A Method

For finding the Number *of the* Julian Period *for any Year assign'd, the* Number *of the* Cycle *of the* Sun, *the* Cycle *of the* Moon, *and of the* Indictions *for the same year, being given; together with the* Demonstration *of that Method.*

IN these *Transactions*, N° 18. *p.* 324. is a *Theorem* for finding the Year of the *Julian Period* by a new and very easie Method, which was taken out of the *Journal des Scavans*, N° 36. as it had been proposed and communicated by the Learned Jesuit *De Bill.*

Multiply the { *Solar* / *Lunar* } *Cycle* / *Indiction.* } by { 4845. / 4200. / 6916. } Then divide the sum of the Products by 7980 (the *Julian Period*) the Remainder of the Division, without having regard to the Quotient, shall be the Year inquired after.

Some Learned Mathematicians of *Paris*, to whom the said *P. de Billy* did propose this Problem, have found the Demonstration thereof as the same *Journal* intimates.

There being no further Elucidation of the said *Theorem* since publish'd, Mr. *John Collins*, now a Member of the *Royal Society*, communicated what follows, *viz.*

That the *Julian Period* is a Basis, whereon to found *Chronology* not liable to Controversie, as the Age of the *World* is: And 'tis the Number abovesaid, to wit, 7980, which is the Product of { 28 / 19 / 15 } the { *Solar* / *Lunar* } *Cycle.* / *Indiction.* }

Concerning this *Julian Period*, the late Archbishop of *Armagh*, *Usher*, in the Preface to his Learned Annals, advertiseth, that *Robert Lotharing*, Bishop of *Hereford*, first observed the Conveniencies thereof; 500 years after whom, it was fitted for Chronological uses by *Joseph Scaliger*, and is now embraced by the Learned as such a limit to *Chronology*, that within the space of 7980 Years, the *Number* of the *Sun's Cycle*, the *Prime*, and the year of the *Roman Indiction* (which relates to their ancient Laws and

and Records) can never happen alike. And these Remarques being given, the year of the *Julian Period* is by the former Rule infallibly found.

This *Period* is used by the said Archbishop in his *Annals*, and is by him accounted to exceed the Age of the *World* 709 years. Those that desire further satisfaction about *Æra's*, *Epocha's*, and *Periods*, may repair to many Authors, and among them to *Gregory's Posthuma* in English, *Helvici Chronologia*, *Ægidii Strauchii Breviarium Chronologicum*, who is one of the latest Authors.

Now as to the *Problem* it self, it may be thus proposed:

Any number of Divisors, together with their Remainders after Division, being proposed, to find the Dividend.

This thus generally proposed is no *new* Problem, and was resolved long since, by *John Geysius*, by the help of particular Multipliers, such as those above-mentioned, and publish'd by *Alstedius* in his *Encylopædia* in *Ann.* 1630. and by *Van Schooten* in his *Miscellanies*.

We shall clear up, what Authors have omitted concerning the *Definition* and *Demonstration* of such fixed Multipliers, *&c.* And therefore say, that each Multiplier is relative to the Divisor, to which it belongs, and thus define it;

It is such a Number, as divided by the rest of the Divisors, or their Product, the Remainder is 0; *but divided by its own Divisor, the Remainder is an* Unit.

We require the Divisors proposed to be *Primitive* each to other, *i. e.* that no two or more of them can be reduced to lesser terms by any common Divisor: For if so, the Question may be *possible* in it self, but not resolvable by help of such Multipliers, such being impossible to be found. The reason is, because the Product of an Odd and Even Number is always Even, and that divided by an Even Number, leaves either Nothing, or an Even Number.

$$\text{Divisors}\left\{\begin{matrix}28\\19\\15\end{matrix}\right\}\text{ The Multipliers relative thereto are }\left\{\begin{matrix}4845\\4200\\6916\end{matrix}\right.$$

