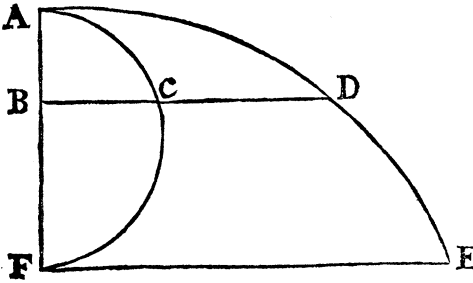


IV. De Figurarum Geometricè irrationalium
 Quadraturis. Autore Johanne Craig.



SIT ACF Semicirculus, cujus Diameter est AF, ADE Curva Geometricè irrationalis, cujus Ordinatum applicata BD secat semicirculum in C. Quantitates verò sic designentur; Diameter AF = 2 a, Abscissa AB = y, Arcus AC = v, Ordinata BD = z:

fitque $Z = rvy^n$ æquatio generalis exprimens naturas Curvarum Geometricè irrationalium ADE, in qua r denotat quantitatem quamlibet datam & determinatam, & n exponentem indefinitum quantitatis indeterminatæ y. Dico Aream.

$$ABD = \frac{rvy^{n+1}}{n+1} - qv + \sqrt{2ay - yy} \times \frac{ra}{n+1} y^n + \frac{2nra^2 + ra^2}{nx} \frac{y^{n-1}}{n+1} +$$

$$\frac{aAx^{2n-1}}{n-1} y^{n-2} + \frac{aBx^{2n-3}}{n-2} y^{n-3} + \frac{aCx^{2n-5}}{n-3} y^{n-4} + \frac{aDx^{2n-7}}{n-4} y^{n-5} +$$

$$\frac{aEx^{2n-9}}{n-5} y^{n-6} + \&c.$$

De hac Serie Infinitâ hæc sunt notanda: (1.) Quod Literæ majusculæ A, B, C, D, E, &c. designent coefficientes terminorum ipsis immediatè præcedentium, sciz: $A = \frac{2nraa + ra^2}{nxn + 1xn + 1}$

$B = \frac{aAx^{2n-1}}{n-1}$, $C = \frac{aBx^{2n-3}}{n-2}$ & sic porro. (2.) Quod si expo-

nens n sit numerus integer & positivus, aut nihilo æqualis, vel etiã si 2 n sit numerus impar, tum Quadratura Spatii ABD exhibeatur per Quantitatem finitam; serie in his casibus abruptente. (3.) Quod q designet terminum ultimo abruptentem. (4.) Quod omnes illæ Figure in quibus series abruptitur habeant unam portionem Geometricè Quadrabilem, ex ipsâ serie facillimè assignabilem: Nimirum si capi-

atur

atur Abfciffa $y = r^{\frac{1}{n+1}} \times \sqrt[n+1]{nq+q^{\frac{1}{n+1}}}$; Erit huic Abfciffæ competens Area Geometri cè quadrabilis. (5.) Quod folus terminus irrationalis $\sqrt{2ay-yy}$ in terminos ipfum fequentes fit multiplicandus.

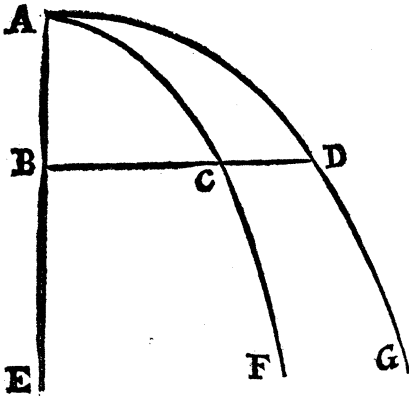
Exemplum 1. Sit $z=v$, quia in hoc cafu $r=1$, $n=0$, ideo $\frac{r^a}{n+1} y^n$ eft terminus ultimò abrumpens, quare $q=a$, unde $ABD = vy - av + a\sqrt{2ay-yy}$: & proinde fi (per not. 4) capiatur Abfciffa $y=a$, id eft, fi ordinata tranfeat per circuli centrum erit portio huic competens Geometricè Quadrabilis, fcil. Area= aa , id eft, Radii Quadrato.

Exemp. 2. Sit $z = \frac{vy}{a}$, quia in hoc cafu $r = \frac{1}{a}$, $n=1$, ideo $\frac{2nra + ra}{n \times n+1} y^{n-1}$ eft terminus ultimo abrumpens, quare $q = \frac{3a}{4}$;

unde $ABD = \frac{vy^2}{2a} - \frac{3av}{4} + \frac{v+3a}{4} \sqrt{2ay-yy^2}$ & proinde fi (per not. 4) capiatur $y = \sqrt{\frac{3aa}{z}}$, erit huic abfciffæ competens Area Geometricè Quadrabilis, Scil. Area = $\sqrt{\sqrt{6a^4 - \frac{3a^2}{z}} \times \sqrt{\frac{3a^2}{32} + \frac{3a}{4}}}$.

