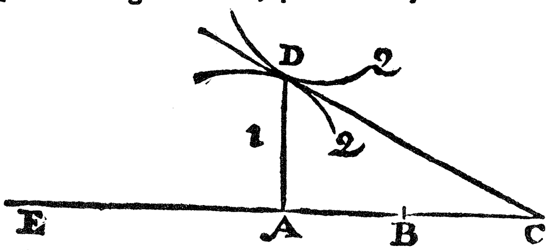
An Extract of a Letter from the Excellent *Renatus Franciscus Slusius*, Canon of *Liege* and Counsellor to his Electoral Highness of *Collen*, written to the Publisher in order to be communicated to the *R. Society*; concerning his short and easie *Method of drawing Tangents to all Geometrical Curves* without any labour of Calculation: Here inserted in the same language, in which it was written.

—*Methodum meam ducendarum ad Curvas quaslibet Geometricas Tangentium mitto ad Te, & Virorum Doctissimorum* R. Societatis *censuræ submitto. Brevis mihi visa est ac facilis, quippe quam puer ἀγεωμέτρητος doceri possit, & quæ absque ullo calculi labore ad omnes omnino lineas extendatur: Malo tamen aliis talem videri quàm mihi, cùm in rebus nostris cæcutire plerumque soleamus.*

Fig. 1. *Data sit igitur qualibet Curva D Q, cujus puncta omnia referantur ad Rectam quamlibet datam E A B per Rectam D A; sive E A B sit diameter seu alia quælibet, sive etiam aliæ simul lineæ datæ sint, quæ, vel quarum potestates Æquationem ingrediantur; parùm id refert.*



In Æquatione Analytica, facilioris explicationis causâ, D A perpetuò dicatur v, *B A*, y. *E B verò & aliæ quantitates datæ*, Consonantibus *exprimantur. Tum supponatur ducta D C, tangens curvam in D, & occurrens E B, productæ, si opus sit, in puncto C; & C A perpetuò quoque dicatur* a. *Ad inveniendam A C vel* a, *hæc erit* Regula Generalis;

1. *Rejectis ab æquatione partibus, in quibus* y *vel* v *non invenitur; statuantur ab uno latere omnes in quibus est* y, *& ab altero illa in quibus habetur* v, *cum suis signis* + *vel* —. *Hoc, dextrum, illud, sinistrum latus, facilitatis causâ, vocabimus.*

2. *In latere dextro, præfigatur singulis partibus exponens potestatis quam in illis obtinet* v; *seu, quod idem est, in illum ducantur partes.*

3. *Fiat idem in latere sinistro, præponendo scil. unicuique illius parti Exponentem potestatis quam in illa habet* y. *Sed & hoc amplius: Unum* y *in singulis partibus vertatur in* a.

Ajo, Æquationem sic reformatam modum ostendere ducendæ Tangentis ad punctum D datum. Cùm enim eo dato, pariter datæ sint y *&* v, *& cæteræ quantitates, quæ Consonantibus exprimuntur;* a *non poterit ignorari.*

Si

Si quid forte sit obscuritatis in Regula, *aliquot exemplis illustrabitur: Data sit hæc Æquatio* $by - yy = vv$; *in qua EB sit* b, *BA*, y, *DA*, v, *& quæratur* a *sive AC talis, ut juncta DC tangat Curvam DQ in D.* *Ex* regula, *nihil rejiciendum est ab hac Æquatione, cùm in singulis ejus partibus reperiatur* y *vel* v. *Ita quoque disposita est, ut ab uno latere sint omnes illius partes in quibus* y; *ab altero, omnes in quibus* v. *Singulis itaque tantùm præfigendus est Exponens potestatis, quam in illis habet* y *vel* v; *& in latere sinistro unum* y *vertendum in* a, *ut fiat* $ba - 2ya = 2vv$. *Ajo nunc, hanc Æquationem ostendere modum ducendæ Tangentis ad punctum D, sive* $a = \frac{2vv}{b-2y} = AC$.

