CAPVT IV.

DE VLTERIORI AMPLIFICATIONE CAMPI HVIC MICROSCOPIORVM GENERI CONCILIANDI.

Problema I.

206.

Cuiuscunque indolis fuerit lens obiectiua, post imaginem realem duas adhuc lentes ita disponere, vt margine colorato euanescente, campus maximus euadat.

Solutio.

Quemadmodum in superiori capite vidimus, naturam lentis obiectiuae siue sit simplex siue multiplicata nihil in lentibus posterioribus mutare, ita vicissim multiplicatio lentium posteriorum neutiquam lentem obiectiuam adficiet; quamobrem considerabimus hic lentem obiectiuam vt simplicem, quandoquidem determinationes, quas inueniemus aeque ad omnes multiplicatas quoque erunt accommodatae. Cum igitur iam habeantur tria interualla, litterarum P, Q, R. se-

R secunda erit negatiua hincque ponatur

$$Q = -k, \text{ vt fit } PkR = \frac{ma}{b}$$

distantiae igitur focales erunt:

$$p = \mathfrak{A}\, a;\quad q = -\frac{A\mathfrak{B}}{P}.\, a;$$

$$r = -\frac{AB\mathfrak{C}}{Pk}.\, a \text{ et } s = +ABC\frac{b}{m};$$

vnde concluditur, fore $\mathfrak{C} > 1$ hinc $C < o$. Tum vero interualla erunt

$$I^{mum} = Aa(1 - \tfrac{1}{P});$$

$$II^{dum} = -ABa(\tfrac{1}{P} + \tfrac{1}{Pk})$$

$$III^{tium} = ABC.\, a(-\tfrac{1}{Pk} + \tfrac{b}{ma});$$

vnde sequitur $R < 1$. Cum porro pro campo apparente sit $z = \frac{\mathfrak{q}+\mathfrak{r}+\mathfrak{s}}{ma+b}.\, ab\xi$ vt campus fiat maximus, debet esse $\mathfrak{q} = 1$, $\mathfrak{r} = 1$ et $\mathfrak{s} = 1$. vt fiat

$$z = \frac{3ab}{ma+b}.\, \xi \text{ ex quo erit } M = \frac{3b}{ma+b};$$

hincque aequationes fundamentales

$$1^{\circ}.\ -\mathfrak{B} = (P-1)M = \frac{3.b(P-1)}{ma+b};$$

$$2^{\circ}.\ \mathfrak{C} = (Pk+1)M - 1.$$

Pro loco oculi vero distantia

$$O = \frac{s.d}{Ma}.\frac{b}{m} = \frac{s}{Ma}.\frac{b}{m} = \tfrac{1}{3}s(1 + \tfrac{b}{ma}).$$

Margo autem coloratus destruetur ope huius aequationis $o = \frac{1}{P} - \frac{1}{Pk} - \frac{1}{PkR}$ vnde inuenitur $k = 1 + \frac{1}{R}$.

Quia

Quia vero debet esse $R < 1$, statuamus $R = \frac{1}{2}$ fietque

$$k = 3 \text{ et } PkR = \tfrac{3}{2} P = \tfrac{ma}{b},$$

ita, vt fit

$$P = \tfrac{2ma}{3b} \text{ et } Pk = \tfrac{2ma}{b},$$

ex quo concluditur

$$\mathfrak{C} = \left(\tfrac{2ma+b}{b}\right) M - 1 \text{ seu}$$

$$\mathfrak{C} = \tfrac{6ma+3b}{ma+b} - 1 = \tfrac{5ma+2b}{ma+b}$$

pro magnis igitur multiplicationibus erit $\mathfrak{C} = 5$ hincque $C = -\frac{5}{4}$. Ex priore vero aequatione prodit

$$\mathfrak{B} = \tfrac{3b-2ma}{3b};\ M = \tfrac{3b-2ma}{ma+b}$$

et pro magnis multiplicationibus

$$\mathfrak{B} = -2 \text{ et } B = -\tfrac{2}{3}.$$

Statuamus igitur

$$\mathfrak{B} = -2;\ B = -\tfrac{2}{3};\ \mathfrak{C} = 5 \text{ et } C = -\tfrac{5}{4},$$