The *Definition* affords light enough for the discovery of these Numbers. To instance in the *first*: The Product of 19 and 15 is is 285, which multiply by all numbers ſucceſſively, and divide by 28, till you find the Remainder required. Thus twice 285 is 570, which divided by 28, the remainder is 10; alſo thrice 285 is 855, which divided by 28, the remainder is 15. Thus if you try on ſucceſſively, you'l find, that 17 times 285, which is 4845, is the Number required, the which divided by 28, the Remainder is an *Unit*. Hence then we ſhall find, that

4845	is equal to the Solid or Product of	19, 15, 17.
4200		28, 15, 10.
6916		28, 19, 13.

More eaſie ways of performing this *poſtulatum*, are to be found in *Van Schooten's Miſcellanies*, and *Tacquet's Arithmetick*, which perchance are not ſo obvious to every underſtanding.

For illuſtration of the *Rule* propoſed, take this Example.

In the year 1668.	*Cyclus Solis*	25	The Multipliers.	4845	Products. 121125
	Cyclus Lunæ	16		4200	67200
	Indictio	6		6916	41496
			The Sum of the Products		229821

The which divided by 7980, the remainder is 6381, for the year of the *Julian Period*; from which ſubtracting 709, there remains 5672, for the Age of the World, according to Archbiſhop *Uſher*.

For DEMONSTRATION of this *Rule* we thus argue:

1. *Each Multiplier multiplied by its Remainder, is meaſured or divided by its own Diviſor, leaving ſuch a Remainder as is propoſed.*

For before, each Multiplier was defined to be a *Multiplex* of its own Diviſor, *plus* an *Unit:* Wherefore multiplying it by any Remainder, it doth only render it a greater *Multiplex* in the ſaid Diviſor, *plus* an *Unit*, multiplied by the Remainder, which is no other than the Remainder it ſelf; but if 0 remain, that Product is deſtroyed.

2. *The Sum of the Products, divided by each reſpective Diviſor, have the Remainder aſſigned.*

For concerning the firſt Product, it is by the firſt *Section* mea-

ſur'd

ſur'd by its own Diviſor, leaving the remainder propoſed; and if we add the reſt of the Products thereto, we only add a *Multiplex* of its own Diviſor, which in Diviſion enlargeth the *Quote,* but not the *Remainder.*

Particularly the ſecond Multiplier is 28 + 15 + 10 + Remainder, all which is but a *Multiplex* of 28.

And ſo the third Product is 28 + 19 + 13 + Remainder.

And what hath been ſaid concerning the ſum of the Products, being divided by the firſt Diviſor, and leaving the Remainder thereto aſſign'd, may be ſaid of each reſpectively.

3 *The ſum of the Products divided by the ſolid of the three Diviſors, leaves a Remainder ſo qualified as the ſaid Sum.*

For concerning the ſaid Sum, 'tis evident by the *ſecond* hereof, that it is no other than the firſt Product, increas'd by *adding* a juſt *Multiplex* of the firſt Diviſor, that thereby we did only *enlarge* the *Quote,* not *alter* the *Remainder.* By the like reaſon, the *ſubtracting* a juſt *Multiplex* thereof, doth only *alter* the *Quote,* not the *Remainder*; but the Solid of all three Diviſors, multiplied *here* by the *Quote,* as *there* by the *Remainder*, is no other than a juſt *Multiplex* of the firſt Diviſor. Wherefore the Remainder, after this Diviſion is perform'd, is of the ſame Quality as the ſum of the Products, and divided by the firſt Diviſor, leaves the Remainder proper thereto. And the like may be ſaid concerning each Diviſor.

