ omnes haud dubiè perfectio- nis gradus, qui in iis desiderantur, acquirent, uti spe- ro, apud vos, quibus nihil eorum, quæ nosse mortali- bus datum fuit, non notum est: imò & identidem lu- cubrationum mearum fructus aliquos typis excuden- dos, & publicis scriptis vestris adjungendos vobis com- municabo, si vobis id gratum fore mihi videbitur. In- terim meas circa organum auditus animadversiones à clarissimo viro D. Herbert nobili anglo vobis meo no- mine offerendas accipite: si minùs placent, pro meis non habebo, si secus, nec docti cujusquam judicium, nec publicam lucem reformidabunt, cujus usuram vos ipsi concedatis, quæso, iis, si vobis Dignæ videantur, quæ publici juris fiant. Valetè, viri spectatissimi, & me vobis devinctissimum in ære vestro numerate.

Raymund. Vieuffens, D.M.M.

Monspeliū die vigesi-
ma mensis Februarii
anni 1699.

III. *A Letter from Dr. William Musgrave to Dr. Sloane, being an Argument for the more frequent use of Laryngotomy, urg'd from a remarkable Cure in Chirurgery; perform'd by Mr. John Keen of Roch in Cornwal.*

SIR,

IT cannot pass your Observation, that the erroneous Opinions, and unhappy Prejudices; entertained by Mankind, in matters of Physic; have occasioned great Calamities, and been of Pernicious Consequence to them.

It was no small number of Men, that some years since, lost their Lives, from an Aversion to the Jesuits-Bark: depriving themselves of the Use and Advantage of that excellent Drug, from a Reason merely nominal.

The like unaccountable Humour obtained a long time against the use of Opiates, and a Temperate Regimen in the Small Pox; by which single Method, the famous Dr. *Sydenham* has in all probability already preserv'd more of his Countrymen, than in the last ten years fell by the Sword, in *Ireland* and *Flanders*.

Of such destructive Consequence are Errors of this kind, when they become Fashionable and Establish'd; and of such Public Advantage is it to hinder their Growth, and taking Root in the minds of Men.

We are still Labouring under many Prejudices of this Nature; some quite excluding, others rarely admitting, even in the utmost extremity, most advantageous Methods of Physic. I will at present mention only one; that is *Laryngotomy*, and set forth the groundless

less Exceptions, and needless Fears, commonly express against this safe and useful Operation.

Laryngotomy is highly to be valued, for that in the greatest extremity, when a Man is in most imminent danger of Suffocation, and to all appearance within very few minutes of his last, by opening a new Passage for Breath; it gives speedy and certain Relief, and this when all other Methods fail: and without any considerable Injury from the Instrument. The Patient, in a Minute or two, is brought from the struggles of Death; to a state of Complacency, Ease, and Security. In the large Field of Practical Physic; perhaps there is not any one Method that works so great a Change, for the better, in so short a time.

But however Beneficial this Operation is, in itself, we find it seldom practis'd; very seldom in Comparison to the occasions for it. That Gap which appears on the cutting a Throat, (the divided Parts being then drawn to their other more fixt ends;) together with the great Flux of Blood, when the Jugulars, and Carotid Arteries are also wounded; create in most Men a dread of this butcherly Operation; and make those, especially who are unacquainted with Anatomy, suspect all Wounds of the *Trachea*, as mortal; and oppose *Laryngotomy* under all the most urgent Circumstances.

This Prejudice is still of worse Consequence, for that Squinzies may be, as they often have been, Epidemical; (instances of which we have in *Panarol*, *Wier*, *Hippocrates*, &c.) in which Case this Operation becomes of more frequent necessity; and greater numbers of Men must perish for not admitting it:

In order to wipe off this Prejudice, (as far as Argument will go in this Matter ;) it may be affirm'd, that *Laryngotomy* is in great danger of Suffocation, allowable, and the Wound curable: for that, (to argue *à fortiori*) when the *Trachea* has been Cut through, the Parts have been joyn'd together, and the Wound cured.

Indeed, the *Encyclopædia Chirurgica* (Lib. 2. cap. 4) has these words, *Quæ (vulnera scilicet Asperæ Arteriæ) ut plurimum periculo sunt plenissima; præsertim si vasa Jugularia simul sint discissa, aut ipsa Arteria integrè per transversum dissecta; quæ nullâ Arte denuò connectitur, sed Machine humane totalem affert destructionem.*

But, in opposition to this Voluminous Authority, I beg leave to present you, with the following Observation, sent me by an Ingenious Chirurgeon, Mr. *John Keen* of *Cornwal*, who perform'd the Cure. You have it under his own Hand.

Nicholas Hobb, of *St. Enodor* in *Cornwal*, aged Sixty three or thereabout, was some time in *March 1696.* at a distance from any House set on by *Ruffians*, who first by a Blow on the *Occiput* knockt him to the Ground; then transected the *Trachea* somewhat beneath the *Pomum Adami*, together with several of the adjacent Muscles, and some large Blood-Vessels; from which he lost a very great quantity of Blood, seen afterwards lying on the Ground. The *Ruffians* having Robb'd him, and thinking him either dead, or past all recovery, left him. After some time the Wounded Man recovers so much Sense and Strength as to thrust his Neckcloth into the large and gaping Wound, and by degrees to crawl Home to his own House, not far from the Scene of this Tragedy. In

In this lamentable condition I was sent for, and after examination of the Wound, and considering the great Flux of Blood, I was not more surpris'd at any thing than that the Patient was then alive. There seem'd to be no manner of hopes, not the least prospect of Recovery: however, in order to an attempt, I endeavour'd to suppress the Hemorrhage, and to join the divided parts.

Lipothymies came frequently upon the Patient, especially upon every little motion of his Body, and gave great interruptions to the Methods of Chirurgery, and less'n'd our hopes of a Cure. His frequent *Lipothymies* were after some time succeeded by Convulsions, and then indeed I thought his Thread of Life very near an end.

Another great difficulty arose from the parts of the *Trachea* being now at a vast distance from each other. The lower part being every turn of Inspiration sunk deep into the Neck as low as the *Clavicula*, and just appeared upon every Expiration.

To surmount these Difficulties, and particularly to secure fast hold of the lower part of the *Trachea*, I order'd a lusty strong Fellow, then present, to hold the Legs of the Patient over his Shoulders, and by this means raise them, together with the *Abdomen*, above the *Thorax*, *Collum*, &c. in which Posture the divided parts came so near to each other, that with strong waxen Thread I sew'd together several of them: but as to the Divisions of the *Trachea*, I secured them together by passing large Needles deep into the Flesh on each side, and twisting strong waxen Thread about them as in *labio fisso*. Over all, for greater security, I applied a Restrictive (*ex parte restring. Clowes*) covering the greatest part of the Neck with a Defensative,

Ex bolo cum albumine ovor. advising the Patient to lie as quiet as he could.

The Patient now begins again to Speak, and as well as the Cough, difficulty of Breath, and his weakness would allow, softly, and with a low Voice gives an account of the occasion as above.

An *Arteriac* was then made up for him (to smoothe the *Trachea*, and promote Expectoration) *è Troch. Pectoral. Batean.* (in aq. *Stephan* $\mathfrak{z}\beta$. *Solut.*) $\mathfrak{z}\text{iii}$. *Syr. Tussilag.* $\mathfrak{z}\text{i}\beta$. *Balsamic,* $\mathfrak{z}\text{i}$. *pulv. Anis. Glycyr. ana* $\mathfrak{z}\text{i}$. *Balsam. Sulphur. terebinth.* $\mathfrak{z}\beta$. *Peruv. gut. vj. cum mellis opt. despumat. q. s. fiat Linctus per Bacillum Glycyr. sapius ad libend.* From the use of which his Cough abated, and he discharged by Expectoration much Grumous Blood and other Matter.

As to the Convulsions and *Lipothymies*, I applied to his Nostrils *Spir. C. C. Succin. &c.* and Embrocated the back part of his Neck with a Liniment, *ex ol. Lil. Alb.* $\mathfrak{z}\text{i}$. *Tereb. Succin. ana* $\mathfrak{z}\text{i}$. *N. M.* $\mathfrak{z}\beta$. *Ung. Nervin.* $\mathfrak{z}\text{vj}$. *Mis.* And then took leave, and upon my return the next day found the Convulsions had left him; nor had he from that time any return of them, or of the Syncope.

But on the fourth day the Stitches were torn open, the Wound appear'd large enough to admit a middle siz'd Hand: a great part of the *Oesophagus* appear'd in view much inflam'd and scratcht by the Instrument. The *Epyglottis* did not as usual, cover the *Rima* of the *Larynx*, so that I could easily see up into the Mouth, part of the Annular Cartilage was cut obliquely, and hung only by a little Fibre to the upper part of the *Larynx*, &c.

Indeed I met with frequent Ruptures, the wax Thread and Needles often fretting through the Flesh they

they held, and was by them put back in my Cure; but I as often repeated the said Stitches in manner and method as before-mentioned.

About the tenth Day the larger Blood-Vessels appear'd conglutinated and covered with new Flesh; the *Gula* of good Aspect, the Inflammation of that and all the Neighbouring parts gone. I now dress with Liment *Arcei*.

On the Eleventh the symptomatic Fever was in a manner gone, and the Wound under the circumstances of good digestion.

In the mean time the Diet when he could swallow was of Mutton-Broth, Ale-Meat, Poacht-Eggs.

The Cough continuing a long time very severe, was at length overcome by duly adhering to the *Linctus* aforesaid, with repeated Boles of *Balsam. Lucatel. Conf. Rosar. Rub. horâ somni*, with a Draught of a Pectoral Decoction, used also instead of common Drink To mitigate the violence of it, and procure him Sleep, the following *Haustus* was frequently used, and never fail'd our expectation. *R. Ol. Amygdal. Dul. Rec. Express ʒβ. Syr. de Mecon: ʒv; Laud. Lond. (Aq. Steph. ʒij. Solut.) gr. ij. fiat haustus horâ somni sumendus.*

About the Eleventh and Twelfth Days we plainly discovered little Portions of new Flesh arising not only from the Carneous Membrane incumbent on the Gullet, but also out of the Substance of the Cartilages themselves, both on the upper and lower parts of the divided *Trachea*. The external containing parts of the Neck began now to unite by Incarnation; new Flesh arising and apparently lessening the dimensions of the Wound every time there was a Laceration of the Stitches, insomuch that two Needles were now sufficient, whereas I used in the beginning not less than six.

fix. And those Carneous Portions both of the *Trachea* and Exterior parts, gradually joining and inter-mixing, became one solid *Cicatrix* from each end of the Wound almost to the middle of the Wind-Pipe, where the Air continued in some degree to have an Exit.

About the Fifteenth Day I removed several pieces of Bones which had contracted a Caries in the Cartilage (which in this old Man as in many others was grown Osseous) and were thrust out by the New Flesh.

He now Swallows with little trouble, Eats sufficiently, and nourishes in Proportion. The Aperture about the Twenty sixth Day was almost clos'd up, and in Four or Five Days more the sides of the Wound were perfectly join'd and Cicatriz'd, the *Trachea* performing its part in Respiration as at other times without any considerable inconvenience.

He speaks indifferent well, but is forc't to take care in swallowing, the *Rimula* not being exactly shut as before the Wound, which makes Liquor of any sort more apt to fall into the Canal, and so cause a Cough, Hoarsness, &c. He does not Swallow dry Meats as well as formerly, but in all other respects is as well as ever.