dum est, vt vidimus,

$$P = \tfrac{2ma}{3b},\ k = 3 \text{ et } R = \tfrac{1}{2}$$

fientque distantiae focales

$$p = \mathfrak{A}.\, a;\ q = \tfrac{3Ab}{m};$$

$$r = \tfrac{5Ab}{3m} \text{ et } s = \tfrac{5Ab}{6m} = \tfrac{1}{2} r$$

 et

et intervalla lentium

$$\mathrm{I}^{mum} = \mathrm{A}a\left(1 - \frac{3b}{2ma}\right);$$

$$\mathrm{II}^{dum} = \frac{4\mathrm{A}b}{3m};\ \mathrm{III}^{tium} = \frac{5\mathrm{A}b}{2m};$$

Ne igitur diſtantiae focales poſteriorum lentium fiant nimis paruae, neceſſe eſt, vt A ſit numerus praemagnus ideoque $\mathfrak{A} = 1$ proxime, vnde patet has determinationes lentem obiectiuam non adficere et perinde valere vtcunque lens obiectiua fuerit comparata, quamobrem iam conueniet, loco litterae A diſtantiam focalem q in computum introducere, vt ſit: $\mathrm{A} = \frac{mq}{3b}$ ſicque fient diſtantiae focales ſequentium lentium

$$r = \frac{5q}{9} \text{ et } s = \frac{5q}{18}$$

et interualla erunt

$$\mathrm{I}^{mum} = \frac{mqa}{3b}\left(1 - \frac{3b}{2ma}\right) = \frac{maq}{3b} - \frac{1}{2}q;$$

$$\mathrm{II}^{dum} = \frac{4q}{9};\ \mathrm{III}^{tium} = \frac{5q}{36};$$

et diſtantia oculi proxime $\mathrm{O} = \frac{1}{3}s = \frac{5q}{54}$.

In omnibus igitur caſibus antea tractatis loco binarum lentium poſteriorum adhibere licebit has ternas lentes, dummodo interualla hic indicata obſeruentur hocque modo id lucri naſcetur, quod campus apparens augeatur in ratione 2 : 3 ſiquidem hic eſt

$$\zeta = \frac{3ab}{ma+b}\cdot\mathfrak{z}.$$

Coroll.

Coroll. 1.

207. Cum littera R arbitrio nostro permittatur, dummodo sit vnitate minor, ponamus, $R = \frac{2}{3}$ eritque $k = \frac{5}{2}$ et ob

$$PkR = \frac{ma}{b} \text{ erit } Pk = \frac{3ma}{2b} \text{ et } P = \frac{3ma}{5b};$$

vnde sequitur

$$\mathfrak{C} = \frac{7}{2} \text{ et } \mathfrak{B} = -\frac{9}{5} \text{ hincque}$$

$$C = -\frac{7}{5} \text{ et } B = -\frac{9}{14}.$$

Coroll. 2.

208. Hoc ergo casu $R = \frac{2}{3}$ fiet

$$q = \frac{3Ab}{m} \text{ hincque viciſſim } A = \frac{mq}{3b}$$

vnde sequentes distantiae focales fient

$$r = \frac{3Ab}{2m} = \frac{1}{2}q \text{ et } s = \frac{3}{5}r = \frac{3}{10}q$$

et interualla lentium

$$I^{mum} = \frac{maq}{3b} - \frac{5}{9}q; \; II^{dum} = \frac{1}{2}q \text{ et}$$

$$III^{tium} = \frac{1}{3}s = \frac{1}{10}q.$$

Scholion.

209. Hic scilicet litteris $\mathfrak{B}$ et $\mathfrak{C}$ ex aequationibus fundamentalibus eos valores tribuimus, quos obtinerent, si multiplicatio m reuera esset infinite magna, neque vero hinc nostra solutio erroris redargui potest, nequidem pro minoribus multiplicationibus,

 dum

dum enim hoc modo a veris harum litterarum valoribus recedimus nihil aliud inde eſt metuendum, niſi quod campus apparens non tantus ſit proditurus, quam hic ſuppoſuimus, quod vitium facile eſt condonandum; praecipue quoniam pro maioribus multiplicationibus nequidem fiet ſenſibile, quemadmodum iam ſupra obſeruauimus; quando autem in his determinationibus litteram m quaſi infinitam ſpectamus, quoniam P eam quoque inuoluit ob $M = \frac{3b}{ma}$ in eadem ſcilicet hypotheſi, habebimus in genere

