

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 *xiiith*. 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

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 *Cesar* 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 Ensur'd.

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 ensur'd 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, $\frac{a^2}{a+c^2}$; from the

Third, $\frac{a^3}{a+c^3}$;

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 $\frac{100}{100}$; the Proportion of Certainty after Twelve such Transmissions, will be but as a half; 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 at $\frac{100}{1001}$, from the 695th.

PROPOS. II.

Concerning Concurrent Testifications.

IF Two Concurrent Reporters have, each of them, as $\frac{1}{2}$ th 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 $\frac{1}{2}$ th; 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 $\frac{1}{2}$ th of Certainty before had, he adds $\frac{1}{2}$ th 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 $\frac{1}{40}$ th; and consequently I have, from them both, $\frac{35}{40}$ ths of Certainty. So from Three, $\frac{215}{40}$, &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, $\frac{2097055}{2097056}$ 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 $\frac{1}{6}$ 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 $\frac{1}{6}$ ths of Certainty for the whole: and of the $\frac{1}{6}$ th wanting he has likewise $\frac{1}{6}$ ths, or $\frac{1}{36}$ ths of the whole more; and therefore that there will be no Failure in that single Particular, he has $\frac{1}{6}$ ths and $\frac{1}{36}$ ths of Certainty, or $\frac{7}{36}$ 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 $\frac{nc}{m+n \times a+c}$

P R O .

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 $\frac{1}{2}$ 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 $\frac{20}{30}$ ths of Certainty ; or but $\frac{20}{40}$ ths, or $\frac{1}{3}$ 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 Hal until it passes the Sixty ninth Hand ; (for it will be near Seventy Years, before the Re-bate 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 Swammerdams Treatise de Apibus; the Ahmella Ceylonensibus, and the Faba Sti. Ignatii.*

IT A est, damnabat sua studia $\delta \mu \alpha \nu \alpha \epsilon \lambda \mu \eta \varsigma$ Swammerdamius noster; erat enim Sectæ Antonia Bourignon addictus: id verò doleo non produisse 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 profus.

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 perfimiles *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 *Cæ/alpinus*, eumque sequutus *Tournefortius*, spectare; neque fortè inconcinnè 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