This Cure was in this manner perform'd by me *John Keen*, of *Roch in Cornwall*, in the Year 1696. as above.

This signal History affords Matter for much Observation; but the only use I shall at present make of it, is, that if, in a Person of this Age, (above Sixty;) if in a Wound whereby the *Trachea* was Cut through, and several of the Cartilages beaten together; the divided parts of the *Trachea* may be made to unite and
grow

grow together, (as in the present Case ;) certainly then *Laryngotomy*; which is a much less dangerous Wound indeed, but little in Comparison to it: in violent Squinzies, in danger of Suffocation, from Causes of a like nature with them; may safely, and ought to be put in Practise. The Disadvantage is a slight Wound easily cured; the Advantage nothing less than the Life of a Man.

Exon. Dec. 28.

1699.

F I N I S.

AN ADVERTISEMENT.

Viris Eruditis Saciæ Antiquitatis Studiosis Joannes Anif-
sonius. Præfectus Typographeo Regis Christianissimi.

COEPTA sunt nuper à nobis Acta Conciliorum, cum E-
pistolis Decretalibus & Constitutionibus Summorum
Pontificum Regiis typis imprimi. Damus autem operam, ut
& elegantia characterum & chartæ nitore, priores reliquas
editiones hæc editio longe antecellat.

Prodire enim vero in adeo utile Reipublica Christiana
opus è suo Typographeo Christianissimus Rex LUDOVICUS
MAGNUS: jussitque nulli in eam rem opera vel sumptui
parci. Optat ille nimirum, ut & legentium oculos illicit
detineatque cum voluptate perfectio artis in eo opere: & po-
tissima sumptuum parte in se ultro suscepta, sentiant in hoc
quoque genere Regiam munificentiam, tum viri Principes,
quos hisce voluminibus muneraturus est: tum privatus quis-
que, non modo è subjectis sibi, verum etiam ex universo
orbe Christiano facta scilicet omnibus copia comparanda hu-
jus editionis Regiæ multo minori pretio, quam quæ privati
cujusquam Typographi, aut collatitiis societatis ullius Ty-
pographica impensis prodire possit in lucem.

Contulere certe annos jam complures in emendationem
Græci Latinique contextus, collectionemque diversorum mo-
numentorum & variarum lectionum ex quamplurimis optimis-
que Mss. ad hanc editionem omnibus numeris absolvendam, vi-
ri pereruditi: quibus si quis aliquid nihilominus indican-
dum putaverit, quod huic operi locupletando & perficiendo
prosit, scriptis ad nos literis ut id efficiat flagitamus; præ-
stituri vicissim, ut ejusdem fiat, collatiquæ ab eo beneficii
mentio perhonorifica in præfatione operi præfigenda. Parisiis,
v. Kal. Maias, anni MDCLXXXIX.



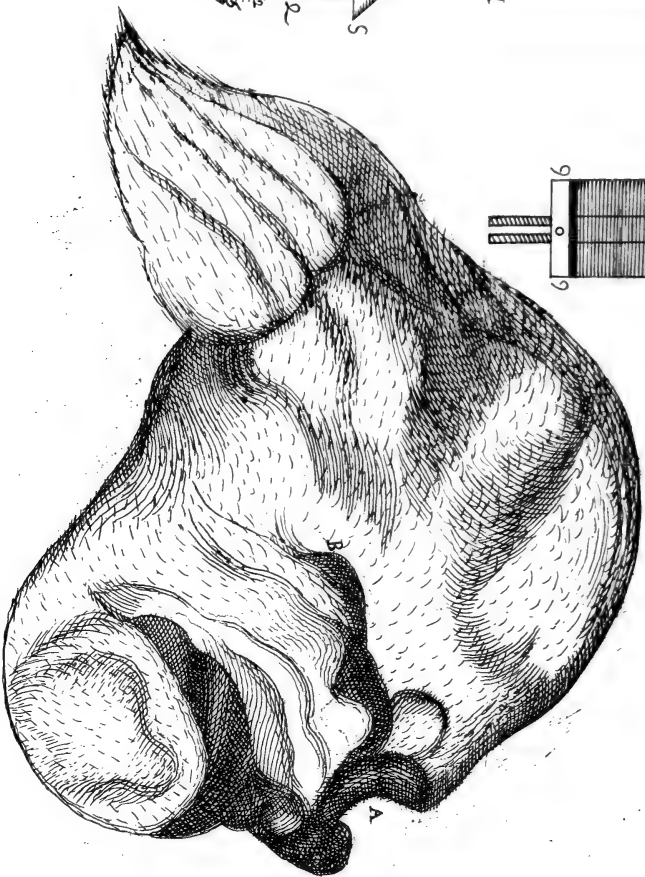


Fig: 11:

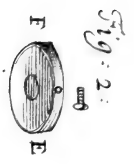
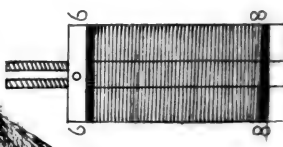
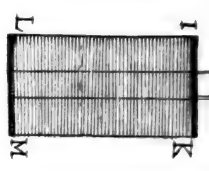


Fig: 2:

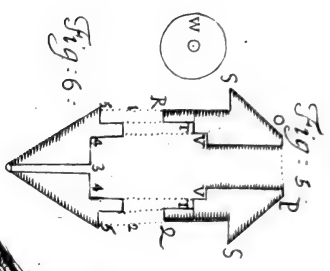


Fig: 6:

Fig: 5:

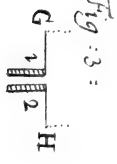


Fig: 3:

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Fig: 1:
B
A

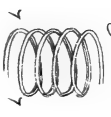


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Fig: 4:

Fig: 7:



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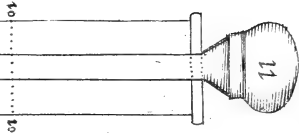


Fig: 9:

Fig: 10:

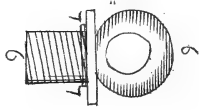
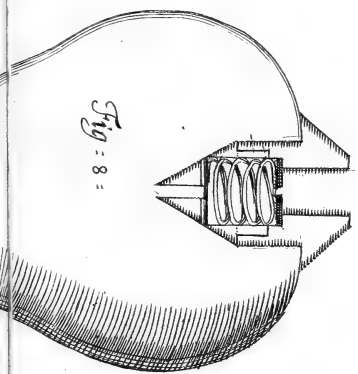
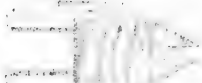


Fig: 8:





PHILOSOPHICAL TRANSACTIONS.

For the Month of *December*, 1699.

THE
C O N T E N T S.

- I. **A** *Letter from Mr. Thomas Luffkin, to Dr. Sloane, concerning the application of the Pneumatick Engine to Cupping-Glasses.*
- II. *A Letter of Dr. Wallis to Dr. Sloane, concerning the Quadrature of the Parts of the Lunula of Hippocrates Chius: performed by Mr. John Perks; with the further Improvements of the same, by Dr. David Gregory, and Mr. John Caswell.*
- III. *Responsio ad Animadversionem ad Davidis Gregorii Catenariam, Act. Eruditorum Lipsiæ Mense Februarii An. 1699.*
- IV. *A Relation of two Monstrous Pigs, with the resemblance of Humane Faces, and two young Turkeys joined by the Breast, by Sir John Floyer, Communicated by Dr. Edward Tyson, Fellow of the College of Physicians, and R. S.*
- V. *A Letter from the Reverend Mr. Hugh Jones to the Reverend Dr. Benjamin Woodroffe, F. R. S. concerning several Observables in Maryland.*
- VI. *An Index to the Philosophical Transactions, from Numb. 247. to 259. inclusive.*

I. *A Letter from Mr. Thomas Luffkin to Dr. Sloane, concerning the Application of the Pneumatick Engine to Cupping-Glasses.*

TRes quatuorve jam effluxêre menses ex quo à Clarissimo omnique laude Dignissimo Doctore Joanne Wallisio literas accepi, quibus exoptat ut descriptionem applicationis Organi Pneumatici ad cucurbitulam (à me fratreque meo excogitatam) tibi communicarem. Quamvis tempus tunc amœnioribus Matheseos Studiis tererem tamen diutius generi humano tam utile inventum ab erudito mundo detinere par non existimavi præcipue cum ejusdem publicatio mea, tam ingenioso viro (quem alterum Archimedem vocare soleo) desiderata erat: itaque morem gerens Inclitissimo viro subsequenter descriptionem compilavi, quam precor ut sereno animi vultu à me accipias, (quia adolescens scribo) locumque ei quendam in eruditissimis actis publicis Philosophicis concedere digneris.

Organi Pneumatici Descriptio, &c.

Sit A B (Fig. 1.) cylinder æneus concavus idoneæ crassitudinis cujus diameter sit unius longitudo verò decem, aut duodecim unciarum, parsque interna exquisitissimè lævigata ut nimirum nulla rimula remaneat, sitque ei propè fundum parvulum foramen O; porrò sit (operculum) E F; (Fig. 2.) fundus G H (Fig. 3.) illud duabus cochleis, hic cemento metallico cylindro nexus, adsit fundo nasus 1, 2 medio perforatus; & ejusdem parti externæ ad modum cochleæ. Fiat virga ferrea N N (Fig. 4.) idoneæ crassitudinis, & longitu-

longitudini cylindri adaptata ; ad ejusdem extremitatem lamina, ænea LM, & propinquiùs duabus unciis cacumini altera IK ; spatiumque intermedium ita filis linteis oleo madefactis replendum est, ut perfectissimè cavitatem cylindri claudat ; adsit tandem manubrium N. Ex his partibus complexum haud dissimile est Syringæ Chirurgorum. Formetur etiam cylinder æneus OPQR (Fig. 5.) magnitudinem figuræ, adæquans duabus alis O S P S, per axem perforatus tam magno foramine, ut ejusdem pars interna formâ cochleæ feminæ modificata, accuratè cochleam marem nasi recipiat ; porrò augeatur foramen ab R & Q usque ad T T ; tandemque fiat humerus V V & formetur lamina W medio perforata ut ei (humero) conveniat & adhæreat. Porrò formetur conulus rectus per axem perforatus 1, 2, 3. (Fig. 6.) augeaturque foramen ab 1, 2. usque ad 4. 4 ; formeturque humerus 55. ut exquisitissimè conveniat cavitati cylindri T T, & ei strenuè adhæreat ; fiatque tandem elater (Fig. 7.) ex filo æneo heliceis formâ circa cylindrum, idoneæ viris, & pixidis 4. 4. V. V. diametrum ferè adæquans ; sed pixide aliquanto altius cùm sibi relinquatur, habeat ad extremitatem infimam laminam 77 ejusdem magnitudinis, cum pars infima corio molli oleo armato vestienda est ad occludendum orificium canalis. Iterùm fiat ad verticem cucurbitulæ (Fig. 8.) perforatio rotunda, quâ immergatur conus usque ad alas S, S. & rimulæ aut fissuræ repleantur cemento ex resina, terebinthinâ & calce composito. Tandemque fiat operculum 6. 76 7. (Fig. 10.) ad humerum 77 corio oleo madefacto vestitum, quo aër quamprimum ex vitro haustus erit (si fissuræ ut ut parvulæ valvulâ forte remanebunt) excludi potest. Hucusque in ejusdem descriptione tempus trivi, nunc non de usu & ad morbosos applicatione,, quia Medicorum & Chirurgorum est, sed usus ratione quatenus ad
Philo-