$$\mathfrak{B} = -\frac{3b}{ma}.P \text{ et } \mathfrak{C} = \frac{3b}{ma}.Pk - 1;$$

vbi probe notandum eſt, hanc hypotheſin $m = \infty$ tantum in his valoribus adhiberi; deinde litteram A, qua numerus praemagnus indicatur ex calculo extruſimus eiusque loco diſtantiam focalem q introduximus, ita, vt ſit $A = \frac{mq}{3h}$; vnde in genere reliquae erunt

$$r = \frac{(\mathfrak{B}+1)\mathfrak{C}.q}{k} \text{ et } s = -\frac{(\mathfrak{C}+1)Pkb.r}{ma} = -\frac{(\mathfrak{B}+1)\mathfrak{C}.Pbq}{ma}$$

Tum vero etiam interualla lentium

$$\mathrm{I}^{mum} = \frac{maq}{3b} - \frac{maq}{3.bP};$$

$$\mathrm{II}^{dum} = (\mathfrak{B}+1)(1+\tfrac{1}{k})q = \frac{(k+1)}{\mathfrak{C}}.r,$$

$$\mathrm{III}^{tium} = (1 - \frac{ma}{Pkb})s = (1 - R)s.$$

Cum autem ſit $P = \frac{ma}{bkR}$, valores hic aſſignati ſequenti modo multo concinnius exprimentur:

$\mathfrak{B} =$

$$\mathfrak{B} = -\frac{3}{kR}; \quad \mathfrak{C} = \frac{3}{R} - 1.$$

$$B = -\frac{3}{3+kR}; \quad C = -\frac{3+R}{3-2R}.$$

Deinde diſtantiae focales

$$r = \frac{3-R}{3+kR} \cdot q; \quad s = \frac{(3-R)q}{(3+kR)(3-2R)} \text{ ſeu } s = \frac{r}{3-2R};$$

ac denique interualla

$$\mathrm{I}^{mum} = \frac{m\alpha q}{3b} - \frac{kRq}{3};$$

$$\mathrm{II}^{dum} = \frac{R(k+1) \cdot r}{3-R};$$

$$\mathrm{III}^{tium} = (1-R)s;$$

exiſtente diſtantia oculi proxime $O = \frac{1}{3}s$.

Hactenus autem nondum rationem habuimus marginis colorati, cuius deſtructio poſtulat, $k = 1 + \frac{1}{R}$ vnde formulae inuentae in ſequentes abibunt:

$$\mathfrak{B} = -\frac{3}{R+1}; \quad \mathfrak{C} = \frac{3}{R} - 1;$$

$$B = -\frac{3}{R+4}; \quad C = -\frac{3+R}{3-2R};$$

$$r = \frac{3-R}{4+R} \cdot q; \quad s = \frac{r}{3-2R} = \frac{(3-R)q}{(3-2R)(4+R)}$$

et interualla

$$\mathrm{I}^{mum} = \frac{m\alpha q}{3b} - \frac{(R+1)}{3}q;$$

$$\mathrm{II}^{dum} = \frac{(2R+1) \cdot r}{3-R} = \frac{2R+1}{4+R} \cdot q;$$

$$\mathrm{III}^{tium} = (1-R)s.$$

Has igitur determinationes cum ſingulis microſcopiorum ſpeciebus quas in praecedentibus capitibus deſcripscripsimus, combinare licebit, sicque obtinebitur sequens

Constructio generalis microscopiorum huius generis qua eorum campus in ratione sesquialtera augetur.

210. Hic iterum distantia obiecti a pro lubitu assumi potest perinde ac multiplicatio m; tum vero etiam distantia focalis q arbitrio nostro permittitur, quam tantam assumi conuenit, vt postrema lens ocularis non fiat nimis parua; praeterea vero quoque fractio R ab arbitrio nostro pendet, dummodo ea vnitate sit minor; hic autem accipiamus $R = \frac{1}{2}$, qui valor ad praxin maxime accommodatus videtur.