AS in the Method hitherto deliver'd, we requir'd the Diviſors be *Primitive* to each other; ſo, if we take the *Problem* as generally propoſed, in the Preface to *Helvicus* his *Chronologia,* we are told, common Arithmetick fails in the ſolution thereof, and *Tacquet* denies it to be performable by the *Regula Falſi,* and being unlimited, we muſt do it by Tryals. Wherefore,

When any two Diviſors with their Remainders are propoſed, try the Multiplices of one of them, increaſed by its Remainder, and divide by the other: If you find ſuch Remainders as are not for the purpoſe, and that they are repeated, the Problem is impoſſible.

	Diviſors	Remainders
Example.	6.	3.
	8.	5.

The Multiplices of 8, increased by 5, are . .	13. 21. 29. 37. 45. 53.
Those divided by 6, the Remainders are . .	1. 3. 5. 1. 3. 5.

Here you see 21 and 45 for the purpose, and take the Progression, adding the common Difference 24 (which is the least Dividend measured by 6 and 8) and you have 21. 45. *69*. *93*. 117. 141.

Admit, the Question had concerned these three Divisors:

Divisors		Remainders
6	the Remainders being	3
8		5
9		6

Then dividing the former Progression by 9, the Remainders are 3. 0. *6*. 3. 0 *6*.

Wherefore I conclude, that the third and sixth of these Numbers are those sought, to wit, *69* or 141, and so on progressively; whereas, if you had propounded the Remainder of 9 to have been any other Number than 3, 0, *6*, the *Problem*, as concerning all these, had not been possible.

Some easie Cases of the Problem are these:

When the Remainder of some Divisor is 0, and of each of the rest of the Divisors, an *Unit*, or less by an *Unit*, than the Divisor.

In which Cases you are to find such a *Multiplex* of the Product or least Dividend measurable by those Divisors that have Remainders, which increas'd or diminish'd by an *Unit*, may be a just *Multiplex* of that Divisor that hath no Remainder. These Cases are handled by *Tacquet*, and *Bachet* in his *Problemes plaisans & delectables*.

PROBLEM.

To find the Year of the Julian Period for any year of our Lord proposed.

It is necessary to be furnished with the *Sun's Cycle*, the *Prime Number*, and the Number of the *Roman Indiction*, which the industrious Mr. *Street* thus performs:

When 1. 9. 3. *to the Year hath added been,*
Divide by 19. 28, *fifteen.*

The Remainders are the Numbers ſought. And hereby we found them for the year 1668. in the former Example

The uſe of the *Prime* is, to find the *Epact*, and thereby the *Moons Age*, time of *High Water*, &c.

A farther uſe of the *Suns Cycle* is, to attain the *Dominical Letter*, and thereby to know the *Day* of the *Week*, on which any Day of the Month happens. But this is more eaſily and with leſs caution obtain'd, by finding on what Day of the Week the firſt of *March* happens for ever, according to ſuch *Rules* and *Verſes* as I have elſewhere publiſhed. In brief thus:

To the Number . . . . 2.
Add the Year of our Lord, ſuppoſe 1669.
And its even 4*th* part, neglecting what remains, if any . . } 417.

The Sum . . . . . . 2088. Divide by 7, noting the Remainder, which ſhews the Number of the Day of the Week, accounting *Sunday* firſt. If 0 remain, the *firſt* of *March* falls on a *Saturday*. In this Example there remains 2, ſhewing the *firſt* of *March* to fall on *Monday*.

If it were required to perform this for years *preceding* our *Saviour's Nativity*, then take this *Rule*:

To the Year add its even fourth part, the Sum divide by 7, the Remainder ſhews the Day of the Week, accounting *Sunday* firſt, *Saturday* ſecond, and ſo backward.

PROBLEM.

To find what day of the Month in the firſt week of each Month, happens to be on the ſame day of the week as the firſt of March.

Uſe the (plain) following *Verſes*, in which the twelve Words relate to the twelve Months of the Year; accounting *March* the firſt:

Ask endleſs Comfort, God enough beſtows,
From Divine Axioms Faith confirmed grows.