Philosophiam (h. e. Φαινόμενων naturæ explicationem) spectat, pauca Subnectam Cum pollex strenuè applicatur ad foramen, & lamina, 99 (Fig.9.) manubrio attollitur ad 10. 10. at quia aër antea tantum spatium 9.0.9. replevit, nunc ita rarefactus aut expansus est ut spatium 9.9.10.10. (hoc est tricenties majus) occupat, quapropter aëris vitro inclusi elasticitas, elasticitates elateris & aëris cylindro contenti superans, sursum obtrudetur lamina, aut valvula, quæ aperta remanebit donec tanta quantitas aëris petat cylindrum ex vitro, ut complementi aëris vitro elasticitas fiat equalis elasticitatibus elateris & aëris nunc cylindro contenti; at aperto foramine O aëris externi pressurâ potenter occluditur valvulâ : Cæteris paribus, & tribus quatuorve suctionibus plus minusve $\frac{2}{1000}$ aëris (secundum elateris potestatem; & rationem quam habet capacitas cylindri ad capacitatem cucurbitulæ) exhaustæ erunt: & si elasticitas aëris eodem spatio sit ut quantitas, resistentia aut pressura sub vitro erit ad pressuram supra partes circumjacentes ut unitas ad mille, quia antequam aër exhaustus erat vitro, resistentia aut pressura sub vitro eadem fuit cum illa supra partes extra vitrum. Notatu dignum existimo, ut quanto major erit cylinder eodem elatere, tanto major aëris quantitas exhausta erit vitro; quia aër 9.0.9. in majus spatium extenditur, & consequenter minorem habet elasticitatem, quapropter majorem habebit rationem elasticitas aëris in vitro ad elasticitatem aëris in cylindro & elatere contenti itaque major aëris quantitas vitro extrudetur, &c.

Colcestriz.

Octob. 16. 1699.

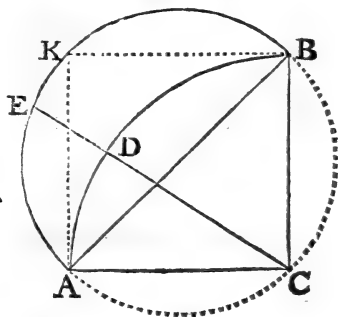
A Letter of Dr Wallis to Dr Sloan, concerning the Quadrature of the Parts of the Lunula of Hippocrates Chius, performed by Mr John Perks; with the further Improvements of the same, by Dr David Gregory, and Mr John Caswell.

S I R,

THE Squaring a certain *Lunula* by *Hippocrates Chius* long since, hath been known (as to the whole *Lunula*) for many Ages. But (as to the *Parts* of it, and the *Appurtenances* thereunto,) *New Discoveries* have been lately made, which (I think) had not been consider'd by any before this present Age.

I received (in *November 1699.*) from Mr. *John Perks* (Master of an Hospital at *Old-Swynford* in *Worcester-shire*, founded by Mr, *Thomas Foley*) a brief account of his *Squaring* the *Portions* of *Hippocrates's Lunula*; with which (I presume) you will not be displeas'd.

For the better understanding of which; I shall premise as known (because long since demonstrated,) That, If on AB (the



Chord of ADB, the Quadrantal Arc of a Greater Circle, whose Center is C,) be described, as on a Diameter, a Semi-circle ABE; R r r *This*

This Semi-circle, will be Equal to that Quadrant. (Because the Squares of their Diameters, are as 2 to 1 ; And, in such proportion are their respective Circles ; and therefore a Quarter of the one, equal to Half the other.)

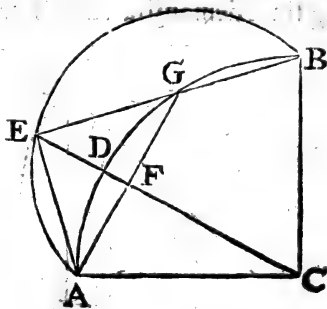
And, consequently, If, from each of these, we subtract the common Segment ABD ; the *Remaining Lunula* ADBE (on the one side) will be Equal to the *Remaining Triangle* (on the other side) ABC. (Or, to ABK, supposing AB bisected in K ; that is, to half the Square CK, inscribed in the Lesser Circle.) Which is commonly called, *The Squaring of Hippocrates's Lunula* ; That is, the Finding a *Rectilinear Figure* (which may be easily reduced to a Square) equal to that *Lunula*.

This being premised ; The Point in hand, is, the *Squaring* a given *Portion* of such *Lunula* : suppose ADE, cutt-off by a Streight Line CDE, drawn from the Center C. Which Mr *Perks* (not knowing that the like had been before attempted by any other) doth perform after this manner ; viz.

Drawing the Streight Lines EA, and EB (cutting the Arc EB in G,) and, on AG, a perpendicular EF, (which will therefore pass to the Center C, because Bisecting AG at Right-angles ;) *The Right-lined Triangle AFE, is equal to ADE, the proposed Portion of the Lunula.*

His Demonstration is to this purpose : viz.

ADB being a *Quadrantal Arc* ; the Angle AGB will be *Three Halves* of a Right Angle ; (and its Conjunct Angle EGA, *Half* a Right Angle.) And that Angle (being External to the Tri-



gle AGE,) is Equal to the Two Opposite Internals $GEA + EAG$. Whereof GEA (because an Angle in the Semicircle AEB) is a Right Angle ; and therefore EAG is *Half* a Right Angle, (as are also FEG , and FEA .) And the Three Triangles AFE, GFE, and

and GEA, each of them *Half a Square*. And AG to AE, as $\sqrt{2}$ to 1 (proportional to the Respective *Radii* of the Two Circles.) And the Like Segments ADG, AE, in their Respective Circles (as the Squares of their Respective *Radii*) as 2 to 1. And therefore the Semi-segment AFD, equal to the Segment AE. And consequently (one taking from the Triangle as much as the other adds to it) the *Portion of the Lunula* ADE, equal to the *Triangle* AFE. Which was to be Demonstrated.

(I take the liberty (both in this and the things that follow) to vary somewhat from the Authors Words, (but to the same sense, and without any disadvantage to Them,) so as to Design the same Respective Points (in all the Figures) by the same Letters. Which makes it somewhat Shorter (without Repeating the same Construction anew for every Figure;) and prevents the Confusion which might arise to the Fancy, if the same Respective Points, in several Figures, were designed by different Letters; and the same Letters, in the different Figures, design different Points.)

If the Point E chance to be in K (the middle of the Arc AEB) there will be no Interfection at G (the Points G, B being then coincident, but without any disturbance to the Demonstration :) If it happen beyond it, toward B; then G will be on the other side; and what is here sayd of EGB, must be accommodated to EGA: which things are so obvious, as not to need any long discourse.

The whole proceeds upon the same general notion with that of squaring the whole *Lunula* (and some other Curve-lined Figures;) that, if as much be added to the one side, as is taken from the other, the Equality remains.

And the stress of the Demonstration, is, to prove the segments ADG and AE, to be *Like Segments*; and therefore Proportional to their Respective Circles; the Whole of one, equal to Half the other.

The Ground of the whole Process is plainly this, The Angle ACE, being an Angle at the Center of the Greater Circle, but at the Circumference of the Lesser, the line CDE (as it passeth from CA to CB) doth, in the same proportion, divide the Quadrantal Arc ADB, and the Semicircular AEB: whence all the rest doth naturally follow.

And this is Applicable to other *Lunula's* (beside that of *Hippocrates*) if (by altering the Angle at F, or otherwise,) we take in such a Portion of the common Segment ABD on the one side (instead of AE cut-off on the other side) as the Proportion of the two Circles requires.

I shewed this Quadrature of Mr. *Perks* to Dr. *David Gregory* (our learned Professor of Astronomy at *Oxford*,) who gives his Opinion about it (with his Improvement of it) in a Letter of his to me; which I shall give you in his own words,

“Reverend Sir, The Quadrature of the Parts of the Lunula of *Hippocrates Chius*, by Mr. *Perks* (which you shewed me) is very Elegant.

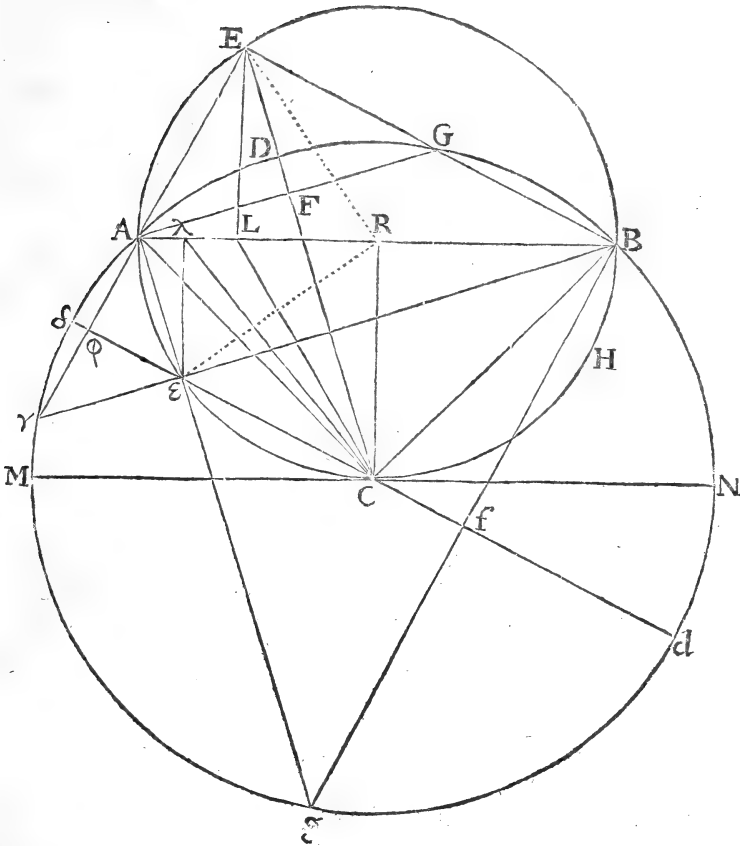
“I remember, the like was done, some years since, by Monsieur *Tchirnhaufe*; who assigns, as equal to the same Portion, not the same Triangle with that of Mr. *Perks*, but another Equivalent thereunto, (as I shall shew by and by.) We have his *Theorem*, in the *Acta Lipsiæ*, for the Month of *September*, 1687. But, without any *Demonstration*.

“But, both the One and the Other, seem not to have considered this affair in its full extent.

“For, if you compleat the Two Circles, whose Arcs contain the Lunula of *Hippocrates*; the same is true, as well of the Points in the other Semi-circle ACB, as of those in the Semi-circle AEB; and, for the same Reasons. As appears in the Scheme annexed, wherein I have mark'd the Points in the Semi-circle ACB, (correspondent to those of Mr. *Perks* in AEB,) with the correspondent small Letters of the Roman and Greek Alphabets.

“If Mr. *Perks* had made his construction universal; by making both EA and EB, meet with the Greater Circle, (which he might have done by protracting these Lines and the Greater Circle 'till they meet;) he might have found that the Portions of the Spaces A ϵ CM, BHCN, (supposing MCN parallel to AB) are Quadrable as well as those of *Hippocrates's Lunula*: And that EA γ being a straight Line, the Portion AED of *Hippocrates's Lunula*, is to A ϵ δ (the Correspondent of A ϵ CM) in the Duplicate Proportion of C ϵ to A ϵ . For ER ϵ (at R the Center of the Lesser Circle) is, in this case, a Right Angle.

