

Maximilian HELL und die Entdeckung des Planeten Uranus

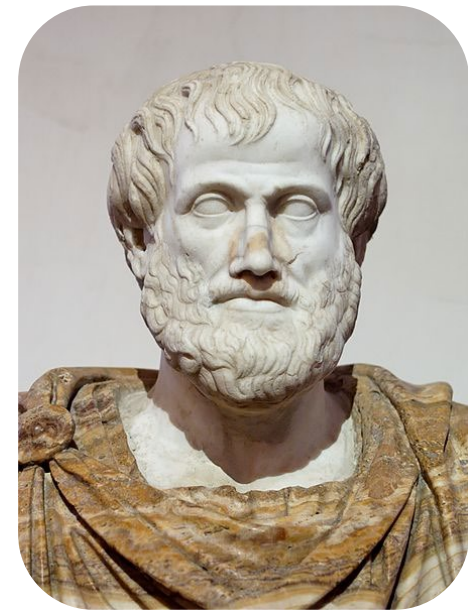
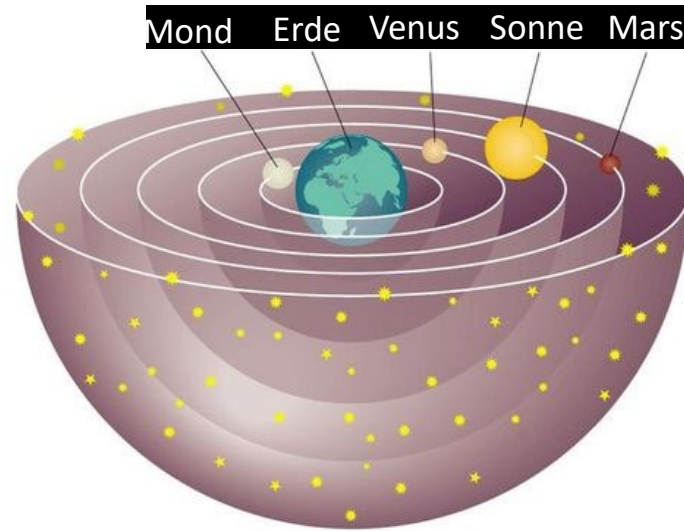
Doris Vickers

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Universität Wien

doris.vickers@univie.ac.at

Aristotéles



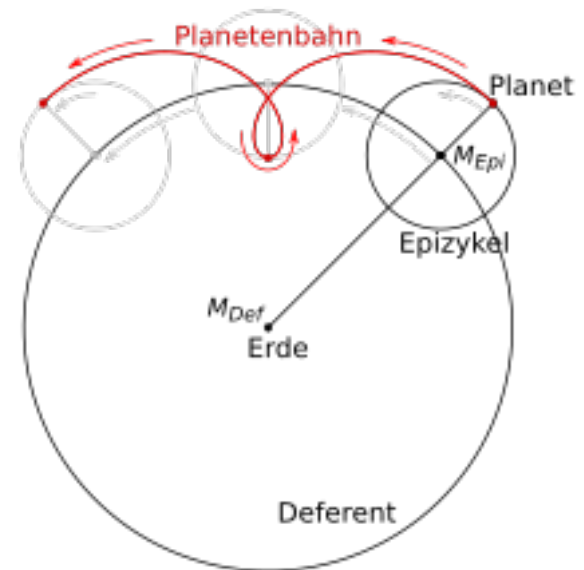
Erde ist unverrückbarer Mittelpunkt des gesamten Universums