I. Siue lens obiectiua reuera sit simplex siue ex duabus pluribusue lentibus proxime sibi iunctis composita, ea hic vt vnica spectetur, ita, vt eius loco omnes constructiones in superioribus capitibus datae substitui possint atque inde dabitur eius aperturae semidiameter $= x$; tum vero eius a secunda lente distantia erit $= \frac{maq}{3b} - \frac{1}{2}q$; quod autem interuallum ob indolem lentis obiectiuae aliquantum immutari potest, cuius tamen ratio in praxi non attendi meretur.

II. Pro secunda lente notandum est eam aeque ac sequentes ex quouis vitri genere parari posse, dummodo sint vtrinque aequaliter conuexae, vt ipsis maxima

xima apertura tribui possit. Sit igitur secundae lentis distantia focalis $= q$ eritque distantia ad lentem tertiam $= \frac{4}{9} q$.

III. Pro tertia lente eius distantia focalis capiatur $r = \frac{5}{9} q$ et distantia ad quartam lentem $= \frac{5}{36} q$.

IV. Pro quarta lente eius distantia focalis capiatur $s = \frac{5}{18} q$ et distantia ad oculum $O = \frac{1}{3} s$ proxime.

V. Nunc autem spatii in obiecto conspicui erit semidiameter

$$z = \frac{z a b}{m \cdot a + b}. \; \xi = \frac{5}{4} \cdot \frac{a b}{m \cdot a + b}$$

et mensura claritatis eadem manebit, vt ante, scilicet $= 20 . \frac{b x}{m a}$, dum nempe mensurae in digitis exprimuntur.

Coroll. I.

211. Si ergo nolimus, vt lens ocularis minor fiat, quam $\frac{1}{3}$ dig. posito $s = \frac{1}{3}$ dig. sumi debebit $q = \frac{6}{5}$ dig. hincque interuallum primum $= \frac{2 m a}{5 b} - \frac{3}{5}$ dig. at si in superioribus lens ocularis etiam statuatur $= \frac{1}{3}$ dig. penultima fit 1 dig. et idem interuallum prodit circiter; vnde patet praesenti casu longitudinem instrumenti notabiliter fore minorem.

Proble-

Problema 2.

212. Cuiuscunque indolis fuerit lens obiectiua, post imaginem realem tres adhuc lentes ita disponere, vt, margine colorato euanescente, campus euadat maximus.

Solutio.

Cum hic habeantur quatuor interualla litterarum P, Q, R, S secunda iterum erit negatiua sitque ergo $Q = -k$, vt fiat $PkRS = \frac{ma}{b}$. Distantiae ergo focales erunt

$$p = \mathfrak{A}a;\ q = -\frac{A\mathfrak{B}}{P}.a;$$

$$r = -\frac{AB\mathfrak{C}.a}{Pk};\ s = \frac{ABC\mathfrak{D}.a}{PkR};$$

$$t = -ABCD.\frac{b}{m} = -\frac{ABCD.a}{PkRS};$$

vnde si loco A littera q in calculum introducatur ob

$$A = -\frac{Pq}{\mathfrak{B}a}\ \text{erit}\ r = \frac{B\mathfrak{C}q}{\mathfrak{B}k};$$

$$s = -\frac{BC\mathfrak{D}q}{\mathfrak{B}kR};\ t = \frac{BCD.q}{\mathfrak{B}kRS}.$$

Simili modo interualla lentium per q ita reperientur expressa

$$I^{mum} = -\frac{Pq}{\mathfrak{B}} + \frac{1}{\mathfrak{B}}q;$$

$$II^{dum} = \frac{B}{\mathfrak{B}}\left(1 + \frac{1}{k}\right)q;$$

$$III^{tium} = \frac{BC}{\mathfrak{B}k}\left(1 - \frac{1}{R}\right)q;$$

$$IV^{tum} = -\frac{BCD}{\mathfrak{B}kR}\left(1 - \frac{1}{S}\right)q.$$

Iam

Iam vt campus apparens prodeat maximus, ſtatuantur litterae $\mathfrak{q} = \mathfrak{r} = \mathfrak{s} = \mathfrak{t} = 1$, vt fiat $M = \frac{4b}{ma+b}$, campi ſemidiametro exiſtente

$$z = M a \xi = \frac{4ab}{ma+b} \cdot \xi = \frac{ab}{ma+b},$$

ſumto $\xi = \frac{1}{4}$; qui ergo campus quaſi ſit quadruplicatus, dum in problemate praecedente erat triplicatus, antea vero tantum duplicatus. Hinc ergo aequationes fundamentales dabunt

$$\mathfrak{B} = (1 - P) M; \quad \mathfrak{C} = (1 + P k) M - 1. \text{ et}$$
$$\mathfrak{D} = (1 + P k R) M - 2.$$

