refractio media $= n : m = \frac{n}{m} : 1$

refractio rubra $= n - dn : m - dm = \frac{n - dn}{m - dm} : 1$

refractio violacea $= n + dn : m + dm = \frac{n + dn}{m + dm} : 1.$

Cum autem differentiae dm et dn tam ſint paruae vt tanquam differentialia tractari poſſint, erit proxime:

refractio rubra $= \frac{n}{m} - d.\frac{n}{m} : 1$

refractio violacea $= \frac{n}{m} + d.\frac{n}{m} : 1.$

Hincque refractio radiorum, quatenus diuerſae ſunt indolis, per media diaphana quotcunque definiri poterit, ſi modo refractio media ex aëre in ſingula iſta media fuerit cognita.

DE

DE NOVO MICROSCOPIORVM GENERE EX SEX LENTIBVS COMPOSITIO.

Auctore

L. EVLERO.

1.

Cum microſcopia ſimplicia maiores multiplicationes largiri nequeant, niſi lenticulae quam minimae adhibeantur, quarum conſtructio non ſolum ſummam artificis ſollertiam requirit, ſed etiam obiecta ipſis tam prope admoueri debent, vt tantum non lenticulam contingant, ideoque minimae inaequalitates in eorum ſuperficie nimis confuſe repraeſententur; vt his inſignibus incommodis occurratur, microſcopia compoſita in vſum vocari ſunt coepta, quibus maiorum lenticularum beneficio quantumuis magnae multiplicationes produci poſſunt, ita vt obiecta non adeo prope admoueri neceſſe ſit. Vulgo haec microſcopia tribus conſtant lentibus, praeter obiectiuam ſcilicet binis ocularibus, quarum ratio ab artificibus diuerſimode aſſignatur. Veram autem rationem nuper indicaui, qua fit, vt non ſolum maximum in obiecto ſpatium conſpiciatur, ſed

 etiam

etiam repraeſentatio a vagis illis coloribus iridis liberetur; tum vero etiam oſtendi, quomodo pluribus lentibus ocularibus adhibendis campus viſionis magis amplificari poſſet.

2. His autem expeditis in mentem mihi venit longe alia microſcopiorum compoſitorum ratio, ſimilis illi, qua hodie teleſcopia 5 et ſex lentibus inſtructa in Anglia confici ſolent. Cum enim horum teleſcopiorum character in hoc conſiſtat, quod in iis vna lens cum minima apertura occurrat, qua, ſine vlla diminutione vel claritatis vel campi conſpicui, radii peregrini feliciſſime arceantur et ab oculo excluduntur, ſimilem ſtructuram ad microſcopia accommodare tentaui, vnde eo maiora commoda expectare licet, quod in vulgari microſcopiorum compoſitione repraeſentatio obiectorum non mediocriter a radiis peregrinis inquinetur, qui non, vti in teleſcopiis fieri ſolet, ope diaphragmatum ſeu ſeptorum foramine exiguo pertuſorum depelli poſſunt, cum hoc modo campus viſionis nimis coarctaretur.

Tab. III. Fig. 1. 3. Huiusmodi conſtructio quinque lentibus expediri poſſet, ſed quia campus viſionis minor eſſet proditurus, quam in vulgaribus, vnam lentem inſuper adiiciam, vt campus eo maior reddatur. Obiecto igitur ante focum lenticulae obiectiuae conſtituto, vt eius imago pone eam ad datam diſtantiam cadat, in hoc ipſo loco imaginis colloco lentem ſecundam B, et poſt eam noto punctum C, in quo lens B obiectum in ipſo lentis obiectiuae loco A conſtitutum eſſet exhibitura; ibique conſtituo tertiam lentem C, cuius apertura poteſt eſſe quam minima, cum debeat eſſe ad aperturam lenticulae obiectiuae, vt diſtantia BC ad AB. Tum vero ſequuntur ternae lentes oculares proprie ſic dictae D, E, F, quarum media E in ipſo foco poſtremae F ſit poſita. Totum ergo negotium eo redit, vt tam diſtantiae focales ſingularum lentium, quam earum interualla ita definiantur, vt microſcopium in ſuo genere perfectiſſimum reddatur.

4. Sint igitur p, q, r, s, t et v diſtantiae focales ſex lentium et aperturae cuiusque ſemidiametri

$$AP = x;\ BQ = \pi q;\ CR = \pi' r;\ DS = \pi'' s;\ ET = \pi''' t \text{ et } FV = \pi'''' v$$

ac poſita diſtantia obiecti ante lentem obiectiuam $= a$, indice multiplicationis $= m$, ad diſtantiam l quae 8 dig. aſſumi ſolet, relatae et ſemidiameter campi apparentis $= \Phi$, vt ſit ſemidiameter ſpatii in obiecto conſpicui $= a\Phi$, habebimus

$$\Phi = \frac{-\pi + \pi' - \pi'' + \pi''' - \pi''''}{ma - l}\, l$$

qui valor vt maximus reddatur, fit ωs ſemidiameter aperturae maximae, quam lens vtrinque aeque con-

conuexa admittit, cuius diſtantia focalis $= s$, quo caſu cenſetur eſſe $\omega = \frac{1}{s}$; ponamus

$$\pi = \theta\omega;\ \pi' = 0,\ \pi'' = -\omega,\ \pi''' = \omega \text{ et } \pi'''' = -\omega$$

eritque $\Phi = \frac{(s-\theta)\omega}{ma-l}.l$. Sit autem breuitatis gratia $M = \frac{(s-\theta)l}{ma-l}$ vt ſit $\Phi = M\omega$.

5. Deinde pro litteris lentes determinantibus ſit:

$A = \frac{\mathfrak{a}}{1-\mathfrak{a}}$; $B = -1$; $C = \frac{\mathfrak{c}}{1-\mathfrak{c}}$; $D = \frac{-\mathfrak{b}}{1+\mathfrak{b}}$; $E = -1$; erit $\frac{A}{1+A} = \mathfrak{a}$; $\frac{B}{1+B} = \infty$; $\frac{C}{1+C} = \mathfrak{c}$; $\frac{D}{1+D} = -\mathfrak{b}$; $\frac{E}{1+E} = \infty$ hincque

$$\frac{B}{1+B}\pi - \Phi = \infty\theta\omega$$

$$\frac{C}{1+C}\pi' - \pi + \Phi = -(\theta - M)\omega$$

$$\frac{D}{1+D}\pi'' - \pi' + \pi - \Phi = +(\mathfrak{b} + \theta - M)\omega$$

$$\frac{E}{1+E}\pi''' - \pi'' + \pi' - \pi + \Phi = \infty\omega$$

$$\pi'''' - \pi''' + \pi'' - \pi' + \pi - \Phi = -(3 - \theta + M)\omega$$

vnde erunt diſtantiae loca imaginum ſucceſſiue indicantes

$a = a$	$\alpha = Aa$;	$p = \alpha a$
$b = A.\frac{Ma}{\infty\theta} = 0$;	$\beta = 0$;	$q = A.\frac{Ma}{\theta}$
$c = A.\frac{Ma}{\theta - M}$;	$\gamma = Cc$;	$r = AC.\frac{Ma}{\theta - M}$
$d = AC.\frac{-Ma}{\mathfrak{b}+\theta-M}$;	$\delta = dD$	$s = AC\mathfrak{b}.\frac{Ma}{\mathfrak{b}+\theta-M}$
$e = AC\frac{\mathfrak{b}}{1+\mathfrak{b}}.\frac{Ma}{\infty} = 0$;	$\varepsilon = -e = 0$;	$t = AC\frac{\mathfrak{b}}{1+\mathfrak{b}}.Ma$
$f = AC\frac{\mathfrak{b}}{1+\mathfrak{b}}.\frac{Ma}{3-\theta+M}$;	$\zeta = \infty$;	$v = AC.\frac{\mathfrak{b}}{1+\mathfrak{b}}.\frac{Ma}{3-\theta+M}$.