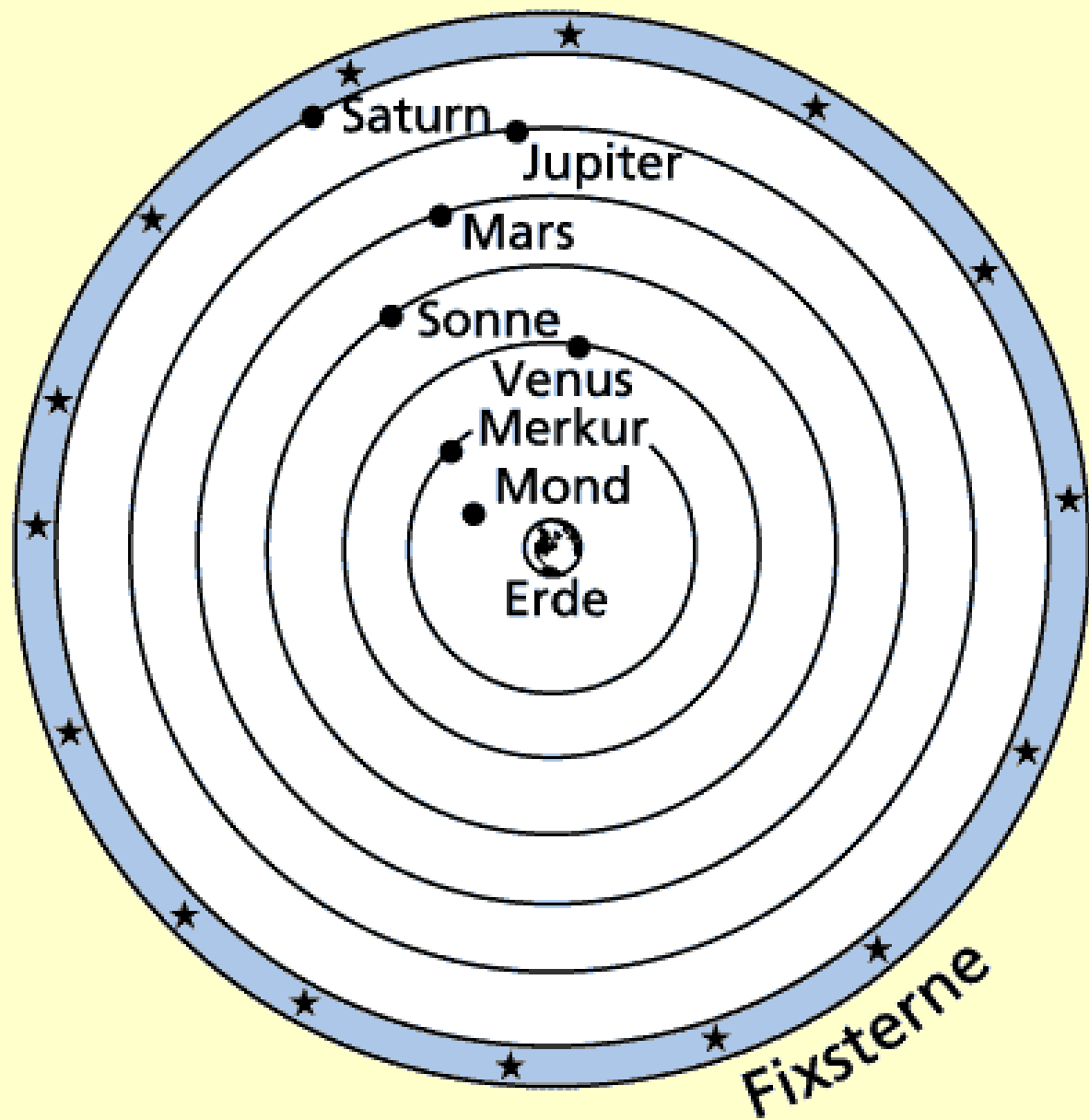
Himmel ist unveränderbar

Sonne, Mond, Planeten drehen sich auf kristallinen Sphären um die Erde

Veränderungen (z.B. Kometen) gibt es nur in der sublunaren Sphäre

Klaudios Ptolemaios



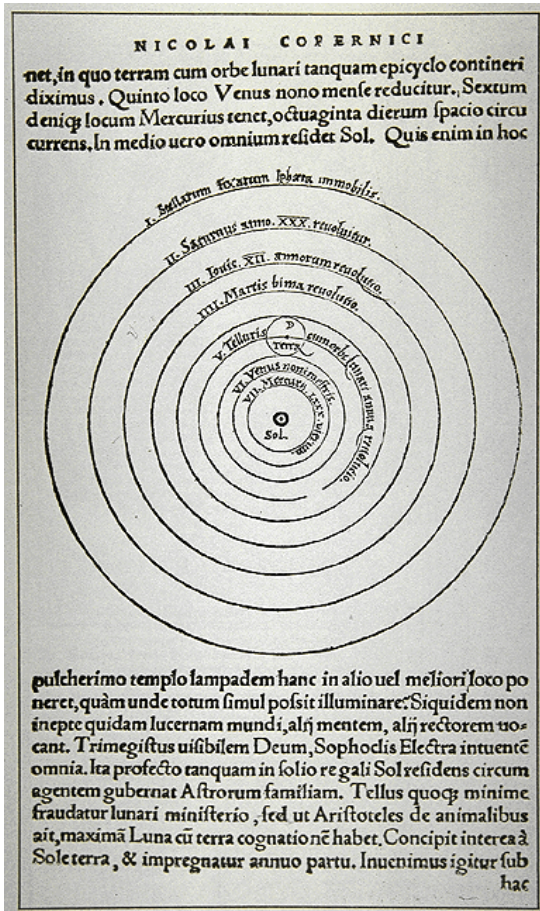
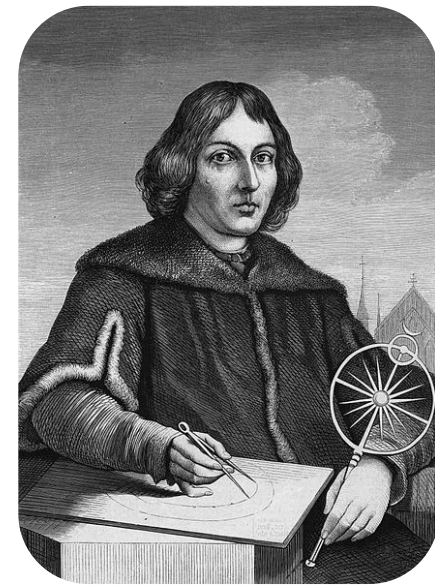


Eine spannende Zeit...

- 1492 Columbus entdeckt Amerika
- 1517 Martin Luthers 97 Thesen
- 1541 Johannes Calvins Ekklesiologie
- 1543 Copernicus stellt Sonne ins Zentrum



Ny Copern



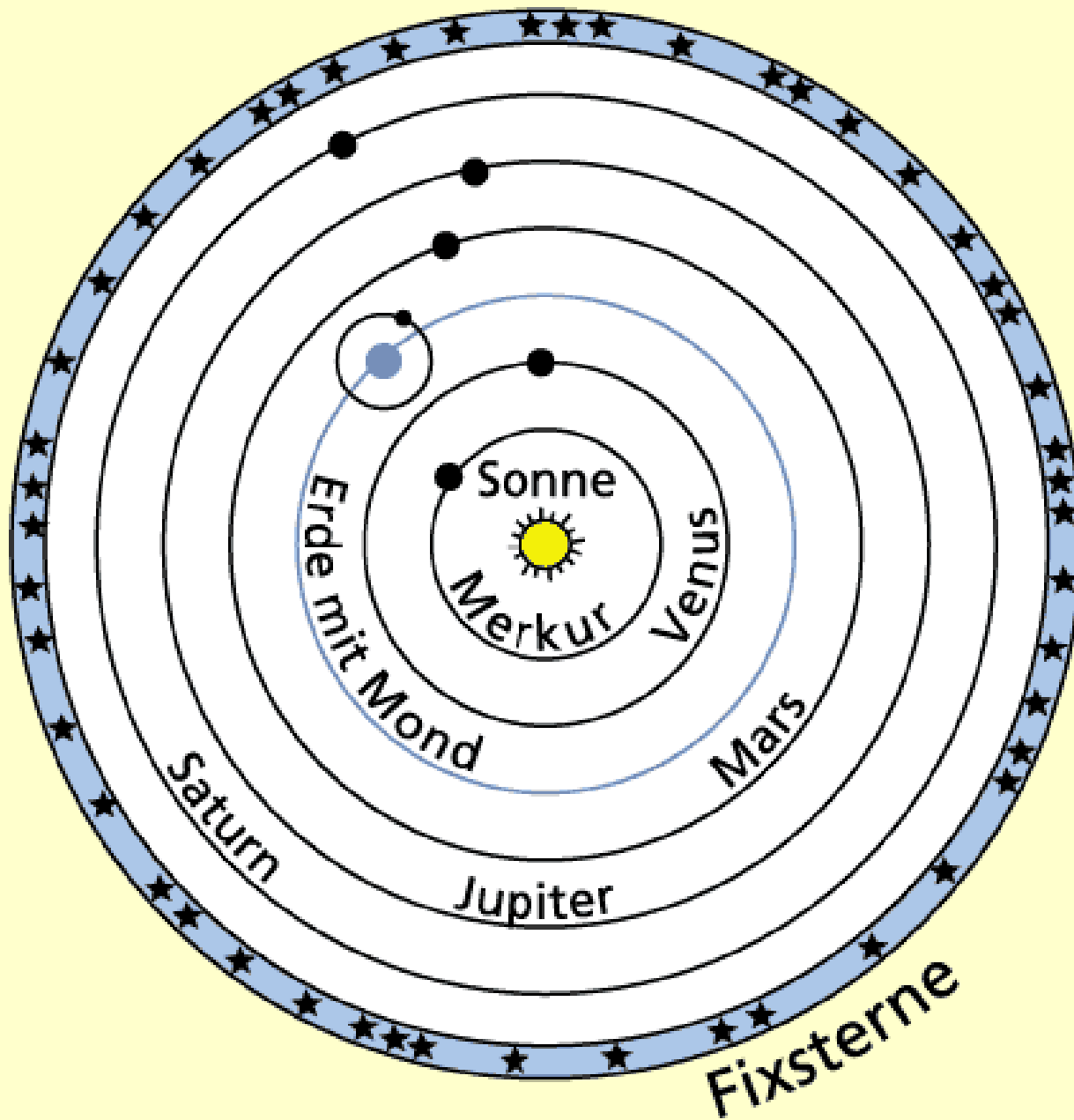
Probleme:

Kristallschalen (woher kommen Kometen?)

Perfekte Kreisbahnen: Planeten sind Objekte des Himmels, müssen also der göttlichen Ordnung gehorchen (< Aristoteles!)

Mit Ptolemäus rechnet es sich noch immer richtiger!