Sic si data fuerit æquatio $qq + by - yy = vy$; *eadem planè fieret cum priori Æquatio pro Tangente, abjecto scil.* qq, *ut Regula præscribit.* *Sic ex* $2byy - y^3 = v^3$ *fit* $4bya - 3yya = 3v^3$ *sive* $a = \frac{3v^3}{4by - 3yy}$: *Ex* $bby + zyy + y^3 = qvv$, *fit* $bba + 2zya + 3yya = 2qvv$ *&* $a = \frac{2qvv}{bb + 2zy + 3yy}$: *Ex* $b^4 + by^3 - y^4 = qqvv + zv^3$, *fit* $3byya - 4y^3a^3 = 2qqvv + 3zv^3$ *&* $a = \frac{2qqvv + 3zv^3}{3byy - 4y^3}$.

Verùm in similibus æquationibus nullam arbitror accidere posse difficultatem. Aliqua fortasse in illis occurret, quarum partes quædam constant ex productis y *in* v: *Ut* yv, yyv, y^3vv, *&c.* *Sed hæc quoque levis est, ut exemplis patebit.* *Detur enim* $y^3 = bvv - yvv$. *Nihil ab illa rejiciendum erit, cùm in singulis ejus partibus reperiatur* y *vel* v.

Sed ut ex Regulæ præscripto disponatur, bis sumendum erit yvv, *& statuendum tam in latere dextro, in quo sunt partes quæ habent* v, *quàm in sinistro, cujus partes habent* y; *quandoquidem* yvv, *tam* y *quàm* v *contineat.* *Faciendum igitur erit*

$$y^3 + vvy = bvv - yvv.$$

Tum mutatâ, ut priùs, hac æquatione in aliam $3yya + vva = 2bvv - 2yvv$, *dabitur* $a = \frac{2bvv - 2yvv}{3yy + vv}$.

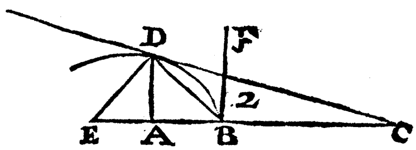
Ita enim intelligenda est Regula, ut nempe in latere non consideretur potestas ipsius v, *ideoque ipsi* yvv *Exponens* vv *præfigi non debeat, sed tantùm ipsius* y: *Sicut contra ab alio latere, in* yvv *considerari non debet potestas ipsius* y, *sed* v *tantùm, eique suus Exponens præponi.* *Sic si foret* $y^5 + by^4 = 2qqv^3 - yyv^3$, *faciendum esset* $y^5 + by^4 + v^3yy = 2qqv^3 - yyv^3$; *& haberetur æquatio pro Tangente* $5y^4a + 4by^3a + 2v^3ya = 6qqv^3 - 3yyv^3$ *&* $a = \frac{6qqv^3 - 3yyv^3}{5y^4 + 4by^3 + 2v^3y}$.

Atque his Exemplis arbitror, me omnem, quæ dari posset, Casuum varietatem complexum esse. *Cæterùm non erit fortasse inutile, si ea quæ generatim exposui, ad lineam aliquam singularem applicem.* *Data sit igitur Curva BD, cujus ea sit proprietas, ut sumpto in illa quolibet puncto D, si jungatur BD, & erigatur ad illam normalis DE, occurrens rectæ BE in E, recta DE sit semper æqualis datæ rectæ BF.* *Ut*

habeatur

habeatur Æquatio in terminis Analyticis, sit DA $= v$, *BA* $= y$, *BF* Fig. 2
vel DE $= q$. *Erit itaque EA* $= \frac{vv}{y}$. *Et cùm quadratum DE æquale sit duobus DA, AE; erit æquatio* $qq = \frac{v^4}{yy} + vv$; *sive* $qqyy = v^4 + yyvv$; *quæ pro Tangente, ex Regulæ præscripto, sic reformanda erit,*

$$qqyy - vvyy = v^4 + yyvv$$
$$2qqya - 2vvya = 4v^4 + 2yyvv$$
$$a = \frac{4v^4 + 2yyvv}{2qqy - 2vvy}.$$