6. Hinc

6. Hinc porro deducuntur lentium interualla

$$AB = \alpha + b = Aa$$

$$BC = \beta + c = A.\frac{Ma}{\theta - M}$$

$$CD = \gamma + d = AC\mathfrak{b}.\frac{Ma}{(\theta-M)(\mathfrak{b}+\theta-M)}$$

$$DE = \delta + e = AC.\frac{\mathfrak{b}}{1+\mathfrak{b}}.\frac{Ma}{\mathfrak{b}+\theta-M} = v$$

$$EF = \varepsilon + f = AC.\frac{\mathfrak{b}}{1+\mathfrak{b}}.\frac{Ma}{\mathfrak{b}+\theta-M} = v$$

et pro loco oculi $FO = \frac{v}{3-\theta+M}$.

Nunc vero vt colores iridis deſtruantur, Theoria hanc praebet aequationem adimplendam:

$\frac{1}{\mathfrak{b}+\theta-M} + \frac{1}{3-\theta+M} = 0$ vnde fit $\mathfrak{b} + \theta - M = 3 - \theta + M$ ideoque $\mathfrak{b} = 3 - 2(\theta - M)$.

7. Gradus claritatis perceptae aeſtimatur ex ſemidiametro cylindri luminoſi, qui a quouis obiecti puncto in oculum transmittitur, qui ſemper eſt $y = \frac{lx}{ma}$; et ipſe claritatis gradus tum aeſtimatur $= 400yy$, claritate plena ſeu naturali per vnitatem expreſſa. Verum ipſa apertura lentis obiectiuae, ſeu eius ſemidiameter x ex hac aequatione definiri debet:

$$\frac{1}{x^3} = \frac{mx^3}{aal}\left\{\frac{\lambda + \nu\mathfrak{a}(1-\mathfrak{a})}{\mathfrak{a}^3} + \frac{M(\lambda'' + \nu\mathfrak{c}(1-\mathfrak{c}))}{A^2\mathfrak{c}^3(\theta - M)} + \frac{M(\lambda''' - \nu\mathfrak{b}(1+\mathfrak{b}))}{A^3C^3\mathfrak{b}^3(\mathfrak{b}+\theta-M)} + \frac{M\lambda^{V}(1+\mathfrak{b})^2}{A^3C^3\mathfrak{b}^3(3-\theta+M)}\right\}$$

vbi

vbi pro microſcopiis ſumi ſolet $\kappa = 16$, et λ, λ', λ'', λ''', λ'''' et λ^{V} figurae ſingularum lentium definiendae inſeruiunt, at ν eſt numerus a refractione pendens, cuius ratio ſi ſit $1,54:1$ erit proxime $\nu = 0,226$.

8. Cum debeat eſſe $\theta > M$, ne diſtantia BC prodeat negatiua, ſtatuamus $\theta = (1+n)M$, eritque $M = \frac{2l}{ma+nl}$, hinc $\Phi = \frac{2\omega l}{ma+nl}$, et diameter ſpatii viſi $= \frac{2al}{2(ma+nl)}$ ſumto $\omega = \frac{1}{4}$.

Tum vero eſt $\theta = \frac{2(n+1)l}{ma+nl}$; $\theta - M = \frac{2nl}{ma+nl}$; atque

$\mathfrak{b} + \theta - M = 3 - \theta + M = \frac{3ma}{ma+nl}$; ideoque $\mathfrak{b} = \frac{2(ma-nl)}{ma+nl}$, vnde noſtrae determinationes pro conſtructione microſcopii ita ſe habebunt:

	Diam. apert.	Interualla
$p = \mathfrak{a}a$;	$PP = 2x$;	$AB = Aa$
$q = A.\frac{a}{1+\mathfrak{a}}$;	$QQ = \frac{2}{3}A.\frac{al}{ma+nl}$;	$BC = A.\frac{a}{n}$
$r = A\mathfrak{c}.\frac{a}{n}$;	$RR = \frac{2x}{n}$;	$CD = AC.\frac{ma-nl}{nl}.\frac{l}{m}$
$s = AC\mathfrak{b}.\frac{l}{m}$;	$SS = \frac{1}{2}s$;	$DE = AC.\frac{\mathfrak{b}}{1+\mathfrak{b}}.\frac{l}{m}$
$t = AC.\frac{\mathfrak{b}}{1+\mathfrak{b}}.\frac{2al}{ma+nl}$;	$TT = \frac{1}{2}t$	$EF = AC.\frac{\mathfrak{b}}{1+\mathfrak{b}}.\frac{l}{m}$
$v = AC.\frac{\mathfrak{b}}{1+\mathfrak{b}}.\frac{l}{m}$;	$VV = \frac{1}{2}v$	$FO = \frac{ma+nl}{2ma}v$

et x ex hac aequatione definiri debet

$$\frac{1}{\kappa^3} = \frac{mx^3}{aal}\left\{\frac{\lambda+\nu\mathfrak{a}(1-\mathfrak{a})}{\mathfrak{a}^3} + \frac{\lambda''+\nu\mathfrak{c}(1-\mathfrak{c})}{nA^3\mathfrak{c}^3} + \frac{\lambda'''-\nu\mathfrak{b}(1+\mathfrak{b})}{A^3C^3\mathfrak{b}^3}.\frac{l}{ma} + \frac{\lambda^{V}(1+\mathfrak{b})^3}{A^3C^3\mathfrak{b}^3}.\frac{l}{ma}\right\}.$$

9. Hic

9. Hic primum obſeruo ad inſignes multiplicationes producendas, ad quas huiusmodi inſtrumenta requiri ſolent, lentem obiectiuam ſemper quam minimam aſſumi conuenire; nam ne tum diſtantia focalis v nimis fiat exigua, numerorum A et C productum AC capi debet quaſi $= \frac{m}{l}$, tum vero interuallum $CD = \frac{ma-nl}{nl}$ fieret enormiter magnum. Sumta autem diſtantia a valde exigua, vt interualla AB et BC ſaltem modica euadant, numerum A valde magnum eſſe oportet, vt ſit quaſi $\mathfrak{a} = 1$; quod etiam claritas exigit, cum hoc modo maior valor pro x prodeat, ita vt ſit $x = \frac{1}{\kappa}\sqrt[3]{\frac{aal}{\lambda m}} = \frac{1}{16}\sqrt[3]{\frac{aal}{\lambda m}}$, ideoque $y = \frac{l}{16m}\sqrt[3]{\frac{l}{\lambda ma}}$ et $20y = \frac{5l}{4m}\sqrt[3]{\frac{l}{\lambda ma}}$, hincque claritas $= \frac{25ll}{16mm}\sqrt[3]{\frac{ll}{\lambda\lambda mmaa}}$.

