ſend it to the ROYAL SOCIETY, with a Figure of the Infant, with the Parts in their proper *Site*. One thing I cannot paſs in Silence, *viz.* how the Circulation could be carried on, the Heart being thus inverted; and yet the Child lived ſeveral Days after Birth. I obſerved the Heart from its Baſis, whence the *Aorta* and pulmonary Artery ſpring, and where the *Cava* and pulmonary Vein enter it, to its Cone; ſurrounded looſely with ſeveral Windings of theſe Veſſels, through which the Blood's Circulation muſt neceſſarily be performed. A wonderful Sagacity in Nature! but I ſhall reſerve the reſt for my Tract.

VIII. Johannes Caſtillioneus *D^no.^ de* Montagny, *V. D. Philoſoph. Prof. in Acad.* Lauzanneſi, *Reg. Soc.* Lond. *Soc. &c. de Curva* Cardioïde, *de Figura ſua ſic dicta.*

S. P.

NON ignoro, V. C. novarum curvarum inveſtigationem, tanquam nimis Analyſtis facilem, contemni: Cum tamen D. *Carré*, non mediocris Geometra Regiæ Scientiarum Academiæ, (28 Feb. 1705.) novam curvam, quanquam *vix ſumma ſequens faſtigia rerum*, proponere non dubitârit; cur tibi, viro in amicos benigniſſimo, nonnulla, quæ mihi ejuſdem *Carré* diſſertationem legenti venerunt in mentem, ſcribere non auſim? Sed procemiis omiſſis, ad rem.

Semicirculi *BMA*, (Fig. 1. 2. 3. TAB. III.) diameter *BA*, ita, puncto *B* peripheriam radens, ut ſemper tranſ-

transſeat per punctum A gignet curvam, de qua agitur.

Ex generatione patet,

1°. Quod $DA\alpha$ normalis ad AB, æquat diametri duplum.

2°. Quod hujus curvæ peripheria $ADNa\alpha NA$ finiet in A.

Curvam hanc a figura *Cardioïdem*, ſi placet, appellabimus.

Jam per a, & A ducantur aE, AQ normales ad aA, & ubi libet EN normalis ad aE: Ex geneſi erit $AN = BA \pm AM$, & (per ſimilitudinem triangulorum QAN, MBA) $AQ = BM \pm MP$, ac $NQ = MA \pm AP$.

Hæc eſt præcipua hujus curvæ proprietas, altera non injucunda eſt, quod recta NN ſemper æquat diametri duplum, & ſemper a circulo biſecatur in M.

Sit nunc $BA = a$, $aE = x$, $EN = y$, Erunt $QN = \mp y \pm 2a$, $AN = \sqrt{x^2 + y^2 - 4ay + 4a^2}$, & $MA = \mp a \pm \sqrt{x^2 + y^2 - 4ay + 4a^2}$; quæ quatuor lineæ per analogiam comparatæ, dant æquationem ad curvam.

$$y^4 - 6ay^3 \begin{matrix} + 2x^2y^2 - 6ax^2y + x^4 \\ + 12a^2y^2 - 8a^3y + 3a^2x^2 \end{matrix} \Big\} = 0$$

Curvæ ſubtangens juxta vulgatas methodos, eſt

$$\frac{2y^4 - 9ay^3 + 2x^2y^2 + 12a^2y^2 - 3ax^2y - 4ay^3}{6axy - 2xy^2 - 3a^2x - 2x^3} = \frac{\dot{x}}{\dot{y}}$$

Sed ex curvæ generatione facilior ducendæ tangentis ratio deduci poteſt. Veniat MAN in locum primo quamproximum mAn, ſumantur $AR = AM$, & $Ar = AN$, & junctis MR, Nr, ducatur per A recta

