

(1527)

were so divided, that they never fell to the Earth, but were exhaled up into the Clouds.

In the said small Particles of Water are conveyed the above-mentioned small *Animalcula* far up into the Land, and when the Ground becomes dry, they contract themselves into an oval Figure, and the Pores of their Skin are so well clos'd, that they do not perspire at all, whereby they preserve themselves till it Rains, upon which they open their Bodies and enjoy the moisture. And thus, in my poor opinion, it happens that we find these *Animalcula* in every Meadow of our Country, none of which are very remote from the Sea or Water Canals.

II. Solutio Problematis.

A Clariff. viro D. Jo. Bernoulli in Diario Gallico

Febr. 1403. Propositi.

Quam D. G. Cheynæo communicavit Jo. Craig.

P*roblema.* Propositæ Curvæ Geometricæ alias innumeras Longitudine Æquales invenire.

Solutio. Sint w, s , co-ordinatæ Curvæ datæ ; & Curvæ quæsitæ sint co-ordinatæ x, y : tum ex conditione Problematis erit $dw^2 + ds^2 = dx^2 + dy^2$. Ponatur $dx = dw - m dz$, unde erit $dy = \sqrt{ds^2 + 2m dw dz - m^2 dx^2}$; in hac pro ds substituatur ejus valor per w, dw & determinatas expressus : & pro dz assumatur talis valor ex w, dw & determinatis compositus, ut valores quantitatum dx, dy sint summabiles : Et sic habentur x ac y Co-ordinatæ Curvæ quæsitæ. Q. E. J.

Exemplum 1. Invenire Curvam æqualem Lineæ Parabolicæ. Sit $2a$ latus rectum Parabolæ ; adeoq; $2as$

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$ds = w^2$ unde $ds^2 = a^2 w^2 dw^2$ adeoque $dy = \frac{w^2 dw^2}{\sqrt{a^2 w^2 dw^2 + 2m dw dz - m^2 dz^2}}$; ut hæc sit summabilis assumatur $m dz = \frac{w^2 dw}{a^2}$: unde $dx = dw$

$-a^2 w^2 dw$: $dy = dw \sqrt{3a^2 w^2 - a^4 w^4}$ quarum integrales per Methodos dudum cognitæ inveniuntur $x = w - \frac{w^3}{3a^2}$ $y = \frac{w^2 - 3a^2}{3a^2} \sqrt{3a^2 - w^2}$.

Exemp. 2. Invenire Curvam æqualem Circulari. Sit a radius Circuli; tum $s = \sqrt{a^2 - w^2}$: unde $ds^2 = \frac{w^2 dw^2}{a^2 - w^2}$; & proinde erit $dy = \frac{w^2 dw^2}{a^2 - w^2} + 2m dw dz - m^2 dz^2$; ut hæc sit summabilis, assumatur $m dz = \frac{4w^2 dw}{a^2}$, adeoq; $dx = dw - \frac{4w^2 dw}{a^2}$: $dy = -\frac{3a^2 w + 4w^3}{a^2 \sqrt{a^2 - w^2}} dw$. Quarum integrales per communes

Methodos inveniuntur $x = w - \frac{4w^3}{3a^2}$, $y = \frac{a^2 - 4w^2}{3a^2} \sqrt{a^2 - w^2}$:

Exemp. 3. Invenire Curvam æqualem Ellipticæ. Sit $2r$ latus rectum, $2a$ latus transversum, tum $s = \frac{r \sqrt{a^2 - w^2}}{a}$,

unde erit $ds^2 = \frac{r^2 w^2 dw^2}{a^4 - a^2 w^2}$, adeoque $dy =$

$\frac{r^2 w^2 dw^2}{a^4 - a^2 w^2} + 2m dw dz - m^2 dz^2$; ut hæc sit summabilis assumatur $m dz = \frac{2a + 2r}{a^2} w^2 dw$: unde

$dx = dw - \frac{2a + 2r}{a^2} w^2 dw$. $dy = dw$

$\frac{r^2 w^2}{a^4 - a^2 w^2} + \frac{4a + 4r}{a^2} w^2 + \frac{2a + 2r}{a^2} w^2$; quarum In-

tegrales per Methodos noniffimas inveniantur $x = w - \frac{2a - r}{3a^2} w^3$, $y = \frac{2a^3 - ra^2 - 2aw^2 - 2rw^3}{3a^2} \sqrt{a^2 - w^2}$.

Exemp. 4. Invenire Curvam æqualem Parabolæ Cubicali cujus æquatio fit $3a^2 s = w^3$. Unde $ds^2 = \frac{w^4 dw^2}{a^2}$.

& proinde $dy = \sqrt{a^2 + w^2} dw^2 + 2m dw dz - m^2 dz^2$;

Ut hæc fit summabilis assumatur $m dz = \frac{w^2 dw}{2a^2}$. Unde

$dx = dw - \frac{w^2 dw}{2a^2} \sqrt{3w^2 + 4a^2}$. Quarum integrales

per Methodos vulgo notas sunt $x = w - \frac{w^3}{6a^2}$, $y = \frac{2}{9} \sqrt{3w^2 + 4a^2}$.

Ex aliis infinitis valoribus quantitatis $m dz$ debite assumptis infinitas invenias Curvas datæ æquales. Tu verò, *vir Eruditissime*, facîle percipias hoc Problema aliquam habere cum Problemate quodam Diophantæo affinitatem: Problema Diophanti est, dividere summam duorum Quadratorum in duo alia quadrata, quorum latera sint rationalia; & Problema *Bernoullii* est, dividere summam duorum Quadratorum in alia duo Quadrata, quorum latera sint summabilia. Sicut Problematis *Diophantæi* solutio a vulgari tantùm Algebrâ dependet, sic *Bernoulliani* Problematis solutio communes tantùm Fluxionum Methodos inversas requirit: utriusq; artificium in debitâ laterum quæstorum assumptione consistit; scilicet *Diophantum* ut sint rationalia, *Bernoullianum* ut sint summabilia.