The Alphabetical Number of the first Letter of the word, proper to the Month proposed, is the Answer.

Example.

If the Month were *April*, the word proper thereto is *Endless*, and *E* is the fifth Letter in the Alphabet. Wherefore conclude, That the first of *March* and *fifth* of *April* do for ever happen on the same day of the Week; which for the year 1669. will be on *Monday*.

PROBLEM.

To find on what day of the Week the first day of each Month happeneth.

Supposing the first of *March* known, it might be reckoned from the former *Problem*, but the following *Verse*, beginning with *March*, as the former, is more ready for the purpose:

A dreadful Fire, Beholders daily Gaze,
Chastized England. *Ah cruel fatal Blaze.*

Explication.

In the Year 1669, the *first* of *March* is *Monday*; I would know on what *day* of the *week* the *first* of *October* happens. The word proper to the Month is *England*; then count Alphabetically to *E*, *viz*. *A*. Monday, *B*. Tuesday, *C*. Wednesday, *D*. Thursday, *E*. Friday, which is the day sought. Whence conclude, that the *1st*, *8th*, 15*th*, 22*th*, 29*th* days of *October* are all *Fridays*. Thence it is easie to reckon, on what day of the Week any day of that Month happened; and so for all other Months.

PROBLEM.

To find on what Day of the Month the Sun enters into any Sign of the Zodiack.

For this, *ex super abundanti*, we give the following Verse:

Charles *brought Content, divers Effects ensue,*
Envy, Fear, Dolour, Danger, bids adieu.

Here again the twelve Words relate to the twelve Months, *March* being the first.

To

To the number of the Letter of the *Alphabet* the word begins with, add 7.

Example. *Bear* is the word for *October*, and *F* the ſixth Letter: Wherefore the Sun enters into the 8*th* Sign, to wit, *Scorpio*, on the 13*th* of *October*.

An Account of ſome Books.

I. PETRI LAMBECII LIB. PRIMUS PRODROMI *HISTORIÆ LITERARIÆ*, &c. ——

THe Author of this Book is now the *Hiſtoriographer* and *Library-keeper* to the Emperour. He publiſh'd this Volume ſome few years ago at *Hamburgh*, the place of his Birth, (whence an Exemplar was but lately ſent to the *Publiſher*.) He was excited to this Work by the complaint made by the illuſtrious Lord *Verulam*, (*Lib.* 2. *cap.* 4. *de Augm. Scientiarum*) of the want of a compleat *Hiſtory* of *Learning*, that might give a *ſatisfactory* Account of the Riſe, Progreſs, Tranſmigrations, Interruptions, Declinations, and Reſtaurations of all kind of Learning, Sciences, Arts, and Inventions; together with the *occaſion* of Inventions through *all* Arts; the *method* of teaching, and the *manner* of improving and advancing them: Adding the various *Sects*, and the moſt famous *Controverſies* among the Learned; the *Encouragements* they received; the chief *Writings* they compoſed; their *Schools*, *Academies*, *Societies*, *Colledges*, *Succeſſions*, *Orders*, and whatever belongs to the *ſtate* of Learning.

This grand *Deſideratum* our Author undertakes to ſupply the World with, and in order thereunto, hath given us the *firſt Book* of the *Prodromus* of this Hiſtory, and with it the *four firſt Chapters* of the *Second Book*, together with an *Appendix*, containing a *Summary* of the chief *Perſons* and *Things* he intends more fully and accurately to treat of in the remaining 32 Chapters, deſigned for the ſame *ſecond Book*: To which, he ſubjoins two Tables of *Univerſal Chronography*, in the firſt whereof he exhibits the ſucceſſion of all Ages from the Creation of the World to the beginning of the common *Chriſtian* Account; in the *other*, a Continuation of them from the beginning of the ſaid Account unto this preſent Age: In which *Tables* he gives a general *Idea* of the Connexion of all Ages, as they are computed in reſpect of the