Wie kann sich die schwere Erde bewegen? (Die anderen Himmelskörper bestehen ja aus „Äther“)



Fernrohr

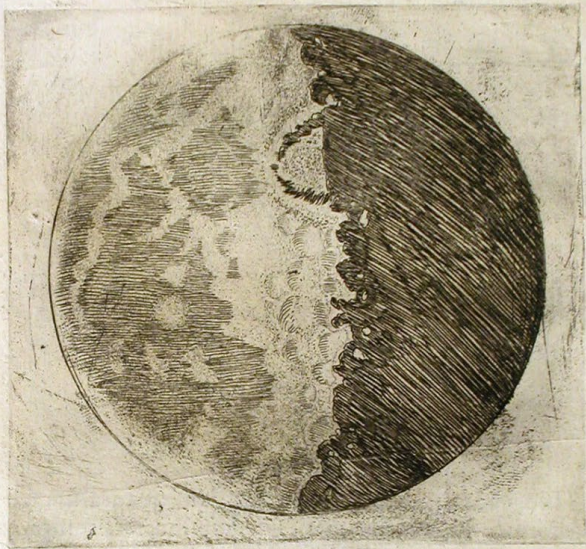
1608 kommt eine Sensation auf den europäischen Markt – das Fernrohr

In Holland erfunden

Hans Lippershey

Kein Patent!





Galileo Galilei Humilis. Servo della Ser.^a V.^a inuigilato.
 Io assisto, et lo ogni spirito di potere ho solo scisfare
 aliarico che none della Lettera di Mathematico nelle sue
 di di Padova,

Inuere deuoere determinato di presentare al Sc^{mo} Principe
 l'ordine et il p^o essere di formamenti incombenti di ogni
 natura et in breua marittima o terrestre spino di tutte que-
 sto nuovo artificio nel maggior segreto et celato a disposizione
 di d. Ser.^a L'ordine canato nelle piu' di dite speculazioni di
 prospettiva ha il vantaggio di scoprire Legni et Veli dell' inimico
 3/4 ore et piu di tempo prima di esser scoperto et distinguendo
 il numero et la qualita de i Vesselli giudicare il suo sforzo
 ballarsi alla caccia al combattimento o alla fuga, o pure anco
 nella battaglia aperta vedere et particolarmente distinguere ogni suo
 moto et propriamento.



Am 7. Jänner 1610 entdeckt Galilei drei
 kleine Sterne neben Jupiter

Am 15. Jänner entdeckt er einen
 vierten Stern

Nennt sie „Medicäische Sterne“

Observationes Iovianae
 1610

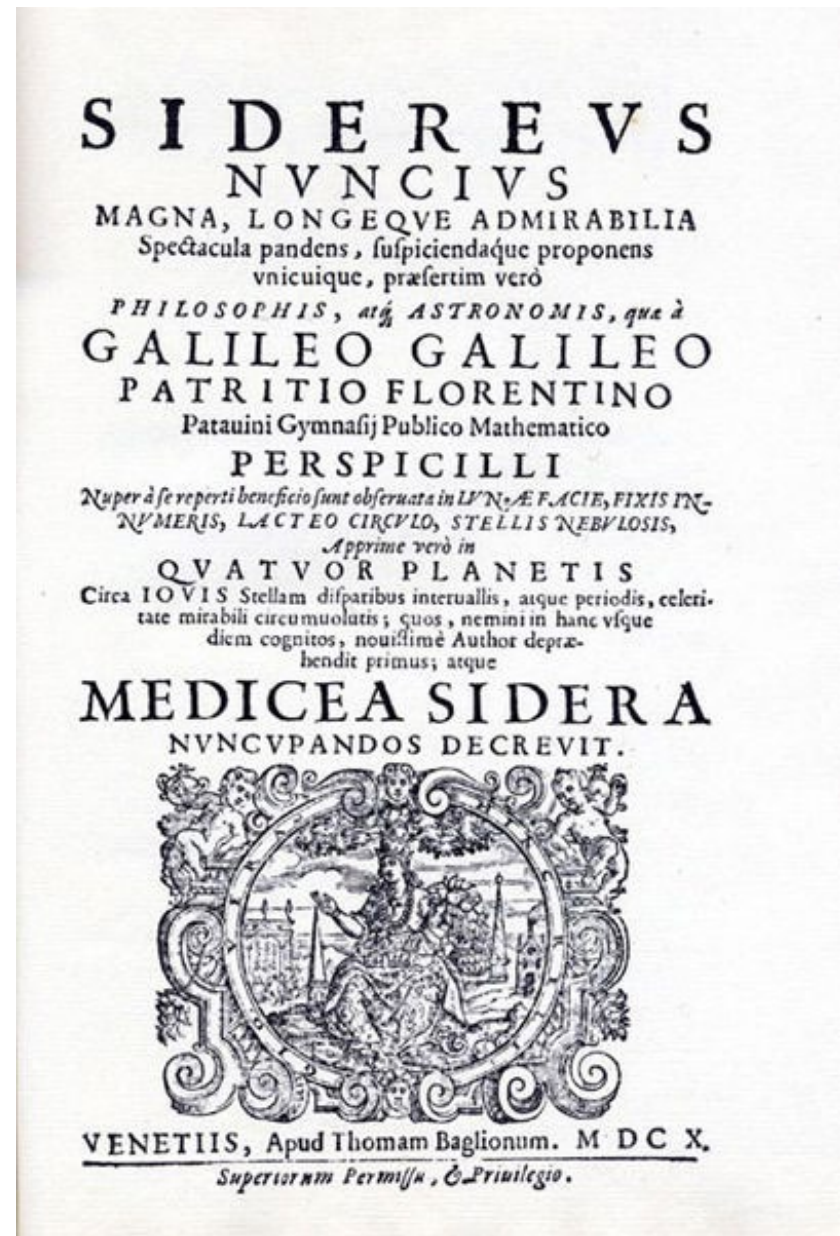
2. J. Jovis mar. H. 12	○ **
3. marc'	** ○ *
2. Jovis	○ ** *
3. marc'	○ * *
3. Ho. s.	* ○ *
4. marc'	* ○ **
6. marc'	** ○ *
8. marc' H. 13.	* * * ○
10. marc'	* * * ○ *
11.	* * ○ *
12. H. 4. neq.	* ○ *
13. marc'	* * ○ *
14. Jovis	* * * ○ *

Sidereus Nuncius

Im März 1610 publiziert

„Sternenbote“ oder
„Nachricht von den Sternen“

Fernrohrbeschreibung
Mond (v.a. Terminator)
Sterne
„Medicäische Sterne“



S I D E R E V S
N V N C I V S

MAGNA, LONGEQVE ADMIRABILIA
Spectacula pandens, suspiciendaque proponens
vnicuique, præsertim verò

PHILOSOPHIS, atq; ASTRONOMIS, quæ à

G A L I L E O G A L I L E O
P A T R I T I O F L O R E N T I N O

Patavini Gymnasij Publico Mathematico

P E R S P I C I L L I

*Nuper à se reperti beneficio sunt observata in LVNÆÆCIE, FIXIS IN-
NUMERIS. LACTEO CIRCVIO, STELLIS NEBVLOSIS,*