10. Sumatur ergo pro A numerus ſatis magnus, vt interuallum $AB = Aa$ modicum euadat, etiamſi diſtantia a ſit minima, tum vero etiam poſtrema lens arbitrio noſtro permittatur, eiusque diſtantia focalis v vt data ſpectetur. Tum ergo erit $AC.\frac{l}{m} = \frac{1+\mathfrak{b}}{\mathfrak{b}}v = \frac{4ma-2nl}{3ma-3nl}v$, et $C = \frac{4ma-2nl}{3ma-3nl}.\frac{mv}{Al}$, hincque $\mathfrak{c} = \frac{C}{1+C} = \frac{2mv(2ma-nl)}{2mv(2ma-nl)+3Al(ma-nl)}$. Quo valore ſubſtituto determinationes noſtae erunt:

$p = \frac{A}{1+A}a$;	$PP = 2x$	$AB = Aa$
$q = \frac{A}{1+\mathfrak{a}}a$;	$QQ = \frac{2}{3}A.\frac{al}{ma+nl}$;	$BC = \frac{1}{n}.Aa$
$r = \frac{C}{1+C}.\frac{A}{n}a$;	$RR = \frac{2x}{n}$;	$CD = \frac{2(2ma-nl)}{3nl}v$
$s = \frac{2(2ma-nl)}{ma+nl}v$;	$SS = \frac{1}{2}s$;	$DE = v$

$t =$

$t = \frac{3ma}{ma+nl} v$; $TT = \frac{1}{4} t$; $EF = v$

$v = v$; $VV = \frac{1}{4} v$; $FO = \frac{ma+nl}{3ma} v$

et $x = \frac{1}{16} \sqrt[3]{\frac{aal}{\lambda m}}$, ſi modo A ſuperet 4 vel 5.

11. Reſtat adhuc vnus numerus n, qui quo maior accipiatur eo breuius ſit inſtrumentum, tum vero viciſſim diameter campi conſpicui $\frac{3al}{2(ma+nl)}$ imminuitur; verum ſi multiplicatio m ſit praegrandis, vt ma multum ſuperet l tum parum refert, etiamſi numerus n aliquanto maior accipiatur. Ponamus in hunc finem $nl = \frac{1}{2} ma$, eritque diameter ſpatii viſi $= \frac{3a}{2n(i+1)} = \frac{3il}{2(i+1)m}$, et reliquae determinationes fient

$p = \frac{A}{1+A} a$; $PP = 2x$; $AB = Aa$

$q = \frac{il}{ma+il} Aa$; $QQ = \frac{3Ail}{2(i+1)m}$; $BC = \frac{Ail}{m}$

$r = \frac{2i(2i-1)Al}{3ma(2i-1)+3A(i-1)l} v$; $RR = \frac{2il}{ma} x$; $CD = \frac{2}{3}(2i-1) v$

$s = \frac{2(2i-1)}{i+1} v$; $SS = \frac{1}{4} s$; $DE = v$

$t = \frac{3i}{i+1} v$; $TT = \frac{1}{3} t$; $EF = v$

$v = v$; $VV = \frac{1}{4} v$; $FO = \frac{i+1}{3i} v$.

12. Alio loco oſtendi, quomodo lens obiectiva ita ex duabus lentibus componi queat, vt confuſio inde oriunda euaneſcat, quae conſtructio ſi in praxi ſuccedat, fiet $\lambda = 0$, ac lenti obiectiuae tanta apertura tribui poterit, quantam curuamen facierum eius permittit. Huiusmodi autem lenticulae

lae duplicatae conſtructio pro eius diſtantia focali p ita ſe habet.

Lenticulae prioris

radius faciei { anterioris $= +1,02863\,p$; poſterioris $= -0,62915\,p$ }

Lenticulae poſterioris

radius faciei { anterioris $= +2,14041\,p$; poſterioris $= +0,72222\,p$ }

quae ad interuallum circiter $\frac{1}{4} p$ coniungi debent, tum vero apertura tribui poterit, cuius diameter ſit $= \frac{1}{3} p$ ac proinde $x = \frac{5}{12} p$, vnde fit $y = \frac{3l}{20m} \cdot \frac{p}{a} = \frac{3l}{20m}$ ob $p = a$ proxime et gradus claritatis $= \frac{p\,l\,l}{m\,m}$.

13. Praeterea hic perpendendum eſt, numerum i ita aſſumi debere, vt diameter aperturae lentis ſecundae $QQ = \frac{3Ail}{2(i+1)m}$ non ſuperet ſemiſſem diſtantiae focalis huius lentis. Ad hoc autem requiritur, vt ſit $i > \frac{3ma}{ma-3l}$. Cum igitur poſuerimus $i = \frac{ma}{nl}$, haec conditio poſtulat vt ſumatur $n < \frac{ma-3l}{3l}$; quod ſi hic valor $n = \frac{ma-3l}{3l}$, vel $i = \frac{3ma}{ma-3l}$ in noſtris formulis ſubſtituatur, habebimus.

$p = \frac{A}{1+A} a$; $PP = 2x$; $AB = Aa$

$q = \frac{3l}{ma-l} Aa$; $QQ = \frac{l}{ma-l} Aa$; $BC = \frac{3l}{ma-3l} Aa$

$r = \frac{A(ma+l)\cdot 4mal\,v}{(ma-3l)(3ma(ma+l)+Al(ma+3l))}$; $RR = \frac{4l}{ma-3l} x$; $CD = \frac{2(ma+l)}{ma-3l} v$

$s = \frac{2(ma+l)}{ma-l} v$; $SS = \frac{1}{4} s$; $DE = v$

$t =$

$u = \frac{3ma}{ma-l} v$; $TT = \frac{1}{2} t$; $EF = v$

$v = v$; $VV = \frac{1}{2} v$; $FO = \frac{ma-l}{2ma} v$

et diameter campi conſpicui $= \frac{al}{ma-l}$.

14. Hic ante omnia obſeruo, has formulas vſum habere non poſſe, niſi ſit $ma > 3l$ ſeu $m > \frac{3l}{a}$ hoc eſt $m > \frac{24}{a}$, ob $l = 8$ dig. ſicque minores lenticulae ne ad exiguas quidem multiplicationes vſurpari poſſunt. Statuamus ergo, vt has formulas ſimpliciores reddamus $ma = \mu l$ vt ſit multiplicatio $m = \frac{\mu l}{a}$, et microſcopii conſtructio ſecundum has menſuras erit inſtituenda.

Diſtantiae focales	aperturae	Interualla
$p = \frac{Aa}{1+A}$;	$PP = 2x$;	$AB = Aa$
$q = \frac{2Aa}{\mu-1}$;	$QQ = \frac{Aa}{\mu-1}$;	$BC = \frac{2Aa}{\mu-3}$
$r = \frac{4\mu(\mu+1)v}{2\mu(\mu+1)v+(\mu+3)Aa} \cdot \frac{Aa}{\mu-3}$;	$RR = \frac{4x}{\mu-3}$;	$CD = \frac{2(\mu+1)}{\mu-3} v$
$s = \frac{2(\mu+1)}{\mu-1} v$;	$SS = \frac{\mu+1}{\mu-1} v$;	$DE = v$
$t = \frac{2\mu}{\mu-1} v$;	$TT = \frac{\mu}{\mu-1} v$;	$EF = v$
$v = v$;	$VV = \frac{1}{2} v$;	$FO = \frac{\mu-1}{2\mu} v$

et diameter campi conſpicui $= \frac{a}{\mu-1}$ et $x = \frac{a}{16\sqrt[3]{\mu}}$

hincque $y = \frac{a}{16\mu\sqrt[3]{\mu}}$ et claritas $= \frac{25aa}{16\mu\mu\sqrt[3]{\mu\mu}}$.