“Moreover; If you take any Point ϵ in the Semi-circle ACB, and proceed according to Mr. *Perk's* construction Universalized as above-said; you will find, on the one side, the *Trilineum* A ϵ δ (contained by the Arcs A ϵ , A δ , and the straight line ϵ δ) equal to the Rectilineal Triangle A ϵ ϕ . And, on the other side, the *Trilineum* contained by the Arc B ϵ (the Complement of ϵ A to the Semi-circumference,) and the Arc B δ (the Complement of A δ to the Fourth part of the Circumference,) and the straight line ϵ δ , (that is, the *Trilineum* BHCd diminished by the Segment



“gment $C\varepsilon$;) to be equal to the Rectilineal Triangle $B\varepsilon f$. And,
 “that those two spaces $A\varepsilon\delta$, and the *Difference* of $BHCd$ from
 “the Segment $C\varepsilon$ (parts of the *Lunula* $ACB\gamma A$) taken to-
 “gether, are equal to the Triangle ACB ; as well as the two
 “Spaces AED and BED , parts of the *Lunula* of *Hippocrates*.

“So that, upon the whole, it appears, that the Two Circles
 “(containing the *Lunula* of *Hippocrates*) being completed; this
 “*Lunula* $AEBGA$, and the other $ACB\gamma A$, make up one System,
 “and are *Conjugate Figures*.

“For, (drawing a straight line CDE , or $C\varepsilon\delta$, or $C\varepsilon d$, at pleasure
 “through C the Center of the Greater Circle, and cutting those
 “two Circles,) the Space contained within two Arcs of these two
 “Circles and part of the said straight line, (as AED , or $A\varepsilon\delta$, or
 “ $BH\varepsilon d$),

"BH = d,) is equal to the Rectilinear Triangle AEF, or A = e, or
 "B = f, respectively.

"And it so happens, that, if this line going out from C, be on
 "the same side of the Diameter MN with the *Lunula* of *Hippo-*
 "*crates*; the foresaid Space (which receives a perfect Quadra-
 "ture) is solitary; (such as are the Parts of *Hippocrates's Lunula*;
 "and of the two Spaces A = CM, BHCN; which therefore are Parts
 "of the *Lunula* more nearly relating to one another.)

"But if that Line going out from C, be on the other side of
 "MN; then the Space which is equal to the Rectilinear Triangle,
 "is, the *Difference* of two Mixtilinear Figures, (the one a Tri-
 "lineum, the other a Segment of the Lesser Circle,) as is above-
 "said; neither of which can be squared severally.

"All these particulars are plain from Mr. *Perks's* Demons-
 "tration; which, with a little variation (such as is usual in the dif-
 "ferent *Cases* of the same *Theoreme*) is applicable to all of them:
 "though perhaps he was not aware of it.

"In the Dimension of the Parts of *Hippocrates's Lunula*,
 "it might perhaps be expected, that the Triangle assigned equal to
 "a Portion of the *Lunula*, should be Part of the Triangle to
 "which that whole *Lunula* is wont to be assigned equal; (that is,
 "that the Triangle assigned equal to the Portion ADE, should be
 "the respective part of ACB which is equal to the whole *Lunula*;))
 "which in that of Mr. *Perks* is not.

"But, in that of Mr. *Tschirnhause* (above-mentioned) it is so,
 "which is to this purpose.

"If from any Point E, in the circumference of the Lesser Circle,
 "we let fall on AB, a Perpendicular cutting it in L, and draw the
 "line CL; the Triangle CAL, is equal to the Portion of the *Lu-*
 "*nula* AED. (And, consequently, the Triangle CBL, equal to
 "the Portion BED.)

"Which (because Mr. *Tschirnhause* hath not at all done it)
 "I shall briefly Demonstrate, so as the Demonstration may reach
 "the *Portions* of the *Conjugate* Space ACB g γ A.

"For the Triangles ACB, AEF, are like Triangles, each being
 "the half of a Square: And therefore, by 19 el. 6, the Triangle
 "ACB is to the Triangle AEF in the duplicate proportion of BA
 "to AE, that is, by 8, el. 6, as BA is to AL. But, by 1. el. 6, the
 "Triangle ACB is to the Triangle ACE as BA is to AL. There-
 "fore, by 9. el. 5, the Triangles ACL and AEF are equal. But
 "the Triangle AEF is (by Mr *Perks*) proved equal to the Por-
 "tion

tion AED. And therefore the said Portion AED is also equal to the Triangle ACL.

“I am, Sir, Your &c. D. Gregory.

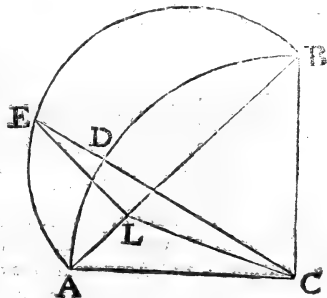
Mr *Caswell* had a fight of this Quadrature of Mr *Perks* (before Dr *Gregorie* or I had seen it ;) And had given a *Specimen* of its being capable of further Improvement. But, without having Leisure, or giving himself the Trouble, of pursuing it through all its Appendages. I would (with his leave) have here inserted that *Specimen* : But he chose rather to decline it ; saying, He thought it needless, because Dr *Gregorie* had, since, done the like more fully.

The Result of it, is to this purpose ; On the Center B, he draws by A, a Third Circle ; which forms another *Lunula*, than that of *Hippocrates* : And he doth (very dextrously) Square the *Portions* of this *Lunula*. And doth thereby let us in, to a New System, which may be pursued in like manner as Dr *Gregorie* hath done that of *Hippocrates*.

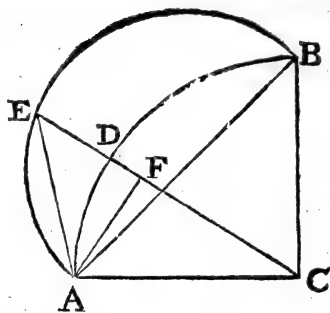
After these learned Disquisitions, on so trite a Subject ; it will not be needful for me to say much. I shall but briefly Compare the Two Quadratures of Mr *Tschirnbause* and Mr *Perks*, (where-in they Agree or Differ with each other.) And then shew, How, by either of them, to Divide the *Lunula* in any Given Proportion.

Monfieur *Tschirnbause* ; Letting fall, from E (on AB) a Perpendicular EL, determines the Triangle ALC equal to the Portion ADE.

Which being admitted ; We may thus Divide the *Lunula* in any Given Proportion. If we divide AB, at L, in such Given Proportion ; CL will, in the same proportion (because of the Common Altitude) divide the Triangle ACB (which is equal to the Whole *Lunula*.) And LE (erected at Right Angles on ALB) will determine the Point E ; from whence if we draw, to C, the Streight line EC, this will, at DE, divide the *Lunula* in the same Proportion.



Mr *Perks* ; On EDC, drawing the Perpendicular AF, determines the Semi-quadrant AFE, equal to the proposed Portion.



tion ADE. Which Semi-quadrate, is a Like Figure, and a like situate to AE, as is ACB to AB.

And therefore (because like Figures are in the Duplicate Proportion of their respective Sides) If we so inscribe AE, as that the Square of AE be to the Square of AB, in such Given Proportion, the Lunula will at DE, be so divided as is required.

And this will hold (if duly applied, according as the different Cases may require) though E be taken (in the Continuation of the Semi-circle) beyond B. For (still) Like Figures, will be in Duplicate Proportion of their Respective Sides; and $CE = CD \pm DE$. And the same is yet improveable much further.

I forbear to Apply this to the several Parts of the whole Systeme, considered by Dr *Gregorie*, (Or to that of Mr *Caswell*,) that I be not too Teadious.

Much less shall I give my self the trouble to consider the Solids to be made by the Conversion of it, or of its parts, about a given Axis, (as MN, or AB, or AC, or BC, &c.) with their Surfaces and Centers of Gravity; as I have done elsewhere for the *Cycloid*: But such as are at Leisure (and think it worth the while,) may do it by such like Methodes as I have made use of for the *Cycloide*,

I am SIR,

Yours to serve you,

JOHN WALLIS.

Post-script.

In the *Transactions* for the Month of *August* last past; *Numb.* 255. A Letter of mine, is very faultyly Printed. I desire that the *Errata* may be thus Corrected.

Pag. 280. *l.* 24. ut ait. *p.* 281. *l.* 15. differentias infinitesimas. *p.* 282. *l.* 12. (ut antea) rerum Novitas. *l.* 14. Mellis. *l.* 15. Et quidem. *l.* 16. Atque hinc. *l.* 17. natura. *l.* 22. Academia. *l.* 25. reapse. *l.* 33. mihi. *p.* 283. *l.* 5. desperatum. *l.* 11. Sueci. *l.* 17. itinere. *l.* 25. adornat. *l.* 33. Cœno. *p.* 284. *l.* 1. fita. *l.* 13. redeundo) sensim. *l.* 17. motibus. *l.* 19. penitius. *l.* 22. materiæ. *l.* 23. perpendicularum erectos) ad. *l.* 24. longo tractu. *l.* 25. præ se. *l.* 29. Multaque. *l.* 30. annos. *l.* 31. deprompta) mihi videntur huc. *l.* 32. aliud. *l.* 34. cœnosum, turbidum. *l.* 35. Isthmo. *l.* ult. The Words P. S. Aug. 29. 1699. should have stood at *lin.* 20.

Numb. 257. *p.* 346. *l.* 11. the Solar Tropical year. *p.* 349. *l.* 2. suggested by. *p.* 351. *l.* 34. stands thus.

Responsio ad Animadversionem ad Davidis Gregorii Catenariam, Act. Eruditorum Lipsiæ. Mense Februarii An. 1699.

QUÆ in Animadversione ad nostras de Catenaria Demonstrationes objicit Anonymus sunt hæc. Quod rem ab aliis jam ante septennium inventam & publice expositam demonstrare aggressus sim, modo quodam meo. Ita quidem est, & me hoc facturum in ipsa præfatione sum professus. Quid vero hic redarguendum sit non capio. Celeberrimi viri Hugenius, Leibnitius & Bernoullius plurimas Catenariæ proprietates detexerunt & ediderunt, at non demonstrarunt. Ego, quod suscepi, demonstrationes pertexui. An Archimedi honeste objiciatur illum *post diutiorem Temporis moram eorum de Helicibus Theorematum demonstrationes edidisse quæ Conon reperit at non demonstravit?* Hoc tamen profitetur, in præf. ad Librum de istis lineis, Archimedes. Ego certe Credo ita demum Geometriæ suam sinceritatem, decusque constare, si nihil non demonstratum in publicum proferatur, saltem per annos plures non demonstratum maneat.