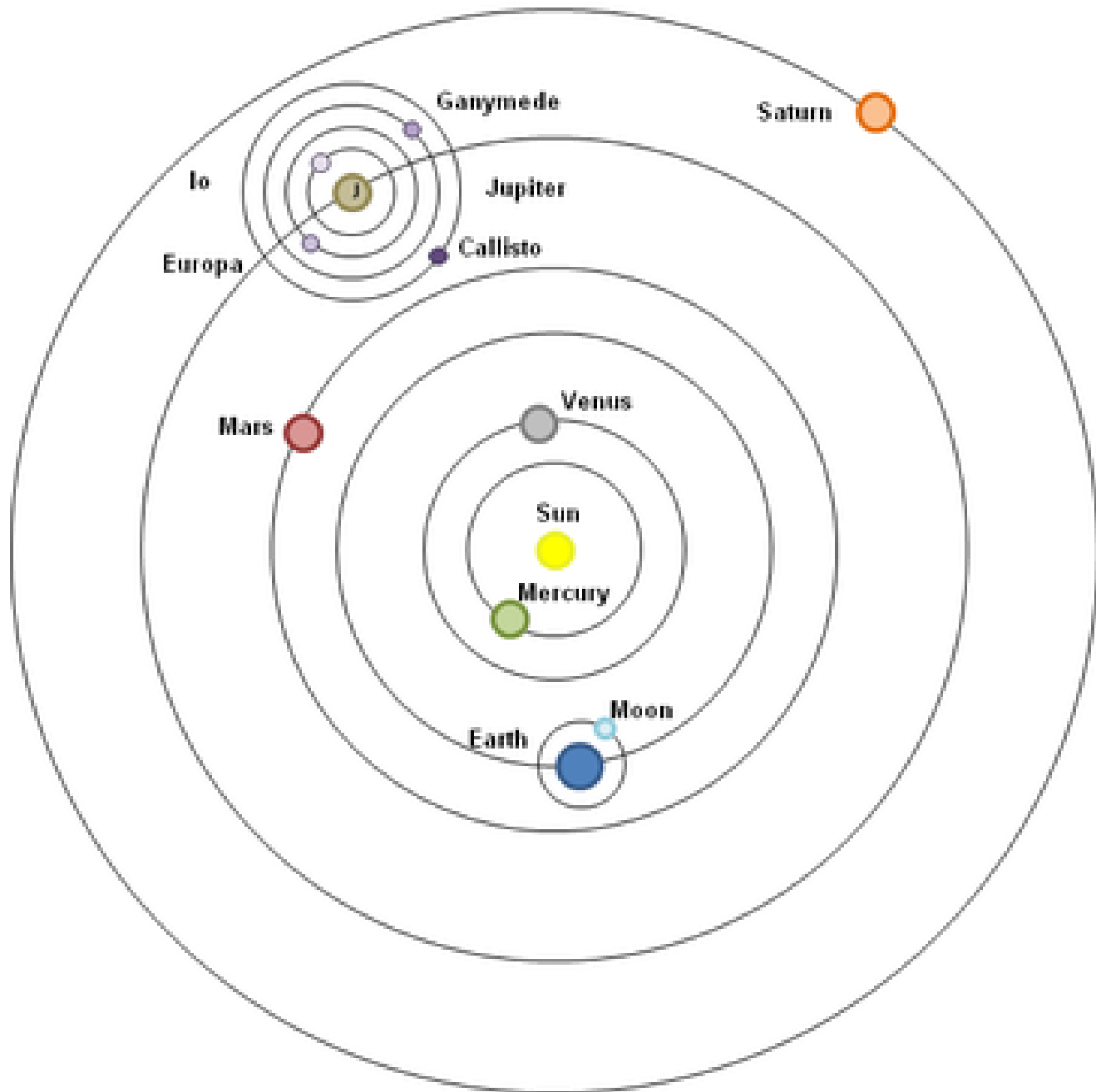
Apprime verò in

Q V A T V O R P L A N E T I S

*Circa IOVIS Stellam disparibus interuallis, atque periodis, celeri-
tate mirabili circumuolutis; quos, nemini in hanc vsque
diem cognitos, nouissimè Author depra-
hendit primus; atque*

M E D I C E A S I D E R A
N V N C V P A N D O S D E C R E V I T .

The Galilean Planets



Die Entdeckung des Uranus

Lemuel Francis ABBOTT, William
HERSCHEL (1785)

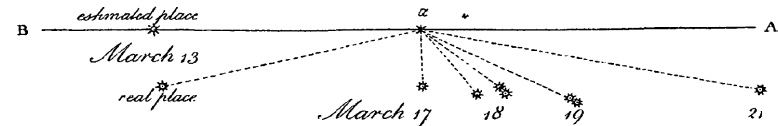
William HERSCHEL
13. März 1781

Vorhergehende Sichtungen:

- John FLAMSTEED (5 mal)
- Tobias MAYER (1 mal)
- Pierre Charles LE MONNIER (12 mal)



Account of a comet, Phil.Trans.,
vol. lxxi., 1781, pp.492-501



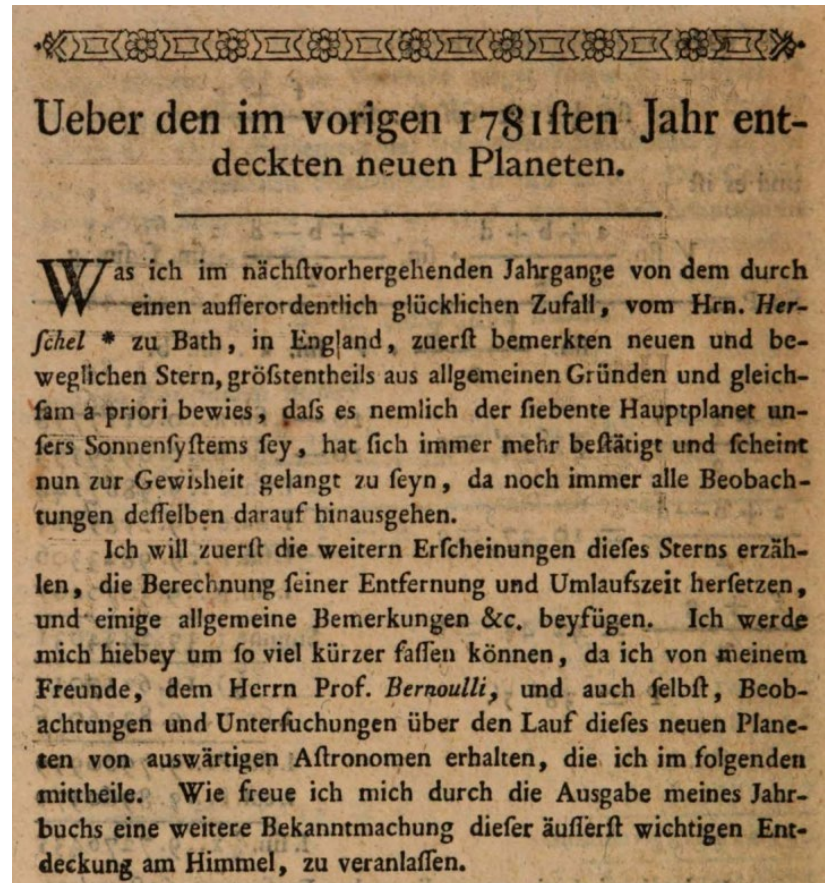
Stern, Komet oder doch Planet?