Quomodo autem Æquationes hujusmodi ad faciliores terminos pro constructione reduci debeant, id sanè solertem Geometram minimè latebit. Ut ecce in hoc Exemplo, quoniam Rectangulum BAE supponitur æquale Quadrato AD, si EA dicatur e, *erit* $vv = ye$, *&* $v^4 = yyee$, *&* $qq = ye + ee$. *Itaque pro illis, posito in æquatione eorum valore, fit* $a = \frac{4yyee + 2y3e}{2eey + 2eyy - 2eyy}$, *sive* $a = \frac{2eyy + yy}{e}$, *hoc est,* $ae = 2ey + yy$ *& addito* ee *utrinque* $ae + ee = ee + 2ey + yy$. *Erant itaque tres* $e \mid e + y \mid e + a$, *sive EA, EB, EC, in continua analogia, & facillima evadet constructio.*

Cæterùm, quoniam hactenus supposuisse videmur, Tangentem versus partes B ducendam esse, cùm tamen ex datis accidere possit, ut vel parallela sit ipsi AB, vel etiam ducenda ad partes contrarias; definiendum nunc superest, quomodo hæc Casuum diversitas in Æquationibus distinguatur. Factâ igitur Fractione pro a, *ut in Exemplis supra adductis, considerandæ sunt partes tam Numeratoris quàm Denominatoris, & earum signa.*

1. *Nam si in utroque, partes vel habeant omnes signum* +, *vel saltem Affirmatæ prævaleant Negatis, ducenda erit Tangens versus B.*

2. *Si Affirmatæ prævaleant Negatis in Numeratore, sed æquales sint in Denominatore, recta per D ducta, parallela AB, tanget Curvam in D: hoc enim in casu,* a *est infinitæ longitudinis.*

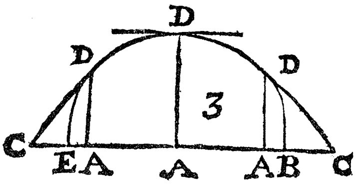
3. *Si tam in Denominatore, quàm Numeratore, partes Affirmatæ minores sint negatis; mutatis omnibus signis, ducenda erit rursus Tangens versùs B: hic enim casus cum primo in idem recidit.*

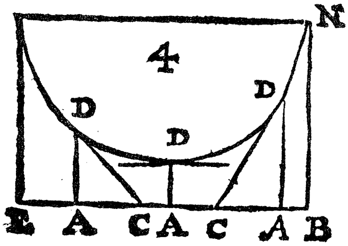
4. *Si in Denominatore prævaleant, in Numeratore minores sint, vel contra; mutatis signis illius in quo sunt minores, ducenda erit Tangens versùs partes contrarias, h. e. AC sumenda erit versùs E.*

5. *Ac tandem si in Numeratore partes Affirmatæ sint æquales Negatis, quomodocunque se habeant in Denominatore,* a *abibit in nihilum. Itaque vel ipsa AD erit Tangens, vel ipsa EA, aut ei parallela; quod ex datis facilè dignoscitur. Horum autem Casuum varietas explicari potest per Æquationes ad circulum.*

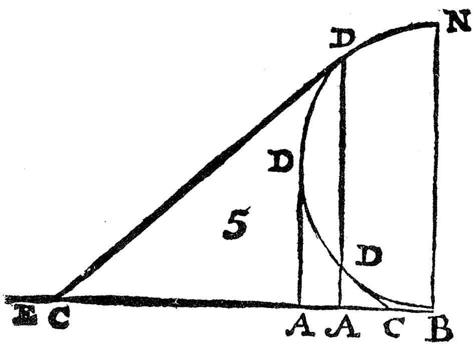
Vid.

*Vid.*Fig.3. *Sit enim Semi-circulus, cujus diameter EB, & in eo punctum D datum, ex quo cadat normalis DA* = v. *Sit BA* = y, *BE* = b; *erit æquatio* b y − y y = v v, *& ductâ Tangente DC, erit AC sive* a $\frac{2vv}{b-2y}$. *Nunc si* b *major sit* 2 y, *ducenda est tangens versùs B; si æqualis, fit parallela EB; sin autem minor, ducenda est versùs E; ut n.* 1. 2. *&* 4. *diximus.*





*Vid.*Fig.4. *Detur rursus alius Semi-circulus inversus, cujus puncta referri intelligantur ad Rectam diametro parallelam, & eidem æqualem, ut in schemate. Denominatis, ut priùs, partibus, & NB* = d, *fit æquatio* b y − y y = d d + v v − 2 d v. *Igitur A C sive* a = $\frac{2vv-2dv}{b-2y}$. *Cùm verò in exemplo supposuerimus,* v *semper esse minorem* d; *si* b *sit major* 2 y, *ducenda erit Tangens versùs E; si æqualis, erit parallela; sin minor, mutatis omnibus signis, ducenda erit versùs* B; *ut n.*4.5.*&* 3.