15. Hae

15. Hae formulae ad praxin maxime videntur accommodatae et quia ob campum expedit, numero μ quam minimos tribui valores, is autem ternario maior capi debet, eo magis, quo maior multiplicatio deſideratur, contemplemur ſequentes hypotheſes.

I. Hypotheſis vbi $\mu = 4$ et $m = \frac{32}{a}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{1+A}$;	$PP = 2x$	$AB = Aa$
$q = \frac{2}{3} Aa$;	$QQ = \frac{1}{3} Aa$	$BC = 2Aa$
$r = \frac{80v}{40v+7Aa} \cdot Aa$	$RR = 4x$	$CD = 10v$
$s = \frac{10}{3} v$;	$SS = \frac{5}{3} v$	$DE = v$
$t = \frac{8}{3} v$;	$TT = \frac{4}{3} v$	$EF = v$
$v = v$;	$VV = \frac{1}{2} v$	$FO = \frac{3}{8} v$.

Diameter ſpatii conſpicui $= \frac{a}{3}$ et $x = \frac{a}{25}$.

II. Hypotheſis vbi $\mu = 5$ et $m = \frac{40}{a}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{1+A}$.	$PP = 2x$.	$AB = Aa$
$q = \frac{1}{2} Aa$	$QQ = \frac{1}{4} Aa$	$BC = Aa$
$r = \frac{15v}{15v+2Aa} \cdot Aa$	$RR = 2x$	$CD = 6v$
$s = 3v$	$SS = \frac{3}{2} v$	$DE = v$
$t = \frac{5}{2} v$	$TT = \frac{5}{4} v$	$EF = v$
$v = v$	$VV = \frac{1}{2} v$	$FO = \frac{2}{5} v$

Diameter ſpatii conſpicui $= \frac{a}{4}$ et $x = \frac{a}{27}$

III.

III. Hypotheſis vbi $\mu = 7$ et $m = \frac{56}{a}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{1+A}$;	$PP = 2x$	$AB = Aa$
$q = \frac{1}{3}Aa$:	$QQ = \frac{1}{8}Aa$	$BC = \frac{1}{2}Aa$
$r = \frac{20v}{56v+5Aa} \cdot Aa$	$RR = x$	$CD = 4v$
$s = \frac{8}{3}v$	$SS = \frac{4}{3}v$	$DE = v$
$t = \frac{7}{3}v$	$TT = \frac{7}{6}v$	$EF = v$
$v = v$	$VV = \frac{1}{4}v$	$FO = \frac{2}{7}v$

Diameter campi conſpicui $= \frac{1}{8}a$ et $x = \frac{a}{32}$

IV. Hypotheſis vbi $\mu = 9$; et $m = \frac{72}{a}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{1+A}$	$PP = 2x$	$AB = Aa$
$q = \frac{1}{4}Aa$	$QQ = \frac{1}{8}Aa$	$BC = \frac{1}{4}Aa$
$r = \frac{5v}{15v+Aa} \cdot Aa$	$RR = \frac{2}{3}x$	$CD = \frac{10}{3}Aa$
$s = \frac{5}{2}v$	$SS = \frac{5}{4}v$	$DE = v$
$t = \frac{9}{4}v$	$TT = \frac{9}{8}v$	$EF = v$
$v = v$	$VV = \frac{1}{2}v$	$FO = \frac{4}{9}v$.

Diameter ſpatii conſpicui $= \frac{1}{8}a$ et $x = \frac{a}{34}$.

V. Hypotheſis vbi $\mu = 15$ et $m = \frac{120}{a}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{1+A}$	$PP = 2x$	$AB = Aa$
$q = \frac{1}{7}Aa$	$QQ = \frac{1}{14}Aa$	$BC = \frac{1}{6}Aa$
$r = \frac{40v}{240v+9Aa} \cdot Aa$	$RR = \frac{1}{3}x$	$CD = \frac{1}{9}v$
$s = \frac{16}{7}v$	$SS = \frac{8}{7}v$	$DE = v$
$t = \frac{15}{7}v$	$TT = \frac{15}{14}v$	$EF = v$
$v = v$	$VV = \frac{1}{2}v$	$FO = \frac{7}{15}v$.

Diameter ſpatii conſpicui $= \frac{1}{14}a$ et $x = \frac{a}{40}$.

VI.

VI. Hypotheſis vbi $\mu = 27$ et $m = \frac{216}{a}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{A+1}$	$PP = 2x$	$AB = Aa$
$q = \frac{1}{13}Aa$	$QQ = \frac{1}{26}Aa$	$BC = \frac{1}{15}Aa$
$r = \frac{21v}{252v+5Aa} \cdot Aa$	$RR = \frac{1}{6}x$	$CD = \frac{7}{3}v$
$s = \frac{28}{13}v$	$SS = \frac{14}{13}v$	$DE = v$
$t = \frac{27}{13}v$	$TT = \frac{27}{26}v$	$EF = v$
$v = v$	$VV = v$	$FO = \frac{12}{27}v$.

Diameter ſpatii conſpicui $= \frac{1}{26}a$ et $x = \frac{a}{48}$.

16. Patet ergo, ſi lenticula obiectiua ſimplex adhibeatur, pro his maioribus multiplicationibus, huic lenti tam exiguam aperturam tribui debere, vt claritas fiat quam minima, tum vero etiam apertura lentis tertiae C erit quaſi puncti inſtar, quo pacto vtique radii peregrini feliciſſime arcebuntur. Interim tamen ad haec microſcopia perficienda in hoc maxime erit elaborandum; vt lentes obiectiuae compoſitae, quarum deſcriptionem ſupra dedi, ad praxin deduci queant. Cum enim tum capi poſſit $x = \frac{3}{25}p$ ſeu $x = \frac{3}{25}a$, ob $a = p$ proxime, claritas inde obtinebitur multis partibus maior, ita vt tanta illuminatione obiecti, quantam microſcopia ordinaria poſtulant, non amplius ſit opus. Dabo exemplum ex hypotheſi V deſumtum:

Microſcopium obiecta ſexcenties amplificans.

17. Statuo diſtantiam obiecti a lente obiectiua $a = \frac{1}{5}$ dig. ac ſumo numerum $A = 30$, vt fiat interual-

teruallum $Aa = 6$ dig. tum vero ſit $v = \frac{1}{4}$ dig. et determinationes microſcopii erunt in digitis expreſſae

Diſtantiae focales	Aperturae	Interualla
$p = \frac{6}{31} = 0,194;$	$PP = 2x$	$Aa = 6$
$q = \frac{6}{7} = 0,857$	$QQ = \frac{3}{7} = 0,429$	$BC = 1$
$r = \frac{20}{29} = 0,690$	$RR = \frac{1}{3}x$	$CD = 1\frac{1}{3}$
$s = \frac{8}{7} = 1,143$	$SS = \frac{4}{7} = 0,572$	$DE = \frac{1}{2}$
$t = \frac{15}{14} = 1,071$	$TT = \frac{15}{28} = 0,536$	$EF = \frac{1}{8}$
$v = \frac{1}{2} = 0,500$	$VV = \frac{1}{4} = 0,250$	$FO = \frac{7}{330}$

Diameter ſpatii conſpicui $= \frac{1}{75}$ et $y = \frac{x}{15}$, vnde claritas $= \frac{16}{9}xx$. Tota autem inſtrumenti longitudo $= 9\frac{17}{30}$ dig.