ON Tuesday the 13th of March, between ten and eleven in the evening, while I was examining the small stars in the neighbourhood of H Geminorum, I perceived one that appeared visibly larger than the rest : being struck with its uncommon magnitude, I compared it to H Geminorum and the small star in the quartile between Auriga and Gemini, and finding it so much larger than either of them, suspected it to be a comet.

I was then engaged in a series of observations on the parallax of the fixed stars, which I hope soon to have the honour of laying before the Royal Society ; and those observations requiring very high powers, I had ready at hand the several magnifiers of 227, 460, 932, 1536, 2010, &c. all which I have successfully used upon that occasion. The power I had on when I first saw the comet was 227. From experience I knew that the diameters of the fixed stars are not proportionally magnified with higher powers, as the planets are ; therefore I now put on the powers of 460 and 932, and found the diameter of the comet increased in proportion to the power, as it ought to be, on a supposition of its not being a fixed star, while the diameters of the stars to which I compared it were not increased in the same ratio. Moreover, the comet being magnified much beyond what its light would admit of, appeared hazy and ill-defined with these great powers, while the stars preserved that lustre and distinctness which from many thousand observations I knew they would retain. The sequel has shewn that my surmises were well founded, this proving to be the Comet we have lately observed.

Account of a comet, Phil.Trans.,
vol. lxxi., 1781, pp.492-501

Astronomisches Jahrbuch für
das Jahr 1785 (1782)



Maximilian HELL

1720 – 1792

Jesuitenpriester

Expedition nach Vardo, um den
Venustransit 1769 zu beobachten

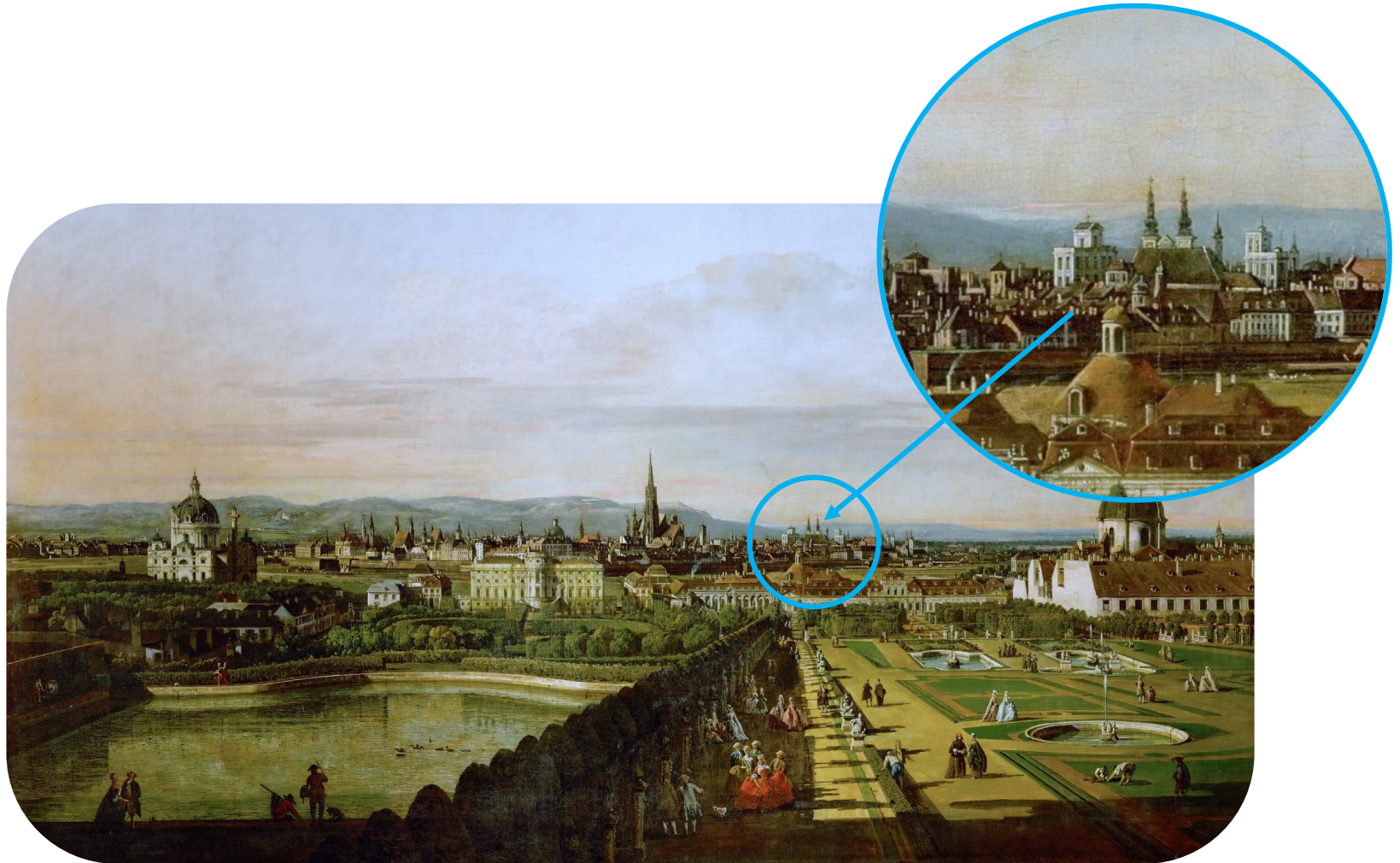


Maximilian HELL (1769)

Hauptwerke:

- *Ephemerides astronomicae*, 37 Bände, 1757-93
- *De transitu Veneris ante discum Solis*, 1770
- *De parallaxi Solis*, 1773

Die Wiener Universitätssternwarte



Bernardo Bellotto (called: CANALETTO), view of Vienna from the Upper Belvedere (roughly between 1758 and 1761)



BODE oder HELL? Uranus oder Urania?



Johann Elert BODE
(1747 – 1826)



Maximilian HELL
(1720 – 1792)

Astronomisches
J a h r b u c h

für das Jahr 1784.

hebt einer Sammlung

der neuesten

in die astronomischen Wissenschaften
einschlagenden Abhandlungen, Beobach-
tungen und Nachrichten.

Mit Genehmigung
der Königl. Akademie der Wissenschaften
berechnet und herausgegeben

von

J. E. Bode, Astronom der Akademie.



Mit 3 Kupfertafeln.

Berlin, 1781.

Bey dem Verfasser in Berlin und in der Buchhandlung
der Gelehrten in Dessau.

Gedruckt bey George Jacob Decker, Königl. Hofbuchdrucker.

**EPHEMERIDES
ASTRONOMICÆ**

Anni 1786.

AD
MERIDIANUM VINDOBONENSEM

JUSSU

**AUGUSTISSIMI
CALCULATÆ**

A
MAXIMILIANO HELL,

ASTRONOMO CÆSAREO-REGIO UNIVERSIT.

ET

FRANCISCO DE PAULA TRIESNECKER,
ADJUNCTO ASTRONOMIÆ CÆS. REGIO

CUM

APPENDICE OBSERVATIONUM ASTRO-
NOMICARUM ET METEOROLOGICARUM AN-
NIS 1781, 1782 ET 1783 IN OBSERVATORIO C.
R. VINDOBONENSI, ET ALIBI LOCORUM
FACTARUM.