AT iis parallela, & per *Mm*, *Nn*, rectæ *MT*, *nt*. Jam $nA : At :: nr$ (vel mR) $: rN :: mR \times MA : rN \times AM :: mR \times MA : MR \times AN :: MA \times Am : AN \times AT$, sed in ultima ratione $mA = MA$, & *TA* normalis ad *MN*, quare $nA : At :: \overline{MA}^2 : AN \times AT$; si nunc ex *M* ducatur per circuli centrum *F*, recta *MF* producenda, donec. rectæ *TA* item productæ occurrat in *G*, id est, usque ad circuli peripheriam, erit $\overline{MA}^2 = TA \times AG$; quapropter $nA : At :: AG : AN$; describatur igitur semicirculus per *G*, & *N*, qui secabit rectam *AT* in *t*, ex quo ducta recta *tN* erit tangens ad curvam, ad quam insuper recta *NG* est normalis; hinc jungantur *MO*, cui ex *N* ducatur parallela, quæ tanget curvam.

Hic obiter notandum puto hanc ducendarum tangentium methodum probe convenire pluribus curvis.

Sit *AB*, Fig. 2. Conchois Nicomedæa: Tunc (supposita superiori præparatione) $BP : Pt :: BR$, (vel cr) $: Rb :: cr \times CP : Rb \times CP$, (vel $rC \times PR$) $:: \overline{CP}^2 : TP \times PR$, unde deducitur superior constructio.

Recta longitudinis datæ Fig. 3. *CPB*, extremitate *C* radens rectam *CDT* ad *DA* normalem, semper transeat per punctum *P* datum in ipsa *DA*, & ita curvam *AB* gignat.

Superiorem præparationem, & ratiocinium huic aptans habebis $BP : Pt :: bR$ (rc) $: RB :: cr \times CP : RB \times CP$ $(BP \times rC)$ $:: \overline{CP}^2 : BP \times PT$, ut supra. Piget plura referre.

Cæterum methodus de *maximis, & minimis* dat maximam ordinatam $= \frac{9a}{4}$, & ejus abscissam $= \frac{a}{4}\sqrt{3}$. Posset eodem pacto investigari abscissarum maxima; sed

sed *longæ ambages, series sed longa* laborum; quare sic eam quærito.

Quia EN, Fig. 1. est tangens ad curvam, recta MG ex puncto M per centrum F ducta determinat punctum G, ex quo ducta GN est normalis ad EN, ergo & ad Aa, ex hypothesi, sed $NQ = AV = MA + AP$; ergo $VP = MA$; atqui $BA : AM :: MA : AP$; ergo $BA : PV :: VP : PA$; sed $PF = FV = a - 2z$; & ideo $a : a - 2z :: a - 2z : z$. Unde facile deduitur $z = \frac{a}{4}$, $EN = \frac{7a}{4}$, $AQ = \frac{3a}{4}\sqrt{3}$. Ubi notandum quod idem punctum M, quod præbet in recta $NAMN$ punctum majoris ordinatæ, præbet etiam punctum majoris abscissæ.

Sed jam satis patientia tua abusus videor: quare finem faciam, nonnulla alia, quæ de hac curva commentatus sum, propediem missurus, si putes hæc & similia non indigna, quæ a te subcisivis horis legantur. Vale,

Vir, *quo neque candidiorem*
Terra tulit, neque cui me sit devinctior alter.
Viviaci, pridie Kalendas Apriles 1741.

IX. *Ad Eclipses Terræ repræsentandas, Machina* J. And. Segneri, *Med. Physic. & Mathem. Prof.* Goetting, R. S. S.

UT eclipsis aliqua terræ oculis exhibeatur spectanda, projectio arcuum & circulorum, qui in hemisphærio terræ illuminato concipiuntur, in planum, servire potest egregie: Sique in ejusmodi pro-