Quodſi iam lentem obiectiuam duplicare velimus, has menſuras obſeruari oportet:

Pro lenticula priore	pro lenticula poſteriori
radius faciei $\begin{cases} \text{ant.} = +0,199 \\ \text{poſt.} = -0,122 \end{cases}$	radius faciei $\begin{cases} \text{ant.} = +0,414 \\ \text{poſt.} = +0,140 \end{cases}$

ac tum erit $x = \frac{9}{310} = 0,03$ et claritas $= 0,0015 =$ [illegible] qui gradus adhuc ſatis eſt notabilis.

Microſcopium bis millies amplificans.

18\. Sumo hic $a = \frac{1}{16}$ dig. hypotheſi VI. vtens, et $A = 60$ atque $v = \frac{1}{2}$ dig. vnde hae determinationes oriuntur:

Diſtan-

Diſtantiae focales	Aperturae	Interualla
$p =$ [illegible] $= 0,098;$	$PP = 2x$	$AB = 6$
$q =$ [illegible] $= 0,462$	$QQ = 0,231$	$BC =$ [illegible]
$r =$ [illegible] $= 0,404$	$RR = \frac{1}{6}x$	$CD = 1\frac{1}{6}$
$s =$ [illegible] $= 1,077$	$SS = 0,539$	$DE =$ [illegible]
$t =$ [illegible] $= 1,039$	$TT = 0,520$	$EF =$ [illegible]
$v = \frac{1}{2} = 0,500$	$VV = 0,250$	$FO =$ [illegible]

Diameter ſpatii conſpicui $=$ [illegible] dig. et $y = \frac{x}{27}$, vnde claritas $=$ [illegible]; longitudo inſtrumenti $= 9$ dig.

Si lens obiectiua duplicata ſuccedat, erit $x =$ [illegible], ideoque claritas $=$ [illegible], at lenticulae duplicatae conſtructio ita ſe habet.

Pro lenticula priore	pro lenticula poſteriori
radius faciei $\begin{cases} \text{ant.} = +0,101; \\ \text{poſt.} = -0,062; \end{cases}$	radius faciei $\begin{cases} \text{ant.} = +0,211 \\ \text{poſt.} = +0,071 \end{cases}$

19\. Si haec conſtructio in praxi nulla obſtacula, quae vinci nequeant, offendat, nullum eſt dubium, quin hoc microſcopiorum genus, illis, quae vulgo ſunt in vſu, longiſſime ſit anteferendum, propterea quod etiam pro maxima amplificatione ſatis modica longitudine contineri queat, cum microſcopia vulgaria nimis enormem longitudinem requirant. Si enim ope microſcopii communis bis millies amplificare velimus lentemque obiectiuam, cuius diſtantia foci quoque ſit $\frac{1}{16}$ dig. adhibeamus, longitudo inſtrumenti ad 20 dig. exſurgit, etiamſi lente oculari ſemiſſis digiti vtamur. Quin

etiam

etiam hic longitudinem fere ad ſemiſſem reducere licet, ſi numerum A minorem accipiamus; id ſolum eſt perpendendum, quod lentes B et C in eadem fere ratione minuantur, quod quidem incommodum nullius eſt momenti. Imprimis autem ſuſpicor, minimam lentis tertiae aperturam non parum ad repraeſentationem magis diſtinctam reddendam eſſe collaturam, cum idem effectus in teleſcopiis obſeruetur.

20. Sin autem haec microſcopia ad multo maiores amplificationes inſtruere velimus, equidem non ſuaſerim, lenticulas obiectiuas minores adhibere, quam $\frac{1}{15}$ dig. in foco; cum quod tales exiguae lenticulae difficulter parentur, tum vero praecipue quod obiecta nimis prope admoueri oporteret, quo obſeruationes microſcopicae non mediocriter turbantur. Malo ergo, numero μ maiores valores tribuendo, adhuc quasdam hypotheſes adiungere, vnde deinceps quouis caſu conſtructiones huiusmodi microſcopiorum peti queant.

VII. Hypotheſis $\mu = 45$, et $m = \frac{360}{a}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{1+A}$;	$PP = 2x$	$AB = Aa$
$q = \frac{1}{22}Aa$;	$QQ = \frac{1}{44}Aa$	$BC = \frac{1}{21}Aa$
$r = \frac{115v}{345v + 4Aa} \cdot \frac{Aa}{7}$;	$RR = \frac{2}{21}x$	$CD = \frac{46}{21}v$
$s = \frac{46}{22}v = \frac{23}{11}v$;	$SS = \frac{23}{32}v$	$DE = v$
$t = \frac{45}{22}v$;	$TT = \frac{45}{44}v$	$EF = v$
$v = v$;	$VV = \frac{1}{2}v$	$FO = \frac{22}{49}v$

Diameter ſpatii conſpicui $= \frac{1}{44}a$.

VIII.

VIII. Hypotheſis $\mu = 63$, et $m = \frac{504}{a}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{1+A}$	$PP = 2x$	$AB = Aa$
$q = \frac{1}{31}Aa$	$QQ = \frac{1}{62}Aa$	$BC = \frac{1}{31}Aa$
$r = \frac{[illegible]v}{[illegible]v + 11Aa} \cdot \frac{Aa}{5}$	$RR = \frac{1}{15}x$	$CD = \frac{11}{13}v$
$s = \frac{64}{31}v$	$SS = \frac{32}{31}v$	$DE = v$
$t = \frac{63}{31}v$	$TT = \frac{63}{62}v$	$EF = v$
$v = v$	$VV = \frac{1}{2}v$	$FO = \frac{1}{63}v$

Diameter ſpatii conſpicui $= \frac{1}{62}a$.

IX. Hypotheſis $\mu = 99$ et $m = \frac{792}{a}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{1+A}$	$PP = 2x$	$AB = Aa$
$q = \frac{1}{49}Aa$	$QQ = \frac{1}{98}Aa$	$BC = \frac{1}{48}Aa$
$r = \frac{[illegible]v}{[illegible]v + [illegible]Aa} \cdot \frac{Aa}{4}$	$RR = \frac{1}{24}x$	$CD = \frac{25}{12}v$
$s = \frac{100}{49}v$	$SS = \frac{50}{49}v$	$DE = v$
$t = \frac{99}{49}v$	$TT = \frac{99}{98}v$	$EF = v$
$v = v$	$VV = \frac{1}{2}v$	$FO = \frac{49}{99}v$.

Diameter ſpatii conſpicui $= \frac{1}{98}a$.