VIENNÆ,

TYPIS ET SUMPT. JOAN. THOM. NOB. DE TRATTNERN,
CÆS. REG. MAJ. AULÆ TYPOGRAPHI ET BIBLIOPOLÆ.

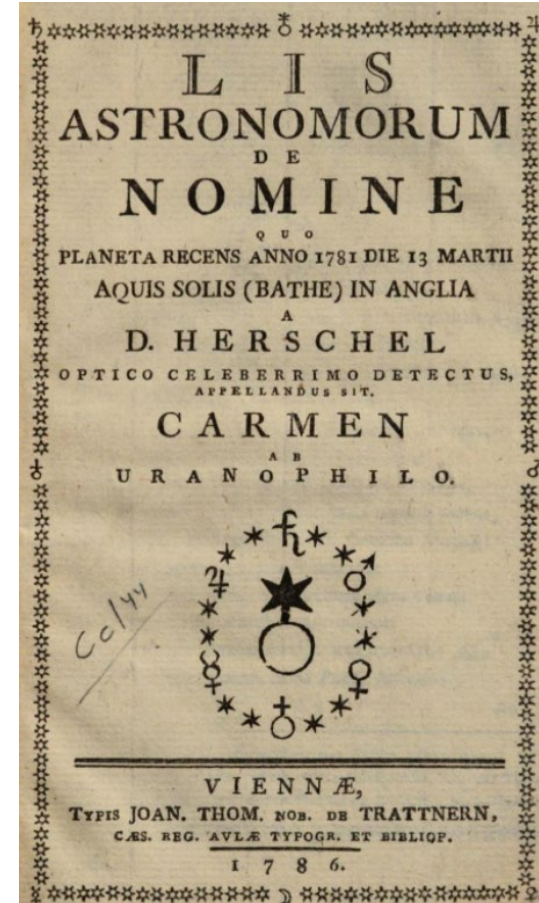
MDCCLXXXV.

Lis Astronomorum

Mehrere Ausgaben: 1786, 1787, 1788
(manche davon eigenständig, manche als
Anhang in den *Ephemerides*)

Author: *Uranophilus* (?)

164 Verse (82 elegische Distichen)



Lis Astronomorum

- Einführung: der Planet wurde entdeckt und mehrere Namen wurden vorgeschlagen
- Argumente für und gegen manche dieser Namen:
 - Poinset – Cybele
 - Herschel – Georgium Sidus
 - Bode – Uranus
 - Hell – Urania
- Zusammenfassung

Einführung

ASTRONOMI certant, et adhuc sub Judice Lis est,
Qua fit signandus Voce Planeta novus,
Est **HERSCHEL** Gallis, **CYBELE** ve: **GEORGIUS** Anglis:
URANUS aſt **Bruffis**: **URANIA** **Auſtriacis**.
HERSCHEL : ut a Gallis dicatur, **LANDIUS** (1) optat;
Optata Eventu, ſed caritura reor:
Herbarum **Gnaris** hic **Mos** eſt: **Nomen**, ut ejus,
Qui prior invenit, **Planta** reperta ferat.

Ter tria cum binis, quæ dicimus *Aſtra Comata*
Unus detexit **MESSIER** **Aſtronomus**.
Ter centum numerat *nebuſoſa* **HERSCHELIUS** *Aſtra*
Millia tum quatuor *lucida* **Puncta** (2) nova
Anne probet quiſquam? **MESSIER** : vocitare *Cometas*
Udenos? **HERSCHEL** : millia **Puncta** nova?
Sit procul hoc **Nomen** : non eſt imitabilis hic **Mos**
Aſtronomis : non eſt **Planta** **Planeta** novus.

Herschel

HERSCHELIO, clarisque Viris, quos Anglia cenfet,
Nomina Regnantum, qui celebrata volunt,
Hisce **GEORGIUS** est Nomen, signare Planetam,
Quo cupiunt; fit Rex, Duxque Planeta novus.
Anglorum Rex, Duxque GEORGIUS Hanoveranus
Scilicet hoc hodie Nomine **TERTIUS** est.
Convenit: ut Sidus, Rege hoc regnante, repertum
BATHENIS, (7) Regis Nomine fit celebre.
Nec Ducis infuetum est, aut sacro Nomine Regis,
Sidera visa recens dicier Astronomis.
Sic **GALILAEUS** ovans jovialia Sidera primus
Dum vidit, dixit: sint *Medicæ* volo.
Sidera sic **FLAMSTEED** *Caroli Cor* dixerat olim
Nonnulla, et *Robur* sic *Caroli* **HALLIUS**.

Bode

Scriptor Ephemeridum, quas Urbs Berlinia prodit,

BODIUS Astronomus, Nomen et ipse dedit.

URANUS: huic, ait, est Nomen; non aptius ullum est,

Cognita, quæ mihi sunt Nomina mythologica.

URANUS, est Genitor Saturni, tum Jovis almi,

Totum, quod Cœlum dicimus, ἄρανος est.

URANUS: ut Deus est summus, primusque Deorum

Sic summo est gyrans Orbe Planeta novus.

Hell

HELLIUS Aufriacus Vocum certamina cernens,

Pax, ait, Astronomis: eligite *Uraniam*.

URANUS, est COELUM, non Pars, aut Incola Cœli,

Non Cœlum est, sed Pars iste Planeta novus.

At, MAS sit summus Præses, non FOEMINA Cœli!

URANON, URANIB jure præire decet.

* * *

Dicite, qui Sidus spectastis, dicite, quæso,

Quam Formam referat? Numne Dei, ? anne Deæ?

Virginea est **Facies**, non *mascula*, foemineasque

Dotes præ se fert: hæc **DEA**, non **DEUS** est.

Castæ Virginis est: *oculos fugitare Virorum*;

Conspectum nostrum nonne **Planeta** fugit?

Vix nudis Oculis (12) spectandum se exhibet **Astrum**,

Felix, qui *armatis* id videt **Astronomus**!

Septenos (nostis) numeravimus usque **Planetas**,

Octonos nobis jam numerare licet:

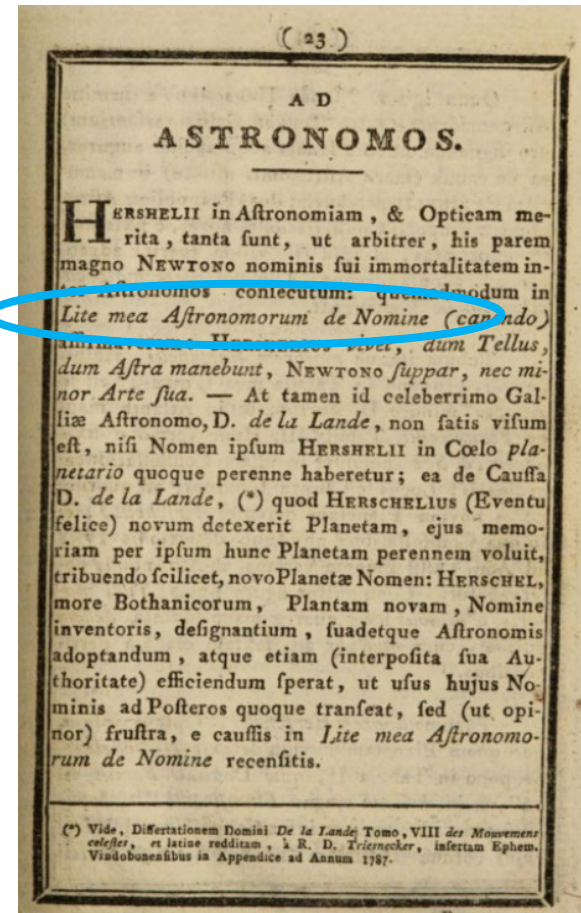
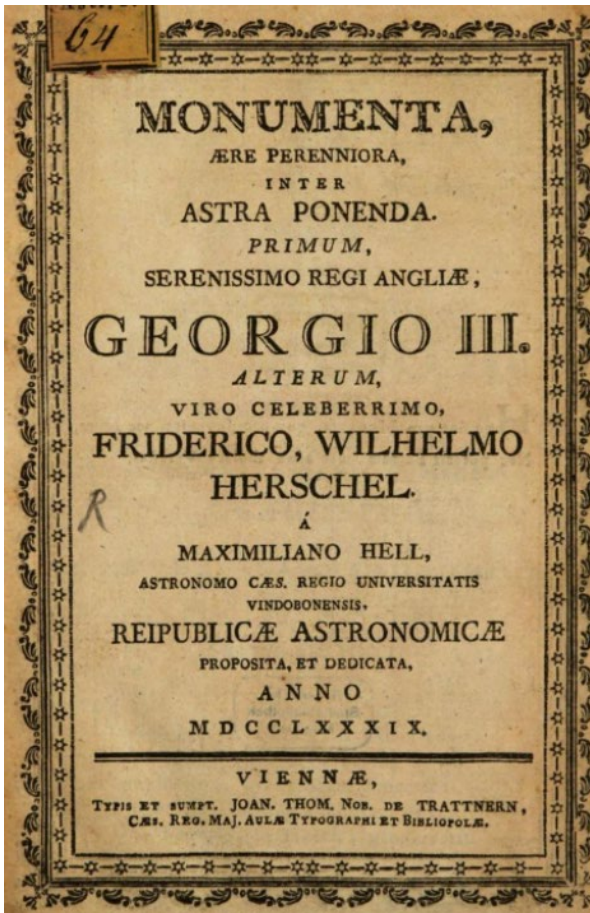
Sunt **Marium Generis** quatuor, tres foemineique (13)

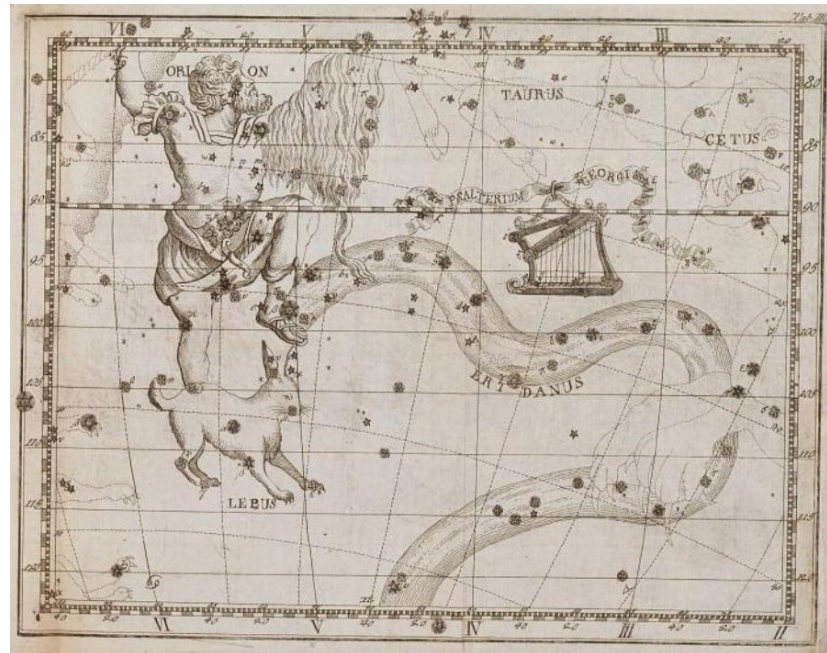
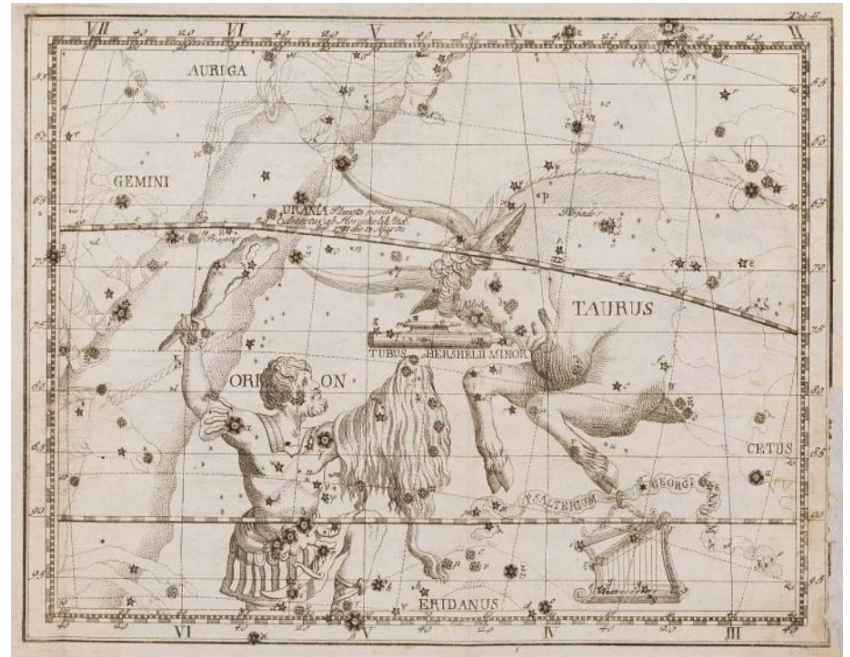
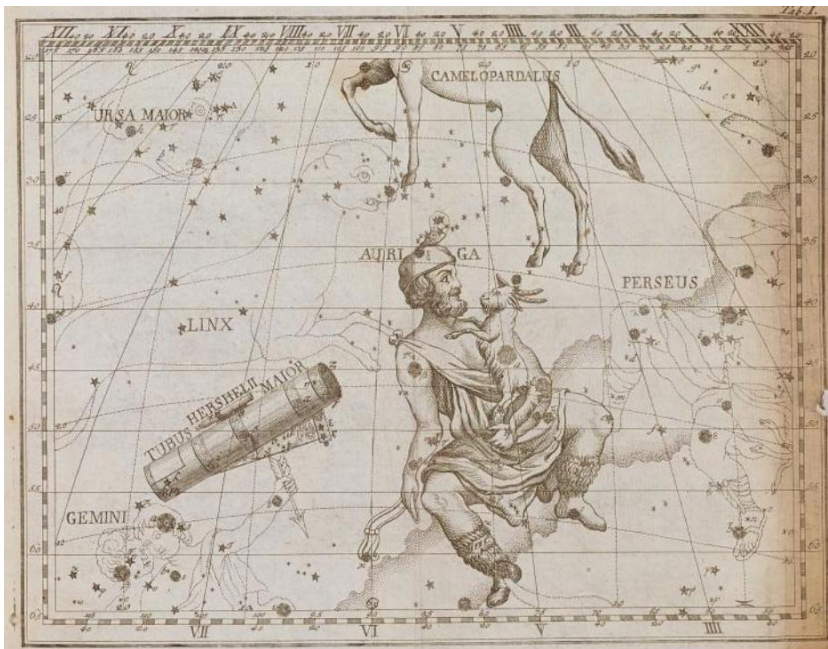
Impar est **Sexus**, congruit esse **parem**.