Cum autem ſufficiat, his formulis proxime ſatisfeciſſe, quia parum intereſt, etiamſi campus aliquantum fiat minor, ſpectemus multiplicationem m cum numero P quaſi infinitam, ac tum iſtae litterae concinnius ita exprimentur ob $M = \frac{4b}{ma}$;

$$\mathfrak{B} = -\frac{4b.P}{ma}; \quad \text{adeoque}$$
$$\frac{\mathfrak{B}}{P} = -\frac{4b}{ma}; \quad \mathfrak{C} = \frac{4b.Pk}{ma} - 1;$$
$$\mathfrak{D} = \frac{4b.PkR}{ma} - 2, \text{ et cum ſit } P = \frac{ma}{bkRS},$$

hae expreſſiones etiam commodius ita exprimentur:

$$\mathfrak{B} = -\frac{4}{kRS}; \quad \mathfrak{C} = \frac{4}{RS} - 1; \quad \mathfrak{D} = \frac{4}{S} - 2;$$

at ob conditionem, qua margo coloratus deſtrui debet, habebimus iſtam aequationem

$$0 = \frac{1}{P} - \frac{1}{Pk} - \frac{1}{PkR} - \frac{1}{PkRS}$$

ex qua nascitur

$$k = 1 + \frac{1}{R} + \frac{1}{RS};$$

ita, vt litterae R et S arbitrio nostro permittantur. Cum autem bina vltima interualla fiant certe satis exigua, litterae R et S parum ab vnitate discrepare possunt; vnde litterae $\mathfrak{C}$ et $\mathfrak{D}$ manifesto fient vnitate maiores hincque C et D negatiuae, dum e contrario littera $\mathfrak{B}$ ipsa, ac propterea etiam B sunt negatiuae, quare vt nostra interualla lentium fiant positiua, euidens est, esse debere $S < 1$ et $R < 1$; qua conditione obseruata nunc omnia momenta facile determinari poterunt,

Coroll. 1.

213. Cum igitur tam R, quam S sint fractiones vnitate minores, litterae k valor certe ternarium superabit, quoniam $\frac{1}{R} > 1$ et $\frac{1}{RS} > \frac{1}{R}$.

Coroll. 2.

214. Cum sit $\frac{P}{\mathfrak{B}} = -\frac{ma}{4b}$, erit primum interuallum $= \frac{maq}{4b} - \frac{kRS}{4}q$ cuius pars prior $\frac{maq}{4b}$ minor est, quam casu praecedentis problematis, ita, vt hic longitudo instrumenti adhuc minor sit preditura.

Coroll. 3.

215. Has ergo quaternas lentes etiam cum omnibus lentibus obiectiuis siue simplicibus siue compositis,

positis, quas supra descripsimus, combinare licebit; vnde hoc insigne commodum assequemur, vt campus apparens prodeat quadruplicatus, cum in praecedentibus tantum esset duplicatus.

Exempl. I.

216. Cum litterae R et S debeant esse vnitate minores, consideremus casum quasi simplicissimum et ponamus $R = \frac{1}{2}$ et $S = \frac{2}{3}$, vt fiat $RS = \frac{1}{3}$ hincque $k = 1 + 2 + 3 = 6$; ex his igitur valoribus, qui ad praxin satis accommodati videntur, colliguntur litterae

$$\mathfrak{B} = -2;\ \mathfrak{C} = 11;\ \mathfrak{D} = 4;$$
$$B = -\tfrac{2}{3};\ C = -\tfrac{11}{10};\ D = -\tfrac{4}{3};$$

deinde ex distantia focali q sequentes ita definientur:

$$r = \tfrac{11}{18}.q;\ s = \tfrac{22}{45}.q;\ t = \tfrac{11}{45}.q = \tfrac{1}{2}s.$$

denique vero interualla lentium,

$$I^{mum} = \frac{maq}{4b} - \tfrac{1}{2}q;$$
$$II^{dum} = \tfrac{7}{18}q.$$
$$III^{tium} = \tfrac{11}{180}q = \tfrac{1}{4}t;$$
$$IV^{tum} = \tfrac{11}{135}q.$$

Exempl. II.