21. Hypotheſes iſtae inde ſunt natae, quod poſuimus $QQ = \frac{1}{2}q$ operae igitur pretium erit alios caſus euoluere. Hunc in finem ponamus in genere $m = \frac{\mu l}{a} = \frac{8\mu}{a}$; et determinationes erunt:

$p =$

$p = \frac{Aa}{1+A}$	$PP = 2x$	$AB = Aa$
$q = \frac{Aa}{1+n}$	$QQ =$ [illegible]	$BC =$ [illegible]
$r = \frac{C}{1+C} \cdot \frac{Aa}{n}$	$RR =$ [illegible]	$CD =$ [illegible] v
$s =$ [illegible] v	$SS = \frac{1}{2}s$	$DE = v$
$t =$ [illegible] v	$TT = \frac{1}{2}t$	$EF = v$
$v = v$	$VV = \frac{1}{2}v$	$FO =$ [illegible] v

et diameter campi conſpicui $=$ [illegible] exiſtente $C =$ [illegible]. Sumamus iam eſſe $QQ = \frac{1}{4}q$, erit $n =$ [illegible], hinque $C =$ [illegible], et habebimus

Diſtantias focales	Aperturas	Interualla
$p = \frac{Aa}{1+A}$	$PP = 2x$	$AB = Aa$
$q = \frac{2Aa}{2\mu-1}$	$QQ =$ [illegible]	$BC =$ [illegible] Aa
$r = \frac{C}{1+C} \cdot \frac{2Aa}{2\mu-9}$	$RR =$ [illegible]	$CD =$ [illegible] v
$s =$ [illegible] v	$SS =$ [illegible] v	$DE = v$
$t =$ [illegible] v	$TT =$ [illegible] v	$EF = v$
$v = v$	$VV = \frac{1}{2}v$	$FO =$ [illegible] v

et diameter ſpatii conſpicui $=$ [illegible], quae vtique maior eſt, quam ante.

22. Cum hoc augmentum in maximis multiplicationibus maximi ſit momenti, vt id vlterius augeamus, ſumamus $QQ = \frac{1}{4}q$, fietque $n =$ [illegible], et $C =$ [illegible]; vnde prodit diameter campi conſpicui $=$ [illegible], quae ſe habet ad praecedentem, vt 15 : 14 cum vero vlteriora augmenta ſint valde parua,

parua, ſiquidem vltra [illegible] progredi non licet, hic ſubſiſtamus, erunt ergo

Diſtantiae focales	Aperturae	Interualla
$p = \frac{Aa}{1+A}$	$PP = 2x$	$AB = Aa$
$q =$ [illegible]	$QQ =$ [illegible]	$BC =$ [illegible]
$r =$ [illegible]	$RR =$ [illegible]	$CD =$ [illegible] v
$s =$ [illegible] v	$SS = \frac{1}{2}s$	$DE = v$
$t =$ [illegible] v	$TT = \frac{1}{2}t$	$EF = v$
$v = v$	$VV = \frac{1}{2}v$	$FO =$ [illegible] v.

23. Ad maximas multiplicationes haec conſtructio multo magis idonea videtur, quam praecedens. Sumamus exempli cauſa $\mu = 51$, erit $C =$ [illegible], et multiplicatio $m =$ [illegible]. Sit porro $a =$ [illegible]; et $Aa = 5$, ideoque $A = 50$, et $v = \frac{1}{2}$ vnde oritur:

Microſcopium quater millies multiplicans ita determinatum.

Diſtantiae focales	Aperturae	Interualla
$p =$ [illegible] $= 0,098$	$PP = 2x$	$AB = 5 = 5,000$
$q = \frac{1}{2} = 0,500$	$QQ = 0,125$	$BC = \frac{5}{9} = 0,555$
$r =$ [illegible] $= 0,490$	$RR =$ [illegible] x	$CD = \frac{31}{9} = 3,444$
$s =$ [illegible] $= 1,550$	$SS = 0,775$	$DE = \frac{1}{2} = 0,500$
$t = \frac{51}{40} = 1,275$	$TT = 0,638$	$EF = \frac{1}{2} = 0,500$
$v =$ [illegible] $= 0,500$	$VV = 0,250$	$FO = \frac{10}{51} = 0,196$

et

et diameter ſpatii conſpicui $=$ [illegible] dig. Si lens duplicata adhibeatur, vt capi poſſit $x =$ [illegible], ob $y =$ [illegible] erit claritas [illegible]; quae adhuc ſatis eſt notabilis. Longitudo autem totius inſtrumenti eſt 10, 196 dig.

vnde patet hoc microſcopium ſatis fore commodum pro inſigni, quam praeſtat, multiplicatione.

24. Infinitae vero inſuper aliae formae huiusmodi microſcopiorum pro varia numerorum A et n determinatione exhiberi poſſunt, atque dignitas argumenti omnino exigere videtur, vt quasdam ad praxin prae ceteris accommodatas in medium afferamus. Formulas igitur generales § 21. ex poſitione $m = \frac{[illegible]}{a} = \frac{[illegible]}{a}$ natas perpendens quoniam vidi ad inſignes multiplicationes producendas numero n maiores valores tribui conuenire; duo incommoda potiſſimum euitari debere videntur, alterum ne diſtantia focalis q nimis fiat exigua, alterum ne longitudo inſtrumenti nimis fiat magna. Cum igitur diſtantia focalis v iam tam parua accipiatur, quam circumſtantiae permittunt, primum pono $Aa = nv$, ſeu $A = \frac{nv}{a}$, vt fiat $q = \frac{n}{1+n}v$, et $BC = v$. Deinde quia iam longitudo inſtrumenti potiſſimum a binis interuallis AB et CD pendet, inter haec certam ſtatuam relationem vel aequalitatis vel inaequalitatis, ac tum facile erit iudicare, quaenam pro qualibet multiplicatione ſit maxime idonea.

25. Cum igitur ſit $Aa = nv$, et multiplicatio $m = \frac{[illegible]}{a}$; ſit primo $CD = AB$, ſeu $nv =$ [illegible] v, eritque $\mu =$ [illegible] et $C =$ [illegible]; quibus valoribus ſubſtitutis fiet.

I. Multiplicatio $m =$ [illegible]. II. Diam. ſpatii viſi $=$ [illegible]. III. Claritas $=$ [illegible] $= \frac{[illegible]\, xx}{nn(3n+2)}$, ac praeterea

$p =$ [illegible]	$PP = 2x$	$AB = nv$
$q =$ [illegible]	$QQ =$ [illegible]	$BC = v$
$r =$ [illegible] v	$RR = \frac{2x}{n}$	$CD = nv$
$s = \frac{4n}{n+2}v$	$SS = \frac{1}{2}s$	$DE = v$
$t = \frac{3n+2}{n+2}v$	$TT = \frac{1}{2}t$	$EF = v$
$v = v$	$VV = \frac{1}{2}v$	$FO = \frac{n+2}{3n+2}v$

At vt fiet $QQ < \frac{1}{2}q$ eſſe debet $n > 1 + \sqrt{5}$ ſeu $n >$ [illegible].

26. Sin autem manente $Aa = nv$ faciamus $CD = 2AB = 2nv$, erit $\mu = \frac{n(3n+1)}{2}$ et $C = \frac{2n(3n+1)}{3n-1}$, vnde ſequens prodit microſcopiorum forma.

I. Multipl. $m = \frac{4n(3n+1)}{a}$. II. Diam. ſpatii viſi $= \frac{a}{n(3n+1)}$. III. Claritas $= \frac{16\,[illegible]\,xx}{nn(3n+1)^2}$, ac praeterea

$p = \frac{nav}{a+nv}$	$PP = 2x$	$AB = nv$
$q = \frac{nv}{n+1}$	$QQ = \frac{[illegible]}{n+1}$	$BC = v$
$r = \frac{2n(3n+1)}{(n+1)(6n-1)}v$	$RR = \frac{2x}{n}$	$CD = 2nv$
$s = \frac{4n}{n+1}v$	$SS = \frac{1}{2}s$	$DE = v$
$t = \frac{3n+1}{n+1}v$	$TT = \frac{1}{2}t$	$EF = v$
$v = v$	$VV = \frac{1}{2}v$	$FO = \frac{n+1}{3n+1}v$

vbi ſumi debet $n > 2$ vt fiat $QQ < \frac{1}{4}q$. Haec forma praecedenti anteferenda videtur, quod iisdem numeris n maiores multiplicationes producat.