Sed an res hæc (nempe Catenariæ Natura & proprietates primariæ) ab aliis inventa & publice exposita fuit? Certe ista Catenariæ proprietates, Corol. 6. Prop. 2. aliis

indicta est penitus ante editas hasce demonstrationes. Cum tamen sit ni fallor inter primarias illius proprietates, & omnium longe utilissima, & ad vitæ communis usus facillime reducenda. Ab omni ævo, in ædificiis publicis fornices arcusque tam ad firmitatem quam pulchritudinem adhibuerunt Architecti: Qualis tamen sit fornices figura legitima ad usque editas nostras demonstrationes ignoratum est. Citato enim Corollario dictum est primo, *Catenam in plano verticali, sed situ inverso, figuram servare nec decidere, adeoque arcum seu fornitem facere tenuissimum: Hoc est sphaeras minimas rigidas & lubricas in inversa curva Catenaria dispositas arcum constituere cujus nulla pars ab aliis extrorsum vel introrsum propellitur; sed manentibus infimis punctis immotis, virtute suæ figuræ sustineri.* Verum quidem est fornices firmos jam olim fuisse extractos: sed ad dictum Corol. ostensum id exinde fieri, quod in *crassitie cu uslibet eorum quædam Catenaria inclusa sit: neque si tenuissimus esset, partesque haberet lubricas sustineretur alterius figuræ arcus.*

Agnoscit tamen postea Animadversionis Auctor Operæ pretium fore si res licet cognita dudum, ex novo sed solido principio derivaretur. Quomodo Res Geometrica non demonstrata dici possit cognita, ego non Capió, nisi assertum pro cognito habeatur, axioma certe Geometriæ promovendæ parum idoneum. Nullus dubito quin Celebres supra nominati Viri Theorematum inventores illorum demonstrationes noverint. At certe non ediderunt, nec alios ab illis edendis arcere voluerunt: Neque omnia ad Funiculariam attinentia exhauriverunt, ut ex dictis de Fornices figura constat. Si priorum pulcherrimorum Theorematum demonstrationes publici juris fecissent, ego de aliis demonstrationibus condendis, neque forsán de aliis Theorematibus inveniendis cogitassém nunquam.

Sufficere ait Animadversor si consideretur quomodo propositionem primam & primariam cui reliquæ superstruuntur

struuntur demonstraverim ego. Neque illi suffecisse credendum, nisi quia in aliis quod commentario suo in pejus detorquere posset invenire nequibat. Et certe si, assumpta primaria Catanariæ proprietate, ad alia exinde eruenda me protinus contulisset, nihil fecissem quod à principibus Geometris non sit factum: Et in isto casu proprietates sequentibus propositionibus 6, & 29 corollariis, de assumpta Curva legitime demonstratæ (quod ante non erat factum) jure habendæ forent. Malui tamen ex Catenæ natura proprietatem istam in antecessum eruere per prop. hanc primam, quam attente considerandam sibi proponit Animadversor.

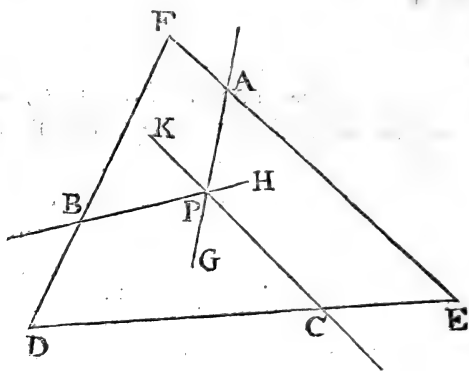
Primum quod reprehendat invenit, quod quædam ex Mechanicis constare dixerim, quæ distinctius enuntiare atque etiam applicare operæ pretium fuisse ait. Ego qui Geometris demonstranda Theoremata quædam susceperam, omnia minutim exequenda non credebam, sed vulgo nota & ex aliis scientiis petita assumere fas esse etiamnum arbitror; presertim si ipsum Theorema, ut in casu presenti, aperte enunciaverim. Verum ut Animadversori gratum faciam, Lemma istud demonstrabo, cum distinctius enuntiare nequeam, quam est hæc verba.

L E M M A.

Potentia tres in æquilibrio posita eandem habent rationem cum rectis tribus ad ipsarum directiones parallelis, vel in dato angulo inclinatis, à mutuo occurso terminatis.

Putæ si potentia tres trahentes, impellentes vel utcunque agentes, secundum rectas PA, PB, PC sint in æquilibrio; & inclinentur ad has directiones tres rectæ EF, FD, DE in angulo quovis dato, hoc est si anguli EAP, FBP, DCP fuerint æquales, Dico potentias

A, B & C esse inter se ut rectæ FE, FD & DE.
 Producantur rectæ AP, BP, CP in G, H & K.



In quadrilatero FAPB, cum angulus externus EAP fit, ex hypothesi, æqualis interno & oppposito PBF, Erunt interni duo oppositi FAP & FBP æquales duobus rectis; Cumque omnes quatuor interni quatuor rectis æquentur, erunt reliqui duo F & APB in eodem quadrilatero oppositi, duobus rectis etiam æquales. Sed APB & BPG efficiunt duos rectos, & igitur angulus F est æqualis angulo BPG. Similiter Ostenduntur D & BPK æquales, item E & APK.

Quoniam tres potentiaë sunt in æquilibrio, sunt immotaë, & igitur earum quælibet pro hypomochlio haberi potest reliquarum duarum respectu quæ in æquilibrio manent. Si B habeatur pro hypomochlio, per Mechanicæ notissimum theorema, Potentia A est ad potentiam C, sicut sinus anguli BPK ad sinum anguli BPG, hoc est sinus anguli D ad sinum anguli F, hoc est recta FE ad rectam DE. Rursus, posito C hypomochlio, potentia A est ad potentiam B ut sinus anguli CPH ad sinum anguli CPG, sive sinus anguli BPK ad sinum anguli APK, hoc est sinus anguli D ad

ad finum anguli E, hoc est ut recta FE ad rectam FD. Tres igitur potentiae A, B & C sunt ut rectae FE, FD & DE. q. e. d.

Prima Demonstrationis meae verba vera esse agnoscit *lin. 16. pag. 88*, in sensu ibi posito, quem ego vicissim pro vero & meo agnosco : Sed haec facilius ex praemisso Lemmate sequuntur, si mecum concipiatur totius lineolae dD gravitas in ejus medium punctum congregari, nempe grave in ejus centrum gravitatis ut Geometris solenne est ; atque grave hoc, rotatione circa d centrum, in situm perpendicularem, sive inter d & Terrae centrum ferri ; hoc est, primo momento, per rectam ad dD normalem.

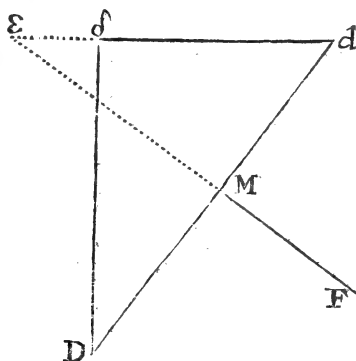
Demonstrationis meae verba sequentia aliquot *lin. 24. pag. 88*. & seqq. apponit, quibus suum in illa commentarium subnectit, in cujus ultimis verbis nempe, *ut constans quaedam recta est ad illam ipsam portionem*, æquivocationi fundamentum ponit. Si per *constantem hanc rectam* intelligat infinite parvam, ejusdemque generis cum dD *viz.* constantem fluxionem ordinatæ in Catenaria, mecum facit, estque illud ipsum quod dixi in primis vocibus ab illo citatis, *lin. 14 & seqq.* Sed in hoc sensu non explicant verba mea ultimo citata quibus explicandis adduci videntur. In illis enim loquor non de gravitate lineæ dD quâ in situm verticalem se componere conatur, sed de gravitatis hujus causa, quam ad distinctionem voco *Gravitatis actionem* in Dd normaliter exertam. Atque causam hanc exponi jubeo per rectam *a*, ejusdem nempe generis lineam cum Catenæ longitudine quam ille assignabilem vocat. Superius quidem lineæ Dd gravitatis partem eam qua in situm verticalem se componere conatur, representari ostendi per infinite parvam sed constantem dδ : At hujus causam, quam gravitatis actionem voco, per assignabilem & constantem *a* expono. Verba enim mea sunt *Gravitatis actio in partes correspondentes Catenæ Dd normaliter exerta etiam constans erit.*

erit *sive ubique eadem*. Exponatur hæc per rectam *a*. Falso igitur post verba hæc Exponatur hæc subjungit (*constans Gravitationis quantitas*) Et ut fidem falsæ hinc expositioni faciat, prius & etiam postea (lineis 29 & 35 pag. 88.) vocem *gravitationis* scribit caractere Italico, quali ubique mea verba à suis distinguit, cum interim à voce hac nimis ambigua prorsus abstineo, & gravitatem pro effectu, gravitatis actionem pro causa usurpo semper. Potuisset *Causa*, sive *Gravitationis Actio*, per eandem *d d* etiam exponi: Et ita quidem fecissem si nulla fuisset occasio hunc applicandi potentias modum mutare. Verum cum in decursu hoc fit factum, ita ut ponderis per *M F* trahentis vis infinite quam nunc major evadat, ideo *Causam* utrique modo applicationis communem, per lineam ordinariam exponere volui.

Postquam semel invenit, vel invenisse fingit me gravitationis quantitatem qua linea *d D* circa *d* mobilis situm verticalem affectat, per lineam *a* exponere vel representare, multa undique illi occurrunt monstra quibuscum pag. 89 & 90 fortiter pugnat. De horum (quippe suorum) salute videat ipse: ad me nihil attinent: Ego siquidem de ponderibus π & z ab ipso in scenam productis ne verbum; qui in vocibus ab ipso citatis sic aio, *d d representabit gravitatis partem eam qua sit ut D d in situm verticalem se componere conatur*; & rectam assignabilem *a* exponere jubeo gravitatis prædictæ actionem, quarum altera est effectus, altera *Causa*. Licetque, ni fallor, causam ab effectu distinguere, & per lineas diversas exponere, modo hæc semper sint proportionales, ut in nostra representatione fit: Effectum siquidem per constantem infinite parvam, *Causam* per constantem assignabilem.

Posteriore parte paginæ 89, post citata quædam ex meis verbis, ait non satis apparere Lemmatis *Mechanici* vel sensum vel applicationem. De ejus sensu hæctenus dictum, quem nunc satis apparere non dubito: De applicatione nunc agendum.

Si concipiatur (ut supradictum) lineolæ dD gravitas absoluta per dD exposita, in ejus centro gravitatis M collecta, & grave hoc secundum directionem MF ad dD normalem vi gravitatis suæ descendere: Potentia secundum MD trahens quæ in æquilibrio est cum prædicto gravi, per præmissum lemma, est ad ejus momen-



tum five potentiam trahentem secundum MF , sicut dD ad $d d$. Nam angulus dDd , quo Dd inclinatur ad MD , æqualis est angulo $dεF$ quo $d d$ inclinatur ad MF ; *viz.* uterque complementum anguli d ad rectum. Atque hoc etiam obtinet, agnoscente Animadversore, si ut in vulgari Mechanica, prædictum grave plano MF incumbens, interposita trochlea ad M , trahatur ab alio gravi ipsi MD incumbente: Erit hoc ad illud sicut Dd ad $d d$.