Exemplum 3. Sit $z = \frac{vy^2}{aa}$; In hoc cafu $r = \frac{1}{aa}$, $n=2$, ideo $\frac{2Ax2n-1}{n-1} y^{n-2}$ eft terminus ultimò abrumpens, ergo $q = \frac{5a}{6}$;

unde per Seriem Infinitam erit $ABD = \frac{6vy^3 - 15a^3v + 2ay^2 + 5a^2y + 15a^3}{18a^2} \sqrt{2ay-yy}$ Et proinde fi (per not. 4) Capiatur $y = \sqrt{\frac{3/5a^3}{z}}$, erit abfciffæ competens Area Geometricè quadrabilis: fcil. Area = $\frac{2ay^2 + 5a^2y + 15a^3}{18a} \times \sqrt{2ay-yy}$.



Secundò. Sit A C F Parabolæ, cujus Axis A E, Vertex A, & latus rectum (B a). Sitque A D G Curva Geometricè irrationalis, cujus Ordinatum applicata B D secat Parabolam in C. Et vocetur Abscissa AB=y, Ordinata B D=z, Arcus Parabolicus A C=v. Sitque æquatio generalis exprimens Naturas infinitarum Curvarum irrationalium, hæc. $Z=ry^n$ in qua r denotat quantitatem datam & determinatam, & n exponentem indefinitum

quantitatis indeterminatæ y. Dico Aream

$$ABD = \frac{ry^{n+1}x^v}{n+1} - qv + \sqrt{2ay+yyx} - \frac{r}{n+2xn+1}y^{n+1} - \frac{ra}{n+2x\frac{n+1}{2}}y^n + \frac{raa \times 2n+1}{nxn+2xn+1}y^{n-1} - \frac{aAx2n-1}{n-1}y^{n-2} + \frac{a^2x2n-3}{n-2}y^{n-3} - \frac{a^3x1n-5}{n-3}y^{n-4} + \&c.$$

De hac serie hæc sunt notanda : (1.) Quod literæ majusculæ, A, B, C, &c. denotent coefficientes terminorum ipsis præcedentium. (2.) Quod si exponens n sit integer positivus aut nihilo æqualis, aut etiam si 2 n sit numerus impar, tum Quadratura exhibeatur per numerum Terminorum finitum ; serie in his casibus abrupte. (3.) Quod + q sit æqualis termino ultimo abrupte. (4.) Quod ex terminis quantitatem $\sqrt{2ay+yy}$ multiplicantes ultimò abruptens sit duplicandus. (5.) Quod omnes illæ figuræ, in quibus n est numerus integer positivus & impar, vel generalius, omnes illæ Figuræ, in quibus ultimus terminus abruptens habet signum affirmativum seu +, habeant unam portionem Geometricè Quadrabilem, & ex ipsa serie facillè assignabilem, sumendo abscissam ut in not. 4. præcedentis Seriei.

Exemplum 1. Sit $z=v$, quia in hoc casu $r=1$, $n=0$, ideo terminus ultimò abruptens est $-\frac{r^a}{n+2xn+1}y^n$, unde + $q = -\frac{a}{2}$ (per not. 3) & quia in hoc casu $-\frac{a}{2}$ est terminus ultimo

ultimo abrumpens, ideo — a est ultimus terminus in $\sqrt{2ay+yy}$ multiplicandus (per not. 4). Adeoque

$$A B D = vy + \frac{av}{2} + \sqrt{2ay+yy^2x} - \frac{x}{2}y - a.$$

Exemp. 2. Sit $z = \frac{vy}{a}$, quia in hoc casu $r = \frac{x}{a}$, $n = 1$, ideo terminus ultimò abrumpens est $\frac{raa \times 2n+1}{n \times n + 2 \times n + 1} y^{n-1} = \frac{a}{4}$, unde

$q = \frac{a}{4}$ & $\frac{a}{2}$ ultimus terminus in $\sqrt{2ay+yy}$ multiplicandus;

$$\text{adeoque } A B D = \frac{vyy}{2a} - \frac{av}{4} + \sqrt{2ay+yyx} - \frac{y^2}{6a} - \frac{y}{12} + \frac{a}{2}$$

Et si capiatur $y = \sqrt{\frac{aa}{2}}$, erit Area competens huic abscissæ

$$\text{Geometricè Quadrabilis, scil. Area} = \frac{1}{12} \sqrt{2a^4} + \frac{1}{12} \frac{a^2}{2} \times 5a - \sqrt{\frac{a^2}{2}} :$$

Plura habeo hujusmodi Theoremata, pro Figuris ex circulo Parabolâ & dependentibus; sed hæc duo, speciminis igratiâ, sufficiant ad ostendendum usum Methodi meæ in tractatu nostro de Quadraturis editæ, in determinandis Figurarum irrationalium Quadraturis, ad quas nulla alia (quantum scio) Methodus hæctenus porrigitur.

V. Part of a Letter of Mr. Robert Tredwey, to Dr. Leonard Plukenet, Dated Jamaica, Feb. 12. 1696, giving an Account of a great piece of Ambergriese thrown on that Island; with the Opinion of some there about the way of its Production.

I Shall only at present let you know the Account I received from *Ambergriese Ben*, for so the Man is called from the vast Quantity of that valuable Commodity