27. Sumamus ergo vt hactenus $v = \frac{1}{2}$ dig. et pro variis valoribus numeri n ſequentes conſtituamus microscopiorum formas, in quibus ſi lens obiectiua duplicata conficiatur, vt ſumi poſſit $x = \frac{1}{2}a$, erit claritas $= \frac{16aa}{nn(n+1)^2}$.

I. *Forma Microſcopiorum* $n = 2$.

Multiplicatio $m = \frac{56}{a}$; Diam. ſpatii viſi $= \frac{a}{6}$; Claritas $= \frac{4aa}{9}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{a}{1+a}$	$PP = \frac{2a}{15}$	$AB = 1$
$q = \frac{1}{3} = 0,333$	$QQ = 0,167$	$BC = \frac{1}{2}$
$r = \frac{14}{33} = 0,424$	$RR = \frac{2a}{45}$	$CD = 2$
$s = \frac{4}{3} = 1,333$	$SS = 0,667$	$DE = \frac{1}{2}$
$t = \frac{7}{6} = 1,167$	$TT = 0,583$	$EF = \frac{1}{2}$
$v = \frac{1}{2} = 0,500$	$VV = 0,250$	$FO = \frac{1}{4}$

Hinc tota longitudo microſcopii $AO = 4\frac{3}{4}$ dig.

Si minores lentes oculares non admittamus quam $a = \frac{1}{10}$ dig. neque maiores quam $a = \frac{1}{2}$ haec forma a multiplicatione $m = 112$ vsque ad $m = 560$ vſurpari poteſt.

II. *Forma*

II. *Forma microſcopiorum* $n = 3$.

Mult. $m = \frac{120}{a}$; Diam. ſpatii viſi $= \frac{a}{12}$; Claritas $= \frac{aa}{81}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{3a}{3+2a}$	$PP = \frac{3a}{16}$	$AB = 1\frac{1}{5}$
$q = \frac{3}{8} = 0,375$	$QQ = 0,125$	$BC = \frac{1}{6}$
$r = \frac{15}{34} = 0,441$	$RR = \frac{a}{10}$	$CD = 3$
$s = \frac{3}{2} = 1,500$	$SS = 0,750$	$DE = \frac{1}{6}$
$t = \frac{5}{4} = 1,250$	$TT = 0,625$	$EF = \frac{1}{6}$
$v = \frac{1}{2} = 0,500.$	$VV = 0,250$	$FO = \frac{1}{3}$

Hinc tota longitudo $AO = 6\frac{1}{3}$ dig.

Limites huius formae in multiplicando ſunt $m = 240$ et $m = 1200$.

III. *Forma microſcopiorum* $n = 4$.

Mult. $m = \frac{208}{a}$; Diam. ſpatii viſi $= \frac{a}{104}$; et Clar. $= \frac{aa}{169}$

Diſtantiae focales	Aperturae	Interualla
$p = \frac{2a}{2+a}$	$PP = \frac{3a}{10}$	$AB = 2$
$q = \frac{2}{5} = 0,400$	$QQ = 0,100$	$BC = \frac{1}{8}$
$r = \frac{52}{115} = 0,452$	$RR = \frac{3a}{45}$	$CD = 4$
$s = \frac{8}{5} = 1,600$	$SS = 0,800$	$DE = \frac{1}{8}$
$t = \frac{13}{10} = 1,300$	$TT = 0,650$	$EF = \frac{1}{4}$
$v = \frac{1}{2} = 0,500$	$VV = 0,250$	$FO = \frac{5}{28}.$

Hinc tota longitudo $AO = 7\frac{2}{13}$ dig.

Sumta diſtantia focali $a = \frac{1}{2}$ dig. multiplicatio prodit $m = 416$. at ſumta $a = \frac{1}{10}$ dig. erit multiplicatio $m = 2080$.

 Sic-

Sicque hoc tam modico inſtrumento multiplicatio vltra bis millies extendi poteſt.

IV. *Forma microſcopiorum* $n = 5$.

Mult. $m = \frac{320}{a}$; Diam. ſpatii viſi $= \frac{a}{30}$; et Clar. $= \frac{9aa}{1600}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{5a}{5+2a}$	$PP = \frac{5a}{15}$	$AB = 2\frac{1}{2}$
$q = \frac{5}{12} = 0,417$	$QQ = 0,083$	$BC = \frac{1}{6}$
$r = \frac{40}{87} = 0,460$	$RR = \frac{12}{15}$	$CD = 5$
$s = \frac{5}{3} = 1,667$	$SS = 0,833$	$DE = \frac{1}{2}$
$t = \frac{4}{3} = 1,333$	$TT = 0,667$	$EF = \frac{1}{2}$
$v = \frac{1}{2} = 0,500$	$VV = 0,250$	$FO = \frac{1}{15}$

Hinc tota longitudo $AO = 9\frac{3}{16}$ dig.

Hic ergo ſi ſumatur $a = \frac{1}{2}$ dig. habebitur multiplicatio $m = 640$, ſin autem capiatur $a = \frac{1}{10}$ dig. prodit multiplicatio $m = 3200$.

V. *Forma microſcopiorum* $n = 6$.

Mult. $m = \frac{456}{a}$; Diam. ſpatii viſi $= \frac{a}{43}$; et Clar. $= \frac{aa}{361}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{3a}{3+a}$	$PP = \frac{3a}{10}$	$AB = 3$
$q = \frac{3}{7} = 0,429$	$QQ = 0,071$	$BC = \frac{1}{2}$
$r = \frac{114}{245} = 0,465$	$RR = \frac{a}{20}$	$CD = 6$
$s = \frac{12}{7} = 1,714$	$SS = 0,857$	$DE = \frac{1}{6}$
$t = \frac{19}{14} = 1,357$	$TT = 0,679$	$EF = \frac{1}{2}$
$v = \frac{1}{2} = 0,500$	$VV = 0,250$	$FO = \frac{7}{38}$

Hinc tota longitudo $AO = 10\frac{3}{19}$ dig.

Hic

Hic ergo ſi ſumatur $a = \frac{1}{2}$ dig. multiplicatio erit $m = 912$, ſin autem capiatur $a = \frac{1}{10}$, multiplicatio erit $m = 4560$.

VI. *Forma microſcopiorum* $n = 7$.

Mult. $m = \frac{616}{a}$; Diam. ſpatii viſi $= \frac{a}{56}$; Clarit. $= \frac{9aa}{3969}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{7a}{7+2a}$	$PP = \frac{3a}{16}$	$AB = 3\frac{1}{2}$
$q = \frac{7}{16} = 0,437\frac{1}{2}$	$QQ = 0,062\frac{1}{2}$	$BC = \frac{1}{8}$
$r = \frac{77}{164} = 0,470$	$RR = \frac{3a}{70}$	$CD = 7$
$s = \frac{7}{4} = 1,750$	$SS = 0,875$	$DE = \frac{1}{2}$
$t = \frac{11}{8} = 1,375$	$TT = 0,688$	$EF = \frac{1}{8}$
$v = \frac{1}{2} = 0,500$	$VV = 0,250$	$FO = \frac{2}{11}$

Hinc tota longitudo $AO = 12\frac{2}{11}$ dig.