Quod si, reliquis manentibus, modus applicationis harum potentiarum mutetur, ita ut ad flexilis lineæ dD , cujus extremum d immotum, punctum medium M applicetur pondus secundum MF vires exerens, quippe arcum centro d , radio dM , in descensu descripturum: Erit Ponderis hujus vis, ad flexilem lineam rectam ad M incurvandam, infinita respectu vis suæ gravitatis absolutæ; & vis secundum MD trahens ad modo descriptam incurvationem impediendam requisita, etiam infinita

nita respectu ejus quæ prius requiribatur ad pondus M in plano MF sustinendum. Adeo ut potentia quæ, in priore applicationis modo, exponebantur per $d\delta$, δD , nunc exponendæ veniant per infinite majores prioribus proportionales: Nam, ut prius, pondus M trahit secundum directionem MF, & potentia illud sustinens secundum MD; & hæc duo esse in æquilibrio, ex partium Catenæ quiete constat. Eadem igitur manebit harum ratio quæ prius fuerat. Sed causa quæ lineam flexilem dD (cujus extremum d immotum, cujusque medio puncto M applicatur grave infinite quidem parvum, sed cujus vires per hunc applicationis modum infinite majores redduntur, & proinde in Animadversoris phrasi assignabiles fiunt) in rectam extendit, est Catenæ DA gravitas quæ est ipsius longitudini proportionalis. Hæc ergo est ad constantem & assignabilem a (constanti sed inassignabili $d\delta$ proportionalem) ut $D\delta$ ad δd . Atque sic Animadversori patere credo veram conclusionem absque assumptis erroneis fuisse probatam.

Ad fugillationes sub initium ac finem Animadversio- nis istius tam indecore sparsas, commodius respondebitur, cum Auctor innotescet; Nam cum ignoto de Mathematicis posthac, nedum aliis, disputare facile mihi non persuaserim.

IV. *A Relation of two Monstrous Pigs, with the resemblance of Humane Faces, and two young Turkeys joined by the Breast, by Sir John Floyer, Communicated by Dr. Edward Tyson, Fellow of the College of Physicians, and R. S.*

BY the description of the following Monsters I design to prove that the Distortion of the parts of a *Fetus*, may occasion it to represent the Figure of different Animals, without any real Coition betwixt the two Species.

In *May* 1699. there was shewed to me a Pig, at *Weeford* in *Staffordshire*, with a Face something representing that of a Man's; the Chin was very like that of an *Humane Fetus*, and the roundness of the Head, and flatness of the Ears surprized all Persons, and they did usually apprehend it to be a *Humane Face*, produced by the Copulation of two Species. But when I had long consider'd the Head, I observed there was a depression of the Bones of the Nose in that place which was betwixt the Eyes; in which the Pig's Face seem'd to me to be broken, and the Nose drawn up to appear like a *Humane*: the Under-Jaw was inverted to grow up to meet the Upper, the Tongue and Mouth were made more like a *Humane*, being altered by some external Pressure upon the Mouth of the Pig, which broke the Bones of the Nose, and caused their depression towards the Palate, and the inversion of the Under-Jaw. This pressure on the Mouth forced the Bones upward, so much as to cover the Eye-holes, and the Pig appears blind: A. (*Tab. I.*) is the place of the Bone depressed: B.

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is the depth of it. It closed it self with a Spring, when we opened it by force, so that it had grown closed up ever since it was Cartilaginous. By this breach or depression of the Pig's Face, I was first convinced that this Monster was not from the Conjunction of both Kinds; but only occasioned by the perversion of the compression of the Womb, or *Placenta*, or other Pigs in the same part of the Womb. And that the Pig's Head was streightned in its growth, appeared by the flatness of the Ears, and that this depressoire happened whilst the Bones were Cartilaginous, appears by the Bones depressed, which remain'd Cartilaginous, and at the same time the Under Jaw was inverted, and Head made more round. I farther observed that all the Head was covered with Hair, as the other Pigs were; that the Teeth in the Mouth were Pigs Teeth, the Hair of the Pigs Head was Yellow, as that of the Sows was: the Monstrous Pig was as big, and as well grown as the rest of the Pigs, and therefore begot by the Bore at the same time: the Nose was a perfect Pigs Snout, and there was no Upper Lip as in the Humane Kind; in all the other parts it appeared to be a perfect Pig, no parts were wanting, but those of the Face, distorted by some external Accident. I could not learn by enquiry that the Sow had any blow, or other Accident, which might occasion the Monstrosity. It is not to be thought that the Imagination of the Sow could be so violent as to distort the Bones without injuring the rest of the Pigs, which appeared all sound. This Monster was pigged alive; but dyed because it could not Suck, the Nose being stopped. The cry of the Pig was not like the other Pigs, because of the stoppage of its Nose, and the alteration of the Figure of its Mouth.

I was

I was further convinced in Opinion that there was really no mixture of the two Species in this Monster, by the Woman's account who saw the Sow take the Bore, and after sixteen Weeks, on the beginning of the seventeenth, which is the usual time, the Sow pigged eight Pigs, the first five were perfect Pigs, the sixth was the Monster, and after that two more perfect Pigs, all which I saw sucking the Sow, and as well shaped, and as large as possible, being then three or four days old.

I oft reflected on the Figure of a Mule, that being an Animal produced by the Copulation of an Ass and a Mare, the extremities of the Body, the Feet, Tail and Ears, and the black Cross on the Back resembling that of the Asses; by this we can observe that the Female contains in her Eggs the first Rudiments of the Animal of her own Species, and that the impregnation only changes some of the extremities into resemblance of the Male.

Parvus gives an Account of a Monster born at *Brussels* Anno 1564. with a Humane Head, Face, and fore Feet like Hands and Shoulders; but in the rest of the Body like another Pig, This at first sight resembled our Monstrous Pig described, but ours had no Hands, neither any part truly Human, but only like the Humane Kind.

Licetus de Monstris, gives many odd Stories of the mixture of many Animals, of Pigs with a Man's Head, and Pigs with Dogs Heads; and a Monster half Man, and the lower parts like a Dog, and this both *Cardan* and *Parvus* describe. This seems to contradict our new Discoveries; for if the Male supplies the *Animalcula*, the *Fetus* must alway be of the same Species as the Male, if the Female supplies it of her Kind, but this Monster must be by a mixture of both Species.

This kind of Monstrous Pigs produced by the unnatural situations of Parts by some external compression I believe is very frequent, because I had another of the same Kind sent me out of *Derbyshire*, which had a resemblance of a Man's Face, and all the other parts of a Pig, and this had the same Chin, and depression betwixt the Eyes, the roundness of the Head, and flatness of the Ears I have above described. But this *Derbyshire* Monster wanted Hair, as Pigs which come too soon do; and no Sex could be distinguished in it: but the former described was a Bore Pig, many other Pigs were pigged at the same time, but I will not relate what particular Monstrosities were told of them, as one Eye amongst five, the crying like a Child; because I believe either Fiction, or want of Observation has made more Monsters than Nature ever produced. Blindness is frequently observed amongst young Pigs, but the cause of their being born blind is not yet observed.

An Account of two young Turkeys joyned together by their Breasts, sent to me from Thorpe.

TWO Turkeys were taken out of one Egg, which was not observed to be more large than ordinary, when the rest of the Turkey Eggs were well hatched, these Turkeys grew together by the Flesh of the Breast Bone, but were in all other parts distinct; the two Heads, four Legs, four Wings, and two Trunks of the Body did appear something Monstrous; but it was evident that the Monstrosity was only two Turkeys sticking superficially together, and both seemed less than the ordinary thickness of Turkeys; there wanted both.

both Nutriment, and room for the growing of both Turkeys, which was the occasion of their cohesion and smallness. 'Tis very obvious to imagine that the Egg had two Yolks in it, and from thence came the double Turkeys. For 'tis a general caution amongst the Women not to set any Egg with two Yolks, because it always miscarries. These Turkeys had distinct Cavities in their Bodies, and two Hearts; so that they had two distinct *Cicatricula's*, and consequently two Yolks from whence they were produced, which Accident is very common. I have a dried Monstrous Chicken, which was given me, it has but one Head, four Wings, four Legs, and one cavity in the Body, and consequently had but one Heart, in this case this Monstrous Chicken was produced from one *Cicatricula*, and consequently one Heart. So *Paræus* mentions a double Infant with one Heart; in these Cases the Original of the Infant was one, and the Vessels regular, but in the extremity the Arteries and Nerves were divided into more Branches than ordinary, and produced double parts; and this is like the double Flowers of Plants, which are produced so by the richness of the Soil.

As the two Yolks of Eggs are joyned in the *Ovarium*, and covered with one Skin. So it is in the Eggs of *Quadrupeds* they are joyned in the *Ovarium*, and as they grow their Bodies do externally cohere. So that I may observe that there are these two Reasons of the multitude of the parts in an *Embryo*; the joining of two perfect Animals, or else the extraordinary division of the Original Vessels, the Arteries and Nerves. I cannot omit another Accident, of which I was informed, and it was much admired by the Country. This year at *Dunchurch* in *Warwickshire*, a Cow calved four Calves perfect, and all living.

V. Part of a Letter from the Reverend Mr. Hugh Jones to the Reverend Dr. Benjamin Woodroffe, F. R. S. concerning several Observables in Maryland.

Honoured Sir,

AS for this Country which you desire me to send you an account of, the following Particulars, I hope, will give you an Idea thereof, and of our way of Living. *Chesapeake-Bay* which runs North and by West about two hundred Miles or more, divides this Province, as well as *Virginia*, into two parts, which we call the Eastern and Western Shores. The whole Province contains Eleven Counties, Six on our side, which is the Western, and Five on the Eastern Shore. The Land is generally Low on both sides. No Hill that I have seen or heard of among the Inhabitants fifty Yards Perpendicular; but about one hundred Miles back, or West of us, towards the Heads of Rivers the Ground rises and appears in very high Mountains, and rocky Precipices, running North and South, from the top of which a Man may have a clear Prospect of *Virginia* and *Maryland*. All the low Land is very woody, like one continued Forrest, no part clear but what is cleared by the *English*. And tho we are Pretty closely seated, yet we cannot see our next Neighbours House for Trees. Indeed in few years we may expect it otherwise, for the Tobacco-Trade destroys abundance of Timber, both for making of Hogheads, and building of Tobacco-Houses; besides clearing of Ground yearly for Planting. Our Soil is generally Sandy, free from Stone, which makes it
very

very convenient for Travelling; and we have no occasion for Shooing our Horses, except in frosty Weather. And what with the goodness of our little Horses, and the smoothness of the Roads, we can travel upon occasion fifty Miles in a Summers Afternoon, and sometimes a hundred Miles in a Day: indeed our Miles are not counted so long as in *England*. As for the natural Situation of the Country, the number of Navigable Rivers, Creeks, Inlets, render it so Convenient for Exporting, and Importing Goods into any part thereof, by Water Carriage, that no Country can compare with it. The rich and plentiful Gifts of Nature likewise add to the Happiness of the Place; the Three Elements affording plenty of Food for the use of Man, *viz.* Deer, Fowle, both Water and Land, in abundance: and for the preserving of Health many excellent Herbs and Roots, the discovery of whose Vertues we owe chiefly to the *Indians*. As for the natural Product of the Country, we have for Timber, several sorts of Oak, *viz.* The Red, White, Black, Chesnut, Water, Spanish, and Line Oaks; which last bears a Leaf like a Willow. We have Cedar White and Red; the Red serves only for Posts and Groundsils, the White to rive or split into Boards, that being the freest from Knots, and goes under the name of Cypress, but I think falsely.