217. Statuamus nunc tam $R = \frac{1}{2}$, quam $S = \frac{1}{2}$ ac prodibit

$k =$

$k = 1 + 2 + 4 = 7$, eritque

$$\mathfrak{B} = -\tfrac{16}{7};\ \mathfrak{C} = 15;\ \mathfrak{D} = 6;$$

$$B = -\tfrac{16}{23};\ C = -\tfrac{15}{14};\ D = -\tfrac{6}{5};$$

et diſtantiae focales ita per q exprimentur:

$$r = \tfrac{15}{23}q;\ s = \tfrac{90}{161}.q;\ t = \tfrac{36}{161}q;$$

et interualla

$$I^{mum} = \frac{maq}{4b} - \tfrac{7}{16}q;$$

$$II^{dum} = \tfrac{8}{23}q.$$

$$III^{tium} = \tfrac{15}{322}q;$$

$$IV^{tum} = \tfrac{18}{161}q.$$

Quod tandem ad locum oculi attinet, hic in genere erit

$$O = \tfrac{1}{4}t\left(1 + \frac{b}{ma}\right) = \tfrac{1}{4}t \text{ proxime.}$$

Problema 3.

218. Cuiuscunque indolis fuerit lens obiectiua, poſt imaginem realem quotcunque adhuc lentes; quarum numerus ſit $= i$, ita diſponere, vt, euaneſcente margine colorato, campus maximus euadat.

Solutio.

Si operatio inſtituatur, vt in problematibus antecedentibus, erit ſemper $Q = -k$ litterarumque ſequentium R S T etc. numerus erit $i - 1$. ſitque vltima

tima $= Z$; tum vero pro campo hic habebitur

$$M = \frac{(i+1)b}{ma+b} \text{ ideoque } z = \frac{(i+1)ab}{ma+b}.$$

Quodsi deinde etiam, vt ante, pro determinatione litterarum $\mathfrak{B}$, $\mathfrak{C}$, $\mathfrak{D}$ multiplicationum m cum numero P vt infinite magnam consideremus, reperiemus

$$\mathfrak{B} = -\frac{(i+1)bP}{ma}; \quad \mathfrak{C} = \frac{(i+1)bPk}{ma} - 1;$$

$$\mathfrak{D} = \frac{(i+1)bPkR}{ma} - 2; \quad \mathfrak{E} = \frac{(i+1)bPkRS}{ma} - 3;$$

etc.

Destructio vero marginis colorati dabit

$$k = 1 + \frac{1}{R} + \frac{1}{RS} + \frac{1}{RST} \cdots \frac{1}{RST..Z}$$

quorum terminorum numerus est i.

Nunc vero has litteras ita definiamus, vt fiat

$$\frac{1}{R} = 2; \quad \frac{1}{RS} = 3; \quad \frac{1}{RST} = 4; \quad \frac{1}{RSTV} = 5;$$

atque vltimus

$$\frac{1}{RSTV..Z} = i \text{ ideoque}$$

$$R = \tfrac{1}{2}; \quad S = \tfrac{2}{3}; \quad T = \tfrac{3}{4};$$

$$U = \tfrac{4}{5}; \; \ldots \text{ ac tandem } Z = \frac{i-1}{i}.$$

Cum igitur hinc prodeat

$$k = 1 + 2 + 3 \ldots + i \text{ hoc est } k = \frac{i(i+1)}{2}.$$

et cum fit

$$RST \ldots Z = \tfrac{1}{i}, \text{ erit } kRS \ldots Z = \frac{i+1}{2}.$$

 hincque

hincque

$$P = \frac{2ma}{(i+1)b} \text{ seu } \frac{1}{P} = \frac{(i+1)b}{2ma};$$

et hinc porro

$$\frac{1}{Pk} = \frac{b}{ima}; \quad \frac{1}{PkR} = \frac{2b}{ima};$$
$$\frac{1}{PkRS} = \frac{3b}{ima}; \quad \frac{1}{PkRST} = \frac{4b}{ima} \text{ etc.}$$

donec perueniatur ad $\frac{1}{PkRST..Z} = \frac{b}{ma}$.