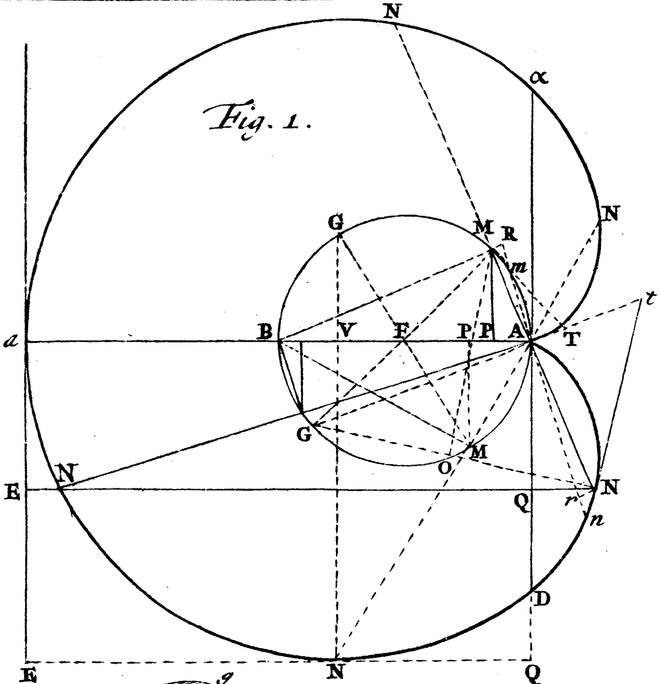

Fig. 1.

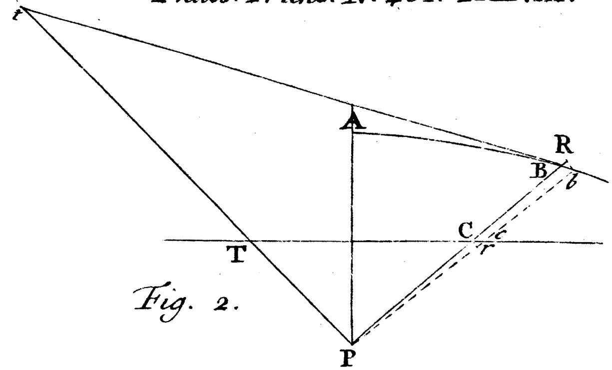

Fig. 2.

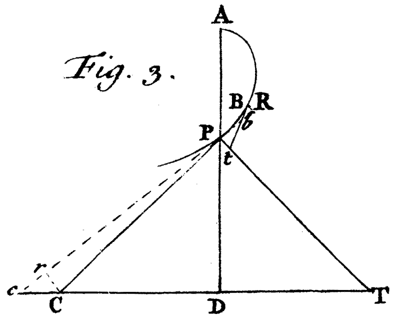

Fig. 3.

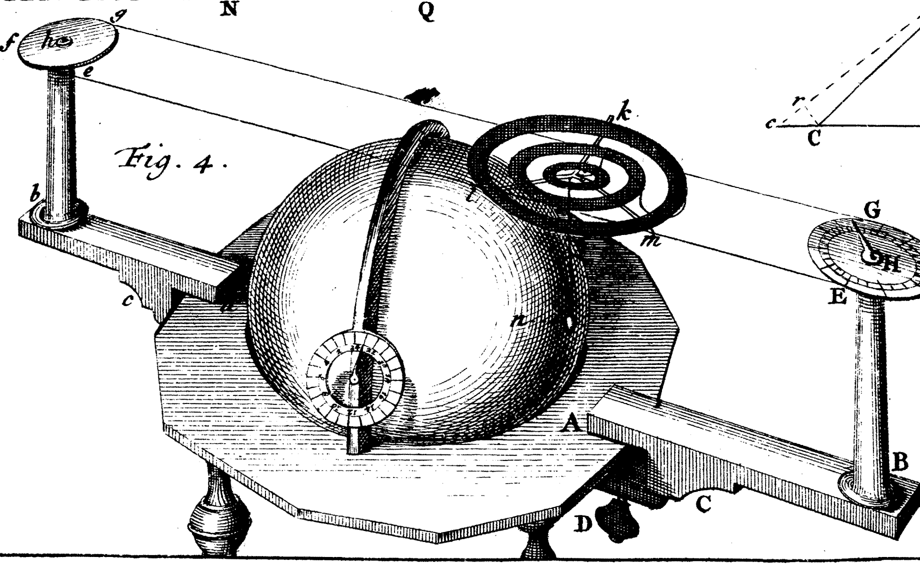

Fig. 4.

J. Mynde sc.