A Summary Account given by Dr. John Wallis, *Of the General* Laws *of* Motion, *by way of Letter written by him to the Publisher, and communicated to the* R. Society, Novemb. 26. 1668.

PEtis, V. C. ut quæ mea sunt de Motibus æstimandis Principia, paucis aperire velim. Id autem, si meministi, jam olim factum est, non modo in illo *Opere*, quod ante octo menses *R. Societati* exhibitum, eorum jussu prælo subjectum est; sed & jamdudum in duobus scriptis eidem *Societati* ante plures Annos exhibitis, quæ & Te penes sunt: Quorum alterum, ex generalibus Motus Principiis, rationem reddit, qui fieri possit, ut Homo flatu suo (Vesicam inflando) saltem Centipondium elevare potis sit (quod Experim. ante 16. vel 18. annos *Oxoniæ* exhibitum, coram Ipsis aliquoties fuit repetitum;) Alterum, varia de Experim. *Torricelliano* dicto, Phænomena, ex principiis Hydrostaticis exponit.

Summa rei huc redit.

1. Si Agens ut A efficit ut E; Agens ut 2 A, efficiet ut 2 E; 3 A, ut 3 E, &c. cæteris paribus: Et, universaliter, m A ut m E; cujuscunq; rationis Exponens sit m.

2. Ergo, si Vis ut V moveat Pondus P; vis m V ut movebit m P, cæter. paribus: puta, per eandem Longitudinem eodem Tempore, *h.e.* eadem Celeritate.

3. Item, si Tempore T. moveat illud per Longitudinem L, Tempore n T movebit per Longitudinem n L.

4. Adeoque, si Vis V, tempore T, moveat Pondus P, per Longitudinem L; Vis m V, Tempore n T, movebit m P, per Longitud. n L. Et propterea, ut V T (factum ex viribus & tempore) ad P L (factum ex pondere & Longitudine) sic $m\,n$ V T, ad $m\,n$ P L.

5. Quoniam Celeritatis gradus sunt Longitudinibus eodem Tempore transactis Proportionales, seu (quod eodem recidit) reciproce Proportionales Temporibus eidem Longitudini transigendæ impensis: erit $\frac{L}{T} \cdot C :: \frac{m\,L}{n\,T} \cdot \frac{m}{n} C$. h. e. Gradus Celeritatum, in ratione composita ex Directa Longitudinum & Reciproca Temporum.

6. Ergo, propter V T. P L :: $m\,n$ V T. $m\,n$ P L: erit $V. \frac{P\,L}{T} :: m\,V. \frac{m\,n\,P\,L}{n\,T}$: *h.e.* $V.\,P\,C :: m\,V.\,m\,P\,C = m\,P \times C = P \times m\,C$.

7. Hoc est, si Vis V movere potis sit Pondus P, Celeritate C: Vis m V movebit vel idem Pondus P, Celeritate m C; vel eadem Celeritate, Pondus m P; vel denique quodvis Pondus ea Celeritate, ut factum ex Pondere & Celeritate sit m P C.

8. Atque hinc dependet omnium Machinarum (pro facilitandis motibus) constru-

construendarum ratio: nempe, ut qua ratione augetur Pondus, eadem minuatur Celeritas; quo fiat, ut Factum ex Celeritate & Pondere, eadem Vi movendo, idem sit: puta $V. P C :: V. m P \times \frac{1}{m} C = P C$.

9. Si Pondus P, Vi V, Celeritate C, latum, in pondus Quiescens (non impeditum) $m P$ directe impingat; ferentur utraque Celeritate $\frac{1}{1+m} C$. Nam, propter eandem Vim, majori Ponderi movendo adhibitam, eadem ratione minuetur aucti Celeritas: nempe $V. P C :: V. \frac{1+m}{1} P \times \frac{1}{1+m} C = P C$. Adeoque Alterius Impetus (intellige factum ex Pondere & Celeritate) fiet $\frac{1}{1+m} P C$; Reliqui $\frac{1}{1+m} m P C$.

10. Si in Pondus P, (Vi V) Celeritate C latum, directe impingat aliud, eadem via, majori Celeritate insequens; puta Pondus $m P$, Celeritate $n C$, (adeoque Vi $m n V$ latum; ferentur ambo Celeritate $\frac{1+mn}{1+m} C$. Nam $V. P C :: mn V. m n P C :: V + m n V = \frac{1+mn}{1} V$. $\frac{1+mn}{1} P C = \frac{1+m}{1} P \times \frac{1+mn}{1+m} C$. Adeoque præcedentis Impetus fiet $\frac{1+mn}{1+m} P C$; subsequentis, $\frac{1+mn}{1+m} m P C$.