Here is a Tree we call Cypress, which is extraordinary large in Bulk, and bears a Leaf like the Sensitive Plant, it is soft and spongy, will not Rive, and is fit for no use. We have Black Walnut, which is mightily esteemed by the Joyners for its Grain and Colour. Here is a sort of Poplar that makes good White Plank, it is a large Tree, and bears a Flower like a Tulip. We have also plenty of Pine, and Dog-wood, which is a fine Flower-bearing-Tree. *Saf-*

safras,

safras, *Locust*, a Tree of very quick growth, and very durable in Building. Hickery, of which he have two sorts, Red and White, this serves chiefly for fire Wood, being the best for that use. We have also plenty of Chesnuts and Chinquapine another Species of Chesnut; and a sort of Elm like a *Dutch Elm*, which we call the Sugar-Tree, from the sweetness of its Juice, with which some have made good Sugar. Here is also a sort of Elder, whose Bark is closely guarded with Prickles like those of a Briar. Tulip-bearing-Laurel, and Myrtle of several sorts; one whereof bears a Berry with which they make in the Eastern Shore green Wax, very proper to make Candles if mixed with Tallow.

Among the Inhabitants of the Air, which are very numerous. The humbling Bird is the most curious, they continue with us all Summer, feeding only upon Flowers like Bees. The mocking Bird, for various Notes, exceeds all the Birds, I believe, in the World; but it is hard to raise one, by reason of the hardness of the Winter that Kills them in their Cages: it is a very tender Bird, and requires a great deal of Attendance, and the Seamen will not give it them, else I had sent your Son one before now, pursuant to his request. Of all our Reptiles, the Rattle-Snake is the most noted; and what is commonly reported of its charming Birds, and Squirrels, &c. is not groundless, for it hath been affirmed to me by several Eye Witnesses. As for the Nature of the Clime, the Air is now more wholesome than formerly, which I suppose proceeds from the opening of the Country, that giving the Air a freer motion. Our Summers are not extreme hot, as in the first seating; and our Winters are generally severe towards what they are in *England*. The North-West Wind is very sharp in Winter, and even in the heat

heat of Summer it mightly cools the Air; and too often at that time a sudden North-Western strikes our Labourers into a Fever, when they are not careful to provide for it, and put on their Garments while they are at Work. We have little or no Woollen or Linnen Manufacture followed, by any of us (except what is done in *Somerset* County over the Bay) because we are yearly supplied from *England* with necessaries: but Tobacco is our Meat, Drink, Cloathing and Monies; not but that we have Money both *Spanish* and *English* pretty plenty, which serves only for Pocket Expences, and not for Trade, Tobacco being the Standard for Trade, not only with the Merchants, but also among our selves.

It were too tedious to relate the way and manner of making Tobacco, which is a Commodity so vendible, especially these last seven years past, that thousands have got good Estates by it. Most of our Planters when they began this sort of Husbandry had not wherewithal to Cloath themselves, whereof several now are worth thousands of Pounds. Indeed this Country hath been chiefly seated by Poor People, whose Industry hath raised them to great Estates. Our common Drink is Syder, which is very good, and where it is rightly ordered not inferior to the best White-Wine. We have Wine brought us from *Madera* and *Fayal*, Rum from *Barbadoes*; Beer, Mault, and Wines from *England*. We have plenty of good Grapes growing wild in the Woods, but there is no Improvement made of them. And now Sir, to touch a little upon that which chiefly under God Advances our welfare, *viz.* Our Government; we are governed by the same Laws as in *England*, only some Acts of Assembly we have relating to some particular Cases not under the Verge of the *English* Laws: or where the Laws of *England* do

not so aptly provide for some Circumstances under which our way of living hath put us.

The Church of *England*, God be praised, is pretty firmly Established among us. Churches are built and there is an Annual Stipend allow'd to every Minister by a perpetual Law, which is more or less according to the number of Taxables in each Parish, every Christian Male above Sixteen years old, and *Negroes* Male and Female above that Age pay forty Pound of Tobacco to the Minister, which is Levied by the Sheriff among other Publick Levies, which makes the Revenues of the Ministers, one with another, about twenty thousand Pound of Tobacco, or one hundred Pound Sterling *per ann.* It hath been the unhappiness of this Country that they have had no Protestant Ministers hardly among them till Governour *Nicholson's* time (who has been a great Promoter and Encourager of the Clergy) but now and then an Itinerant Preacher of very loose Morals, and scandalous Behaviour; so that what with such Mens ill Examples, the *Roman* Priests cunning, and the Quakers Bigotry, Religion was in a manner turned out of Doors. But God be praised things now stand better, and our Churches are crowded as full as they can hold, and the People are pretty sensible of the *Roman* Superstition, and the Quakers Madnes; so that their Parties both joyned together are very inconsiderable to what ours is. Indeed the Quakers struggle hard to maintain their footing, and their Teachers (especially the Female Sex, who are the most zealous) are very free of their Taunts, and Conrumelies against us, but it is to little purpose, unless to make their own way more ridiculous and odious. As for our part, I think we take the most effectual Method, under God, to stop their spreading, *viz.* By not minding them, for I believe that to oppose a Heresie by Disputes

Disputes and Declamations is the ready way to increase it. And I find the more they Condemn our Church, Rail and Scoff at the Clergy, the fewer Profelytes they Gain. And I do not doubt, if it please God, but in few years the Church will have not many to oppose it, especially of Quakers. We have not yet found the way of Associating our selves in Towns and Corporations, by reason of the fewness of Handicrafts-Men; and we have no Trade at Home or Abroad, but that of Tobacco: There are indeed several places allotted for Towns; but hitherto they are only Titular ones, except *Annapolis* where the Governour Resides. Governour *Nicholson* hath done his endeavour to make a Town of that: there are in it about forty Dwelling Houses, Seven or Eight whereof can afford good Lodging and Accommodations for Strangers. There is also a State-House, and a Free-School built with Brick, which make a great shew among a parcel of wooden Houses, and the Foundation of a Church laid, the only Brick Church in *Maryland*. They have two Market-days in the Week, and had Governour *Nicholson* continued there some years longer, he had brought it to some perfection.

As for our Predecessors the *Indians*, I cannot give you at present any further account of them than this, *viz.* That whereas at the first Seating of *Maryland* there were several Nations of *Indians* in the Country, governed by several petty Kings; Now I do not think that there are Five hundred fighting Men of them in the Province, and those are most on the Eastern Shore, where they have two or three little Towns: some of them come over to our side in Winter time to Hunt for *Dear*, being generally Employed by the *English*, they take delight in nothing else; and it is rare that any of them will imbrace our way of Living or Worship.

The Cause of their diminishing proceeded not from any Wars with the *English*, for we have had none with them; but from their own perpetual Discords and Wars among themselves, as being a scattered People under several Heads, and always at variance one with another. The Female Sex also have swept away a great many, so that now they are dwindled almost to nothing. One thing is observable in them, tho they are a People very timorous and cowardly in Fight, yet when taken Prisoners and Condemned, they'l dye like Heroes, braving the most Exquisite Tortures that can be invented, and singing all the time they are upon the Rack.

Now, Sir, Lest I should trespass too much upon your Patience, I will put a stop to this imperfect and desultory Discourse, hoping you will generously pardon all the Faults and Mistakes of

Sir,

Your much Obliged

and very humble Servant,

Hugh Jones.

Maryland,
Jan. 23. 1698.

A N
I N D E X
T O T H E
Philosophical Transactions.

From Number 248, to Number 259. inclusive.

A.

Academy Royal of Sciences at Paris, its new Regulations, Numb. 251. p. 144.
 Ahmella, a Ceylon Plant described, N. 257. p. 365.
 Air Pump applied to Cupping-Glasses, N. 255. p. 288.
 Air, an account of an Experiment of its Refraction, N. 257. p. 329.
 Algebra. See Arithmetick.
 Anomum legitimum, or Tugus described, N. 248. p. 2.
 Amber an Historical account of it, N. 248. p. 2. Found mostly in Germany and thereabout, ib. p. 7. Most in Prussia of any place, p. 8. Found in the Stomachs of several Creatures, p. 16. Several Curiosities of Amber sent to the Royal Society by Dr. Hartman, N. 249. p. 49. More Discourses of Amber, and its Original, N. 249, p. 53.
 Anatomical Matters. A Fatum extra uterum, N. 251. p. 121. An Ac-

count of several Muscles serving to move the Head, N. 251. p. 130.
 Anatomy of a Pigmy, which in several particulars agrees with a Man, N. 256. p. 339. ad ult. Two Glands and their Excretory Ducts near the Prostrate Glands discovered, N. 258. p. 364.
 Animalcula in semine masculino, defended by Leuwenhoek, N. 255. p. 270. That possibly they Generate, p. 272. N. 255. p. 308. More concerning these Animalcules, N. 255. p. 301. That they are all much of a size, N. 255. p. 307. The best way of discovering them, N. 255. p. 308. The Figure of one like an Human Fætus sent, but the Reality questioned, N. 255. p. 303.
 Annus Confusionis at the setting of the Julian Account, N. 257. p. 349.

Arithme-

An INDEX.

Arithmetical Arabian Figures used in England Anno 1690. N. 255. p. 287.
A new Method for solving Arithmetical Questions, N. 257. p. 351.
Concerning some Algebraic Questions, N. 255. p. 281.

B.

B Arometers height for the Year 1698. N. 249. p. 45. *Barometers height at Emay in China*, N. 256. p. 323.
Bees, a Treatise of them finisht by Swammerdam, supposed to be lost, N. 257. p. 365.
Blisters, how they cure Fevers, N. 152. p. 161.
Books, Sieur Redi's M. S. not like ever to be Printed, if he left any, N. 249. p. 42. *Some of Swammerdam's lost*, N. 257. p. 365.
Acta Conciliorum eum Epist. Decretat. in the Press now at Paris, N. 257. p. 406.
A Catalogue of some Books lately printed beyond Sea, N. 249. p. 67.
Books abstracted, Analysis Geometrica, five nova & vera Methodus resolvendi tam Problem. Geomet. quam Arithmat. Quæst. Auth. Anton. Hug. de Omerique, N. 257. p. 351.
The Celestial World discovered, &c. by Ch. Huygens, N. 256. p. 337.
Geography Epitomized by Pat. Gordon, N. 256. p. 335.
Natural History of Medicinal waters in England, N. 251. p. 146.
Museo di fisica & de Esperienze Aut. P. Boccone, N. 249. p. 53.
Orang Outang, or the Anatomy of a Pygmy by Dr. Tyson, N. 256. p. 338.
Paradisus Batavus, &c. Aut. Doctore Hermans, N. 249. p. 63.
Dr. Wallis's Mathematical Works, third Vol. N. 254. p. 259.
Brain wanting in a Child new Born, N. 251. p. 141.

C.

Cantharides used inwardly for the Bite of a Mad Dog, and its use justified, N. 249. p. 59. *More of the inward use of Cantharides*, N. 252. p. 168.
Two Chymical Propositions proposed to be solved, N. 252. p. 186.
A Chymical Examination of Coffee, N. 258. p. 315.
Chirurgical Cures of the great Tendon between the Heel and Calf of the Leg by stitching it together, N. 252. p. 153. *Trachea, and several large Blood Vessels of the Throat cut into two, cured*, N. 257. p. 398. *New Method of cutting for the Stone*, N. 250. p. 100.
Coffee, a Discourse of its use, &c. N. 311. p. 256.
Carmation Colour made by the mixture of two colourless Liquors, N. 249. p. 43.
New Comet seen in Feb. 1698, N. 250. p. 79. *A Discourse of Concoction*, N. 254. p. 233.
Cupping-Glasses by the Pneumatick Engine, N. 259. p. 408.
Cure of the Bite of a Mad Dog by Cantharides, used inwardly, N. 249. p. 59. *Cures done by Greatrix the Seroaker*, N. 256. p. 332. *Cures of Wounds. See Chirurgical Cures.*
Curiosities in a Chinese Cabinet, N. 249. p. 44. N. 250. p. 70.