Sumta ergo diſtantia obiecti ante inſtrumentum $a = \frac{1}{2}$ dig. multiplicatio obtinebitur $m = 1232$; at ſi ſumatur $a = \frac{1}{10}$ dig. multiplicatio prodit $m = 6160$.

VI. *Forma microſcopiorum* $n = 8$.

Mult. $m = \frac{800}{a}$; Diam. ſpatii viſi $= \frac{a}{72}$; et Clar. $= \frac{9aa}{10000}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{4a}{4+a}$	$PP = \frac{3a}{13}$	$AB = 4$
$q = \frac{4}{9} = 0,444$	$QQ = 0,056$	$BC = \frac{1}{8}$
$r = \frac{200}{423} = 0,473$	$RR = \frac{3a}{88}$	$CD = 8$
$s = \frac{16}{9} = 1,778$	$SS = 0,889$	$DE = \frac{1}{2}$
$t = \frac{25}{18} = 1,389$	$TT = 0,695$	$EF = \frac{1}{8}$
$v = \frac{1}{2} = 0,500$	$VV = 0,250$	$FO = \frac{9}{50}$

Hinc tota longitudo $AO = 13\frac{17}{57}$ dig.

 Poſita

Poſita hic diſtantia obiecti ante inſtrumentum $a = \frac{1}{2}$ dig. multiplicatio prodit $m = 1600$, at facta hac diſtantia $a = \frac{1}{10}$ dig. multiplicatio obtinebitur $m = 8000$.

VII. *Forma microſcopiorum* $n = 10$.

Mult. $m = \frac{1240}{a}$; Diam. ſpatii viſi $= \frac{a}{110}$; et Clar. $= \frac{900}{24017}$.

Diſtantiae focales	Aperturae	Interualla
$p = \frac{5a}{5+a}$	$PP = \frac{3a}{10}$	$AB = 5$
$q = \frac{5}{11} = 0,455$	$QQ = 0,046$	$BC = \frac{1}{8}$
$r = \frac{810}{849} = 0,477$	$RR = \frac{3a}{100}$	$CD = 10$
$s = \frac{20}{11} = 1,819$	$SS = 0,910$	$DE = \frac{1}{6}$
$t = \frac{31}{22} = 1,409$	$TT = 0,705$	$EF = \frac{1}{8}$
$v = \frac{1}{2} = 0,500$	$VV = 0,250$	$FO = \frac{21}{83}$

Hinc tota longitudo $AO = 16\frac{21}{31}$ dig.

Quodſi diſtantia obiecti ante inſtrumentum ſtatuatur $a = \frac{1}{2}$ dig. multiplicatio oritur $m = 2480$, ſin autem capiatur $a = \frac{1}{10}$ multiplicatio adeo erit $m = 12400$, quousque certe vulgaribus microſcopiis nunquam peruenire licet.

28. Hae poſteriores formae nobis inſuper hoc inſigne commodum praeſtant, quod lente obiectiua modicae magnitudinis praegrandes multiplicationes obtineri queant, veluti in forma poſtrema ſi ſumatur diſtantia a vnius digiti, multiplicatio oritur $m = 1240$; atque in tanta diſtantia minimae inaequali-

qualitates in ſuperficie obiecti viſionem minime turbabunt. In quo non dubito his microſcopiis maximam praeſtantiam prae vulgaribus adſcribere. Huiusmodi microſcopii formam refert figura ſecunda, vbi binae lentes B et C multo ſunt minores lente obiectiua, ſimulque minima apertura ambae ſunt praeditae. Tab. III. Fig. 2.

Inſignis ergo hic ab artifice requiritur ſollertia, vt hae lentes exactiſſime in axe debitisque locis collocentur, ne radii per lentem obiectiuam intromiſſi has minimas aperturas praetergrediantur.

29. Plurimum autem intererit hic ab artifice in hoc elaborari, vt lentes obiectiuas modo ſupra indicato ex binis lentibus parare addiſcat, quandoquidem hoc modo ob confuſionem euaneſcentem ipſis multo maiorem aperturam tribuere licet; vnde claritatis gradus vehementer augebitur. Hunc in finem hic ſubiungo ſequentem tabulam, quae pro quauis diſtantia focali p compoſitionem lentis obiectiuae oſtendit.

Tabula

Tabula pro conſtructione lentis obiectiuae duplicatae.

Diſt. foci Propoſita p	Lentis prioris A radii facierum anterioris conuexae	Lentis prioris A radii facierum poſterioris concauae	Lentis alterius A′ radii facierum anterioris conuexae	Lentis alterius A′ radii facierum poſterioris conuexae	Interualla inter binas has lentes.
1, 00	1, 0286	0, 6292	2, 1404	0, 7222	0, 250
0, 95	0, 9772	0, 5977	2, 0334	0, 6861	0, 237
0, 90	0, 9258	0, 5662	1, 9264	0, 6500	0, 225
0, 85	0, 8744	0, 5348	1, 8194	0, 6169	0, 212
0, 80	0, 8230	0, 5034	1, 7124	0, 5808	0, 200
0, 75	0, 7715	0, 4719	1, 6053	0, 5417	0, 187
0, 70	0, 7201	0, 4405	1, 4983	0, 5056	0, 175
0, 65	0, 6687	0, 4090	1, 3913	0, 4695	0, 162
0, 60	0, 6173	0, 3776	1, 2842	0, 4334	0, 150
0, 55	0, 5658	0, 3461	1, 1772	0, 3973	0, 137
0, 50	0, 5143	0, 3146	1, 0702	0, 3611	0, 125
0, 45	0, 4629	0, 2831	0, 9632	0, 3250	0, 112
0, 40	0, 4115	0, 2517	0, 8562	0, 2904	0, 100
0, 35	0, 3601	0, 2203	0, 7492	0, 2528	0, 087
0, 30	0, 3086	0, 1888	0, 6421	0, 2167	0, 075
0, 25	0, 2571	0, 1573	0, 5351	0, 1806	0, 062
0, 20	0, 2057	0, 1259	0, 4281	0, 1452	0, 050
0, 15	0, 1543	0, 0944	0, 3211	0, 1083	0, 037
0, 10	0, 1029	0, 0629	0, 2140	0, 0722	0, 025
0, 05	0, 0514	0, 0315	0, 1070	0, 0361	0, 012

30.

30. Si plures huiusmodi lentes duplicatae comparentur, iis omnibus in ſingulis formis vti licebit, vnde plures multiplicationis gradus obtinebuntur. Si quis autem omnis generis obſeruationes inſtituere voluerit, vnica forma, qua reliquae lentes continentur, vix ſufficiet, ſed conſultum erit eum duabus ad minimum huiusmodi formis eſſe inſtructum veluti quarta vel tertia ac ſeptima; tum ſi ternae lentes obiectiuae praeſto ſint, ſingulis ſucceſſiue in ambabus formis vti poterit, quo pacto ſufficientem varietatem in multiplicatione conſequetur; obiectiuae autem lentes ad diſtantias focales 1, ½ et ⅓ digiti inſtructae fortaſſe ad hunc ſcopum maxime erunt idoneae. Imprimis autem totum negotium a felici ſucceſſu in conſtructione huiusmodi microſcopiorum pendet, in quo vtique ſumma cura et ſollertia artificis requiritur.

DE