11. Si Pondera contrariis Viis lata, sibi directe occurrant sive impingant mutuo, puta, Pondus P (Vi V) Celeritate C, dextrorsum; & Pondus $m P$, Celeritate $n C$ (adeoque Vi $m n V$) sinistrorsum: Utriusque Celeritas, Impetus, & directio, sic colliguntur. Pondus dextrorsum latum, reliquo si quiesceret, inferret Celeritatem $\frac{1}{1+m} C$, adeoque Impetum $\frac{1}{1+m} m P C$, dextrorsum, sibique retineret hanc eandem Celeritatem, adeoque Impetum $\frac{1}{1+m} P C$ dextrorsum (per *Sect.* 9.) Pondusque sinistrorsum latum (simili ratione) reliquo si quiesceret, inferret Celeritatem $\frac{mn}{1+m} C$, adeoque Impetum $\frac{mn}{1+m} P C$ sinistrorsum; sibique retineret hanc eandem Celeritatem, adeoque Impetum $\frac{mn}{1+m} m P C$ sinistrorsum. Cum itaque motus utrinque fiat; Impetus dextrorsum prius lati, jam aggregatus erit ex $\frac{1}{1+m} P C$ dextrorsum, & $\frac{mn}{1+m} P C$ sinistrorsum; adeoque re adse vel dextrorsum vel sinistrorsum, prout ille vel hic major fuerit, eo impetu qui est duorum differentia: h. e. (posito $+$ signo dextrorsum, & $-$ sinistrorsum significante,) Impetus erit

$+$

$+ \frac{1}{1+m} PC - \frac{mm}{1+m} PC = \frac{1-mn}{1+m} P$; Celeritas $\frac{1-mn}{1+m} C$; (adeoque Dextrorum vel sinistrorsum, prout 1 vel mn major fuerit.) Et similiter Impetus sinistrorsum prius lati, erit $+ \frac{1}{1+m} mPC - \frac{mn}{1+m} mPC = \frac{1-mn}{1+m} mPC$; Celeritas $\frac{1-mn}{1+m} C$: Adeoque dextrorsum vel sinistrorsum, prout 1 vel mn major fuerit.

12. Si vero Pondera nec eadem directe via procedant, nec directe contraria, sed oblique sibi mutuo impingant; moderandus erit præcedens Calculus pro obliquitatis mensura. Impetus autem *oblique* impingentis, ad ejusdem Impetum qui esset si *directe* impingeret (cæter. paribus) est in ea ratione qua Radius ad Secantem anguli Obliquitatis; (Quod etiam intelligendum est, ubi Perpendiculariter, sed Oblique cadit in percussi superficiem non minus quam ubi viæ motuum se mutuo Oblique decussant:) Quæ quidem Consideratio, cum Calculo priori debite adhibita, determinabit, quænam futura sint sic Oblique impingentium Celeritas, Impetus, & directio, h. e. quo Impetu, qua Celeritate, & in quas partes ab invicem resilient, quæ sic impingunt. Eademque est ratio Gravitationis gravium Oblique descendentium, ad eorundem Perpendiculariter descendentium Gravitationum. Quod alibi demonstramus.

13 Si quæ sic impingunt Corpora, intelligantur non absolute dura (prout hactenus supposuimus) sed ita ictui cedentia, ut *Elastica* tamen vi se valeant restituere, hinc fieri poterit ut a se mutuo resiliant ea corpora, quæ secus essent simul processura; (& quidem plus minusve, prout hæc vis restitutiva major minorve fuerit,) nempe si Impetus ex vi restitutiva sit progressiva major.

In motibus acceleratis & retardatis, Impetus pro singulis momentis is reputandus est, qui gradui Celeritatis tum acquisito convenit. Ubi autem per Curvam fit motus, ea reputanda est, in singulis punctis, motus directio, quæ est Rectæ ibidem Tangentis. Et si quando motus tum acceleratus vel retardatus fit, tum & per Curvam fiat (ut in Vibrationibus Penduli;) Impetus æstimandus erit, pro singulis punctis, secundum tum gradum accelerationis, tum Obliquitatem ibidem Tangentis.

Atque hæ sunt (quantum Ego judico) Generales Motuum Leges; quæ ad Casus particulares Calculo sunt accommodandæ. Quos tamen, si sigillatim persequi vellem Epistolæ limites transilirem: Neque commode fieri potest scire *Schematum* apparatu, quibus hic abstinendum putavi. *Vale*.
Oxon. d. 15. *Novemb.* 1668.

Dr. Christo-

Dr. Christopher Wrens

Theory concerning the same Subject; imparted to the R. Society Decemb. 17. *last, though entertain'd by the Author divers years ago, and verifi'd by many Experiments, made by Himself and that other excellent Mathematician* M. Rook *before the said Society, as is attested by many Worthy Members of that Illustrious Body.*

Lex Naturæ de Collisione Corporum.

Velocitates Corporum propriæ & maxime Naturales sunt ad Corpora reciproce proportionales.