D.

A Discourse of Digestion, N. 254. p. 242.
Diseases, how Blisters cure Fevers, N. 252. p. 61.
Disease caused by swallowing Stones, N. 253. p. 199.
Diseases and their Remedies, used by the Northern Nations, N. 256. p. 310. *An Account of an Hydrocephalus*, N. 256. p. 318. *Opening the*

An INDEX.

the Trachæa proposed in Squinancies, N. 257. p. 398.
Droptic in the Ovary of a Woman, N. 252. p. 150.

E.

Eclipse. See *Mathematicks*.
Earthquake in Sicilia, Anno 1693. p. 53. *Hills rising and falling successively*, N. 249. p. 61.
Earths Medicinal in Italy, N. 249. p. 54.
Earths observed in Coal-borings in Yorkshire, N. 250. p. 73.

F.

Fœtus. See *Generat. Fabæ Sancti Ignatii*. See *Plants*. Fleas. See *Insects*. Fungus. See *Plants*.

G.

Generation of a Fœtus extra uterum, N. 251. p. 121.
Observables about the Generation and increase of the Animalcules in utero, N. 255. p. 304. See more in *Animalcula*.
Two New Glands discovered near the Prostratæ, N. 258. p. 364.
Glossopetræ of Malta, N. 249. p. 61.

H.

Heat its Efficacy in Vegetation, N. 253. p. 226. Herbs. See *Plants*.
Organs of Hearing described, N. 258. p. 364.
Heavens at a vast distance, N. 256. p. 337.
An Hill rising and sinking again successively, N. 249. p. 61. *An Hill two Miles high*, N. 254. p. 231.
History collected from the ancient Mythology, N. 255. p. 273. N. 275. p. 283.

Hydrocephalus, See *Diseases*. Husks. See *Plants*.

I.

Insects. *Cantharides, their use inwardly*, N. 249. p. 59. *Tarantola, of its Bite*, N. 249. p. 59. *A Venemous Spider of Sardinia*, N. 249. p. 58.
Insects inclosed in Amber, N. 248. p. 42. *Fleas, an account of their Generation*, N. 249. p. 42. *Swammerdam's History of Bees lost*, N. 257. p. 365. *Several Insects not mentioned by Moussett*, N. 249. p. 50.
Invention of an Engine to raise Water by the help of Fire, N. 253. p. 228. *Of the first Inventors of some Mathematical disquisitions*, N. 255. p. 280.
Isthmus supposed once to joyn England to France, N. 255. p. 284.

L.

Laringotomy proposed in case of Suffocations, N. 257. p. 398.
Lake Nefle, without bottom, never Freezes, N. 254. p. 250. *Another bottomless Lake always full, but never runs over*, N. 254. p. 231.
Learning, the Reason of its being at a stand, N. 255. p. 273. 281.
Lignum Fossile Chymically examined, N. 248. p. 32.
 — *What it is, and that it is the Matrix of Amber*, p. 12.
Lunula of Hippocrates Chius. Quadrature of its parts, N. 259. p. 41.

M.

Manna, N. 249. p. 56. *Exudes through the Plant*, N. 253. p. 209.
Maryland, Observables in it, N. 259. p. 436.

Mathe-

An INDEX.

Mathematical Discoveries. *A New Comet in Feb. 9³.* N. 250. p. 79. *An Account of the Parallax of the Earths Annual Orb,* N. 244. p. 264. *Of the alteration of the Meridional Line,* N. 255. p. 285. *Eclipse of the Sun, Oct. 12. 1699. observed at Oxford,* N. 256. p. 330. *Of the alteration of the Julian Account,* N. 257. p. 343. *The Gregorian not better, but upon some Accounts worse,* N. 257. p. 345. and 347. *A new Method of resolving Geometrical and Arithmetical Problems,* N. 256. p. 351. *Concerning some Algebraick Quest.* N. 255. p. 281.

A Medicinal Fungus, N. 249. p. 53. *Of Medicinal Manna,* N. 249. p. 56. *Medicinal use of Cantharides inwardly,* N. 249. p. 59. *Strange Preservatives from Poisoning,* N. 250. p. 87. and 89. *Medicines used by the Northern Nations,* N. 256. p. 310. *Of small Microscopes, and their Goodness,* N. 255. p. 302. *difficulty in using them,* N. 255. p. 306.

Microscopical Observations. See Animalcules. *Sable Mice in great multitudes in Lapland,* N. 251. p. 110.

Moors way of dressing their Meat, and of their Food, N. 254. p. 248.

Monstrous Pigs, Relation of them, &c. N. 259. p. 431.

— *Turkeys, ib.*

Monstrous human Scull, N. 251. p. 138. *A Child born without a Brain,* N. 251. p. 141.

A Discovery of several Muscles serving to move the Head, N. 251. p. 130.

N.

Nitre and Salts mixt with Earth destroys Vegetation, N. 253. p. 206. and 212.

Numeral Figures used in England as old as the year, 1090. N. 255. p. 287.

O.

Observables in Maryland, N. 259. p. 436.

Oran Outang. See Pigmy.

Original of Nations collected from the ancient Mythology, N. 255. p. 273, 275, 383.

Oitracites vis Verues, N. 250. p. 81.

Oyster-Shells, on the top of an high Mountain in Scotland, N. 254. p. 232.

P.

Parelia. One at Sudbury in Suffolk, N. 250. p. 107. *Another at Canterbury,* N. 251. p. 126.

Petrifications, viz. Gllofopetræ, &c. N. 249. p. 61.

Pigs monstrous, N. 259. p. 431.

Pigmy Anatomized, N. 256. p. 339.

Planets inhabited as well as our Earth, N. 257. p. 339.

Plants. Amomum Legitimum or Tugus, N. 248. p. 2. **Faba Sancti Ignatii, its vertue against Poison,** N. 250. p. 87, 88. and N. 257. p. 365. **A medicinal Fungus,** N. 249, p. 53. **Observations on some Plants to propagate their Kinds,** N. 251. p. 113. **Some thoughts concerning Vegetation,** N. 253. p. 193. **Water not only the nourishment of Plants,** p. 194. **That 'tis the Terrestrial parts in the Water that nourishes them,** ib. p. 221.

Nitre and Salt no Friend to Vegetation, N. 253. p. 206. 212. **Why Lime good for Plants,** ib. **Each Vegetable requires its proper nourishment,** N. 253. p. 214. **River Water best,** N. 253. p. 220. **Why hot Summers cause best Fruit,** N. 253. p. 227. **All bear alike for**

Vege-

An INDEX.

Vegetation. N. 253. p. 227.
Herbs of the same Classis have the like vertues, N. 255. p. 289.
The Husks of the Verticillate Plants have more vertue than the Flowers, N. 255. p. 291. *Some parts of some Tribes, others of other most Efficacious,* N. 255. p. 291. *Sophia Chirurgorum, good for the Stone,* ib. p. 293. *Fraxinella destroys the smell of other Plants,* N. 152. p. 168. *A Catalogue of some Plants observed at the Island of Ascension,* N. 255. p. 298. *Of the Signatures of Plants,* N. 249. p. 59.
Pneumatic Engine applied to Cupping-Glasses, N. 259. p. 408.
Poysons. See Venoms.
Prussia, most fruitful of Amber, N. 248. p. 8.
Prussian Vitriol examined, N. 248. p. 34.

Q.

Quadrature of the Parts of the Lunula of Hippocrates Chius, N. 259. p. 411.

R.

Rain an Account of what falls, N. 249. p. 45 and 47. *Why Rain Water good for Plants,* N. 253. p. 211.
Redi's M. S. supposed lost, N. 249. p. 42.
Refraction of the Air Experimented, N. 257. p. 339.
Responsio ad animadversionem ad Davidis Gregorii Catenariam, &c. N. 259. p. 419.

S.

Sable Mice in great multitudes in Lapland, N. 251. p. 110.
Saliva compounded of two distinct Juices, N. 254. p. 240.

Salts. See Nitre and Vitriol.
Seeds used in the East-Indies to clarify Water, N. 249. p. 44. *Seed of Fluxwort good for the Stone,* N. 255. p. 293.
Scolopendra marina, an addition to its former Description, N. 251. p. 127.
Sicilian Earthquake. See Earthquake.
Silk, a Discourse of it as it is made in Piedmont, N. 252. p. 183.
Shells on the tops of Hills, N. 25. p. 232.
Shells gathered on the Island of Ascension, N. 255. p. 298. *Of the Physical and Mechanical formation of Speech,* N. 254. p. 264.
Spiders, a Venomous kind in Sardinia, N. 249. p. 58.
Stones found in the Stomach Kidney, and Gall-Bladder, N. 250. p. 95. *New Method of cutting for the Stone,* N. 250. p. 100. *A new sort of Marble or figured Stone found in Wales,* N. 252. p. 187.
Strata of Earths in Coal-boring, N. 250. p. 73. *Concerning Swammerdam and his Treatises,* N. 257. p. 365. *Half-Crown Swallowed without any great inconvenience,* N. 250. p. 97. *Swallowing Stones very dangerous,* N. 253. p. 190.

T.

Of the Tarantola, and the strange Effects of its Bite, N. 249. p. 57.
Temples of the Heathens or Burying places of two Circular Orders of Stones in Scotland, N. 254. p. 232.
Testimony Human, a calculus of its validity, N. 257. p. 359.
Thunder, an account of a Man killed by it, N. 249. p. 50.

An INDEX.

Trachæa, and several Vessels cut, cured, N. 257. p. 400.
 Tradition, written and oral, of what validity, N. 257. p. 363.
 Treatises. See Redi and Swammerdam.
 Turchoises of the new Rock, artificial Stones, N. 249. p. 63.
 Turkeys monstrous, N. 259. p. 431.

V.

Vegitation. See Plants.
 Venoms and their Antidotes, N. 249. p. 58.
 Vitriol Prussian, its examination, N. 248. p. 34. *White Vitriol its Origine, and Figure of its Crystals*, N. 256. p. 331.
 Under-Ground Observations. Great Beams of Timber found under Ground, N. 254. p. 231. An Urn containing Ashes, and a Balsamick Liquor found, N. 249. p. 55.

W.

Water not the nourishment of Plants, only the Vehicle, N. 253. p. 194. Rises up the Vessels of Plants in the same manner as upon a Filtre, N. 253. p. 208. No Water absolutely clear, N. 253. p. 195. Rain Water. See Rain. Engine to raise Water. See Inventions.

Weather, an account of it for the Year, 1698. N. 249. p. 45. An account of that, and of the Barometer at Embay in China, N. 256. p. 323.

Y.

Year Julian of its alteration for the Gregorian. N. 257. p. 343. Annus Confusionis, at the Settling the Julian Account, N. 257. p. 349.

ERRATA.

Number 252. Pag. 118. Line 4. read *Boods*. *Ibid.* l. 10. Dele and not to be found in these parts.

London: Printed for Sam. Smith, and Benj. Walford, Printers to the Royal Society, at the Prince's Arms in St. Paul's Church-Yard. 1700.