Iam ex his formulis litterae noſtrae germanicae $\mathfrak{B}$, $\mathfrak{C}$, $\mathfrak{D}$ etc. reperiuntur

$$\mathfrak{B} = -2; \quad \mathfrak{C} = i^2 + i - 1;$$
$$\mathfrak{D} = \frac{i^2+i-4}{2}; \quad \mathfrak{E} = \frac{i^2+i-9}{3};$$
$$\mathfrak{F} = \frac{i^2+i-16}{4} \text{ etc.}$$
$$B = -\frac{2}{3}; \quad C = \frac{i^2+i-1}{2-i-i^2};$$
$$D = \frac{i^2+i-4}{6-i-i^2}; \quad E = \frac{i^2+i-9}{12-i-i^2};$$
$$F = \frac{i^2+i-16}{20-i-i^2} \text{ etc.}$$

donec vltimus $\mathfrak{Z}$ fiat $= 1$.

Ex his igitur valoribus poterimus diſtantias focales omnium lentium poſt ſecundam per huius ipſius diſtantiam focalem q definire, quod facile praeſtabitur ſequenti modo:

$$\frac{r}{q} = \frac{B\mathfrak{C}}{\mathfrak{B}k} = \frac{2}{3} \cdot \frac{i^2+i-1}{i^2+i}. \text{ ergo } r = \frac{2}{3} \cdot \frac{i^2+i-1}{i^2+i} \cdot q$$
$$\frac{s}{r} = -\frac{C\mathfrak{D}}{\mathfrak{C}R} = \frac{i^2+i-4}{i^2+i-2}; \text{ ergo } s = \frac{i^2+i-4}{i^2+i-2} \cdot r$$

$\frac{t}{s} =$

$$\frac{t}{s} = -\frac{D\mathfrak{E}}{\mathfrak{D}S} = \frac{i^2+i-9}{i^2+i-6}; \text{ ergo } t = \frac{i^2+i-9}{i^2+i-6}\cdot s$$

$$\frac{u}{t} = -\frac{E.\mathfrak{F}}{\mathfrak{E}.T} = \frac{i^2+i-16}{i^2+i-12}; \text{ ergo } u = \frac{i^2+i-16}{i^2+i-12}\cdot t$$

ſicque vlterius

$$v = \frac{i^2+i-25}{i^2+i-20}\,u; \quad w = \frac{i^2+i-36}{i^2+i-30}\,v;$$

etc.

Lentium interualla denique ita determinabuntur:

$$\mathrm{I}^{mum} = -\frac{1}{\mathfrak{B}}(P-1)\,q = \frac{maq}{(i+1)b} - \frac{1}{2}q.$$

$$\mathrm{II}^{dum} = \frac{1}{2}\cdot\frac{i^2+i+2}{(i^2+i-1)}\,r$$

$$\mathrm{III}^{tium} = -\frac{1}{\mathfrak{D}}(R-1) = \frac{1}{i^2+i-4}\cdot s$$

$$\mathrm{IV}^{tum} = -\frac{1}{\mathfrak{E}}(S-1) = \frac{1}{i^2+i-9}\cdot t$$

$$\mathrm{V}^{tum} = -\frac{1}{\mathfrak{F}}(T-1) = \frac{1}{i^2+i-6}\cdot u$$

$$\mathrm{VI}^{tum} = -\frac{1}{\mathfrak{G}}(U-1) = \frac{1}{i^2+i-25}\cdot v.$$

etc.

Coroll. I.

219. Si igitur ſit $i = 1$. vt lens vnica poſt imaginem realem reperiatur, erit $r = \frac{1}{3}q$; et interualla

$$1^{mum} = \frac{maq}{2b} - \frac{1}{2}q.$$

$$2^{dum} = 2r. \text{ et } O = \frac{1}{2}r\left(1 + \frac{b}{ma}\right)$$

Coroll.

Coroll. 2.