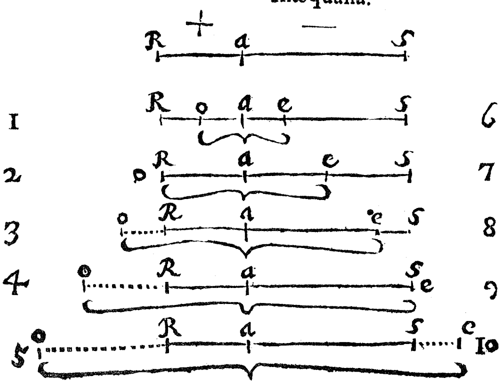
Lex Naturæ.
- *Itaque Corpora* R. S. *habentia proprias Velocitates, etiam post Impulsum retinent proprias.*
- *Et Corpora* R. S. *improprias Velocitates habentia ex Impulsu restituuntur ad Æquilibrium; hoc est, Quantum* R *superat, &* S *deficit à propria Velocitate ante Impulsum, tantum ex Impulsu abstrahitur ab* R *& additur ipsi* S *& e contra.*

Quare Collisio Corporum proprias Velocitates habentium æquipollet Libræ oscillanti super Centrum Gravitatis.

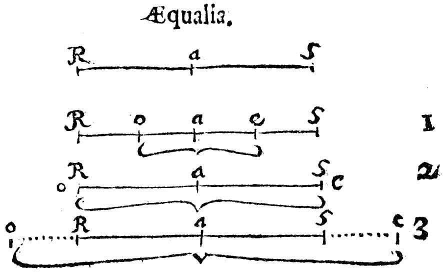
Et Collisio Corporum improprias Velocitates habentium æquipollet Libræ super bina Centra æqualiter hinc inde à Centro Gravitatis distantia: Libræ vero Jugum, ubi opus est, producitur.

Itaque Corporum æqualium impropriè moventium tres sunt casus. Corporum vero inæqualium impropriè moventium (sive ad contrarias sive ad easdem partes) decem sunt omnino Casus, quorum quinque oriuntur ex Conversione.

Inæqualia.



Æqualia.



R S *Corpora æqualia, vel* R *corpus majus*, S *corpus minus.*
a *Centrum Gravitatis sive ansa Libræ.* Z *summa velocitatum utriusque corporis.*

$$\left.\begin{array}{l} Re \\ Se \end{array}\right\}\textit{veloc. corp.}\left\{\begin{array}{l} R \\ S \end{array}\right\}\textit{ante impulsum data} \qquad \textit{vel} \qquad \left.\begin{array}{l} So \\ Ro \end{array}\right\}\textit{veloc. corp.}\left\{\begin{array}{l} S \\ R \end{array}\right\}\textit{ante impulf. data.}$$

$$\left.\begin{array}{l} OR \\ OS \end{array}\right\}\textit{veloc. corp.}\left\{\begin{array}{l} R \\ S \end{array}\right\}\textit{post impulf. quæsita} \qquad\qquad \left.\begin{array}{l} eS \\ eR \end{array}\right\}\textit{veloc. corp.}\left\{\begin{array}{l} S \\ R \end{array}\right\}\textit{post impulf. quæsita.}$$

[*Lege syllabas (quamvis disjunctas)* R *e* S *e o* R *o* S *vel* R *o* S *o e* S *e* R *in Linea cujuslibet Casus*, *& harum quæ scribitur in* Schemate *more* Hebraico, *ea indicat motum contrarium motui*, *quem notat cujusvis syllabæ scriptio* Latina: *Syllaba conjuncta quietem Corporis denotat.*]

$$\text{Calculus}\ \begin{array}{l} R+S:S::Z:Ra \\ R+S:R::Z:Sa \end{array} \left| \begin{array}{l} Re-2Ra=oR \\ 2Sa\pm Se=oS \end{array} \right| \begin{array}{l} So-2Sa=eS. \\ 2Ra+Ro=eR. \end{array}$$

Natura observat regulas Additionis & Subductionis Speciosæ.

An Account of two Books.

I. HISTORIA CÆLESTIS; Ex Libris & Commentariis M.Stis. Observationum Vicennalium TYCHONIS BRAHE, *Dani*, Augustæ Vindelic. *An.* 1666. *in Folio.*

THese Observations of the Noble *Tycho*, as they were procured and preserv'd by those Three Mighty Emperours, RUDOLPH. II. FERDINAND. II. and III; so they were lately by the Command of his Imperial Majesty LEOPOLD made publick. They are usher'd in by a *Liber Prologomenos*, compendiously representing the Observations made from the time of the very Infancy of Astronomy unto that of its Restauration by the Illustrious *Tycho*; and reduced into 7. Classes, *viz.*

1. The *Babylonian* Observations; from *A.* before Christ 721. unto *A.* 432.
2. The *Grecian*; from *A.* before Christ 432. unto the beginning of the Vulgar Christian Account.
3. The *Alexandrian*; from *A. Christi* 1. until *A.* 827.
4. The *Syro-Persian*; from *A. C.* 827. unto 1457.
5. The *Norimbergian*; from *A. C.* 1457. unto 1509.

6. The