Nulla autem ducenda esset Tangens, seu Tangens foret ipsa EB, si supposuissemus NB æqualem semi-diametro, sive 2 d = *b*; *ut n.* 5.

V. Fig. 5. *Sit tandem alius Semi-circulus, cujus diameter NB normalis sit ad rectam BE, ad quam ejus puncta referri intelligantur. NB dicatur* b, *& aliæ partes denominentur ut suprà; fiet Æquatio* y y = b v − v v; *&* a = $\frac{bv-2vv}{2y}$. *Jam si* b *sit major* 2 v, *Tangens ducenda erit versùs B; si minor, versùs E; si autem æqualis, ipsa DA erit Tangens; ut n.* 1. 4. *&* 5to.

Et hæc est, ni fallor, Casuum omnium varietas, quæ ex Æquationum consideratione deprehendi potest.

Quomodo verò ex doctrina Tangentium constituantur Æquationum Limites, non est ut pluribus exponam, cùm evidens esse existimem, maximam vel minimam applicatarum vel utramque simul determinari à Tangente parallela: de quo & aliàs ad Te scripsi, & aliquid etiam attigi

Mis-

Miscelaneorum cap; *ubi &, quâ ratione flexus contrarii curvarum ex Tangentibus inveniantur, ostendi. Eadem ratione reperitur quoque* μοναχὸς λόγος, *ut vocat* Pappus, *& multa alia; quæ si explicare vellem, liber mihi scribendus esset. Nam & in Physico-mathematicis Usus quoque hujus Regulæ opinione major est: Licèt enim falsum sit Axioma,* Naturam agere per lineam brevissimam; *verissimum tamen est, Viam sequi determinatam, &, ubi nullam invenit, agere* ἀορίστως. *De quo aliàs plura, si tanti Tibi visum fuerit: jam enim epistolæ modum excessi; ac vereor, ne, dum obscuritatem vitare satago, in prolixitatem inciderim. Addo tantùm, me Regulæ meæ* Demonstrationem * *habere facilem, & quæ solis constet Lemmatibus; quod mirum Tibi fortasse videbitur. Vale. Dabam* Leodii *d.* 17. Januar. *CIↃIↃCLXXIII.*

* Non dubitamus, quin rogatu nostro Illustris & Candidus hic Author Demonstrationem hîc indigitatam Nobis etiam brevi sit communicaturus.

An Accompt of some Books.

I. *A Discourse concerning the Origin and Properties of WIND, &c. By* R. Bohun *Fellow of N. Coll. in Oxon. Printed at* Oxford 1671. *in 8°.*

THe Industrious Author of this Discourse, having consider'd with himself, how little Progress had been made, as in general, in the *History of Nature*, so, in particular, concerning the History of *Winds*, till our Voyages to the *East* and *West-Indies*, and the great advancement of Navigation in this and the precedent Age, furnish't us with so many new Discoveries and Improvements in all Natural knowledge, especially in the Motions of the *Winds* and *Seas*, that we must acknowledge the Insufficiency of the Theories received from the Schools of the Antients; having, I say, considered this, and withall met with frequent opportunities of conversing with the most Experienced of our Sea-Captains, giving him good information of the Course of the *Trade-winds*, the *Indian Monzoons*, the several sorts of *Brises* in the African and American Climates, *Hurricans*, and other tempestuous Winds: Endeavoureth in this Discourse to give a fuller Accompt of this Subject than former Writers have done, proceeding therein, as he assureth the Reader, with great caution, in seldom making use of any Account of Voyagers, but when several Relations did agree in the same Particulars, or when he