220. Si $i = 2$; vt ſint duae lentes poſt imaginem realem, earum diſtantiae focales erunt

$$r = \tfrac{5}{9} q \text{ et } s = \tfrac{1}{2} r = \tfrac{5}{18} q.$$

tum vero interualla

$$I^{mum} = \frac{maq}{3b} - \tfrac{1}{2} q.$$

$$II^{dum} = \tfrac{4}{5} r = \tfrac{4}{9} q.$$

$$III^{tium} = \tfrac{1}{2} s = \tfrac{5}{36} q. \text{ et } O = \tfrac{1}{3} s \left(1 + \frac{b}{ma}\right).$$

Coroll. 3.

221. Si ſit $i = 3$, vt tres lentes poſt imaginem realem reperiantur, erit

$$r = \tfrac{11}{18} q; \; s = \tfrac{4}{5} r = \tfrac{22}{45} q; \; t = \tfrac{1}{2} s = \tfrac{11}{45} q;$$

tum vero interualla

$$I^{mum} = \frac{maq}{4b} - \tfrac{1}{2} q;$$

$$II^{dum} = \tfrac{7}{11} r = \tfrac{7}{18} q;$$

$$III^{tium} = \tfrac{1}{8} s = \tfrac{11}{180} q;$$

$$IV^{tum} = \tfrac{1}{3} t = \tfrac{11}{135} q.$$

Pro loco denique oculi

$$O = \tfrac{1}{4} t \left(1 + \frac{b}{ma}\right).$$

Coroll. 4.

222. Si ſit $i = 4$, vt quatuor lentes poſt imaginem realem reperiantur, earum diſtantiae focales erunt $r =$

$$r = \tfrac{19}{30}\, q;$$
$$s = \tfrac{8}{9}\, r = \tfrac{76}{135}\, q;$$
$$t = \tfrac{11}{14}\, s = \tfrac{418}{945}\, q;$$
$$u = \tfrac{1}{2}\, t = \tfrac{209}{945}\, q;$$

tum vero interualla erunt

$$\mathrm{I}^{mum} = \frac{maq}{5b} - \tfrac{1}{2}\, q;$$
$$\mathrm{II}^{dum} = \tfrac{11}{19}\, r = \tfrac{11}{30}\, q;$$
$$\mathrm{III}^{tium} = \tfrac{1}{16}\, s = \tfrac{19}{540}\, q;$$
$$\mathrm{IV}^{tum} = \tfrac{1}{11}\, t = \tfrac{38}{945}\, q;$$
$$\mathrm{V}^{tum} = \tfrac{1}{4}\, u = \tfrac{209}{3780}\, q;$$

et pro loco oculi

$$O = \tfrac{1}{5}\, u\left(1 + \frac{b}{ma}\right).$$

Coroll. 5.

223. Si fit $i = 5$, vt quinque lentes post imaginem realem disponantur, erit

$$r = \tfrac{29}{45}\, q;$$
$$s = \tfrac{13}{14}\, r = \tfrac{13 \cdot 29}{14 \cdot 45}\, q.$$
$$t = \tfrac{7}{8}\, s = \tfrac{7 \cdot 13 \cdot 29}{8 \cdot 14 \cdot 45}\, q.$$
$$u = \tfrac{7}{9}\, t = \tfrac{7 \cdot 13 \cdot 29}{2 \cdot 8 \cdot 9 \cdot 45}\, q.$$
$$v = \tfrac{1}{2}\, u = \tfrac{7 \cdot 13 \cdot 29}{4 \cdot 8 \cdot 9 \cdot 45}\, q.$$

Tum vero interualla erunt

$$\mathrm{I}^{mum} = \frac{maq}{6b} - \tfrac{1}{2}\, q.$$

$$\mathrm{II}^{dum} = \tfrac{16}{29} \cdot r = \tfrac{16}{45} \cdot q.$$
$$\mathrm{III}^{tium} = \tfrac{1}{26}\, s = \tfrac{29}{2.14.45} \cdot q.$$
$$\mathrm{IV}^{tum} = \tfrac{1}{21}\, t = \tfrac{13.29}{3.8.14.45} \cdot q.$$
$$\mathrm{V}^{tum} = \tfrac{1}{14}\, u = \tfrac{13.29}{4.8.9.45}\, q.$$
$$\mathrm{VI}^{tum} = \tfrac{1}{5}\, v = \tfrac{7.13.29}{4.5.8.9.45} \cdot q$$

ac denique

$$\mathrm{O} = \tfrac{1}{6}\, v \left(1 + \tfrac{b}{ma}\right).$$

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