Sique **parem** cupitis *cælestem* (14) reddere **Sexum**,

URANUS esto **procul**, sit **Locus URANIE**.

Monumenta aere perenniora, inter astra ponenda (1789)





Historia Uraniae Musae

234 Verse (117 elegische Distichen)

Die Geschichte der Muse Urania:

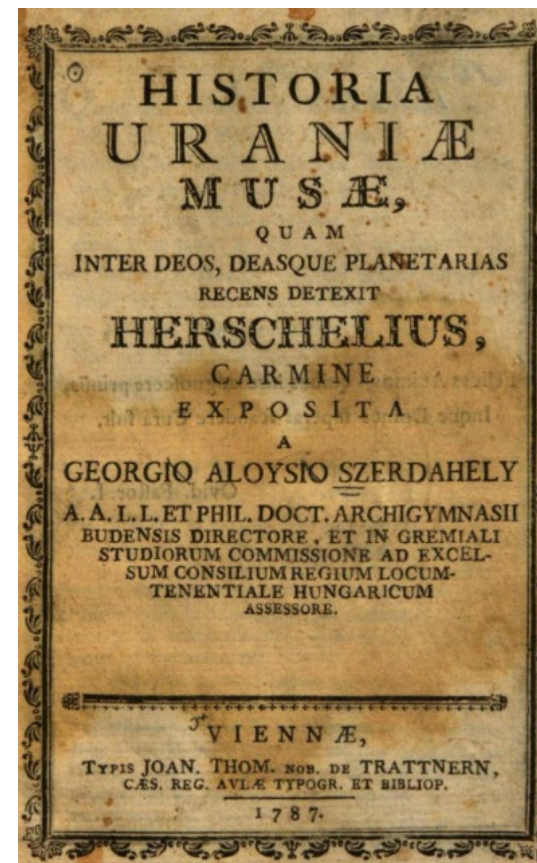
Urania beschwert sich bei Phoebus, dass sie am Himmel keinen Platz hat

Phoebus fragt Uranus, ob er ihr einen Platz zuordnen darf

Urania bekommt die Region hinter Saturn, der dadurch erbost ist

Urania muss sich zu den Fixsternen flüchten

HERSCHEL gibt ihr ihren Ort zurück, HELL ihren Namen



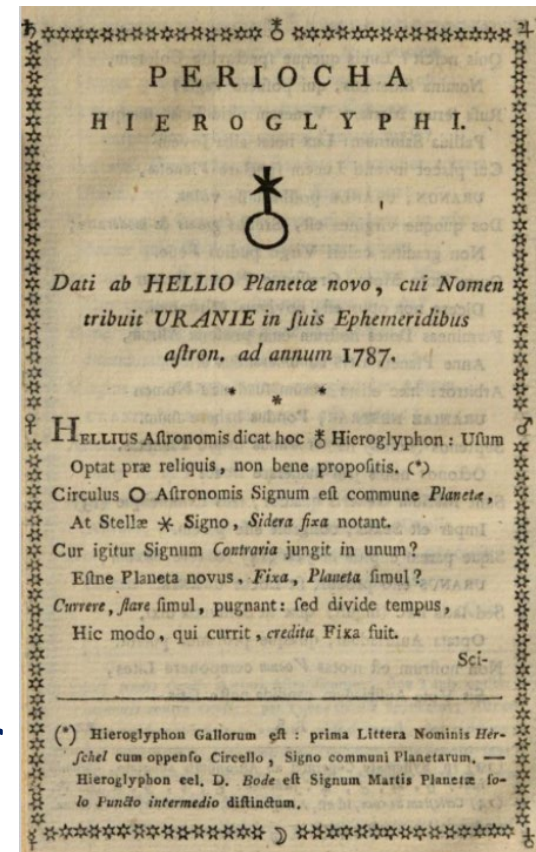
Periocha Hieroglyphi

12 Verse (6 elegische Distichen)

HELL schlängt ein Symbol für *Urania* vor
Stern = Fixstern

Kreis = Planet

Weil man Uranus zuerst für einen Fixstern hielt, dann aber erkannte, dass er ein Planet ist

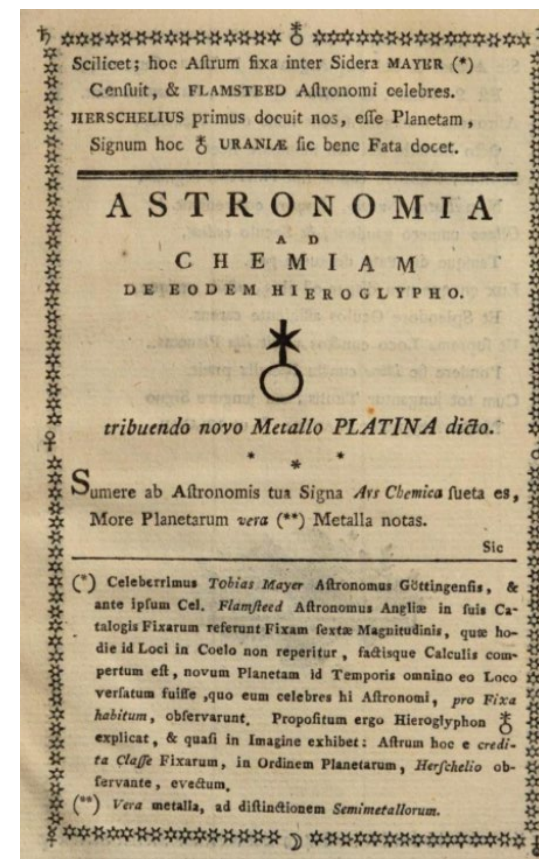


Astronomia ad Chemicam

16 Verse (8 elegische Distichen)

HELL entscheidet, welche Metall für den Planeten verwendet werden soll (Alchemie!)

Platin, weil es im 18. Jahrhundert entdeckt wurde und der Menschheit davor unbekannt bzw. sowohl der Planet als auch das Metall sind weiß



Keiner hat die Entscheidung erlebt

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ALPHABETICALLY ARRANGED.

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the small, the Page of the Preface; and the Arabic, the Page of the Book.

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APPENDIX.

On the Perturbations of Uranus. By J. C. Adams, Esq., M.A.

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Titius-Bode-Gesetz

$$d = 0,4 + 2^i * 0.3 \text{ AU}$$

Planet	i	Halbachse a	TB
Merkur	$-\infty$	0,39	0,4
Venus	0	0,72	0,7
Erde	1	1	1
Mars	2	1,52	1,6
	3		
Jupiter	4	5,2	5,2
Saturn	5	9,54	10,0
Uranus	6	19.18	19,6

Tabelle der Planeten im Sonnensystem mit zugehörigen Wert von i , der Halbachse a und dem Titius-Bode Wert TB



Ein Vorläufer...



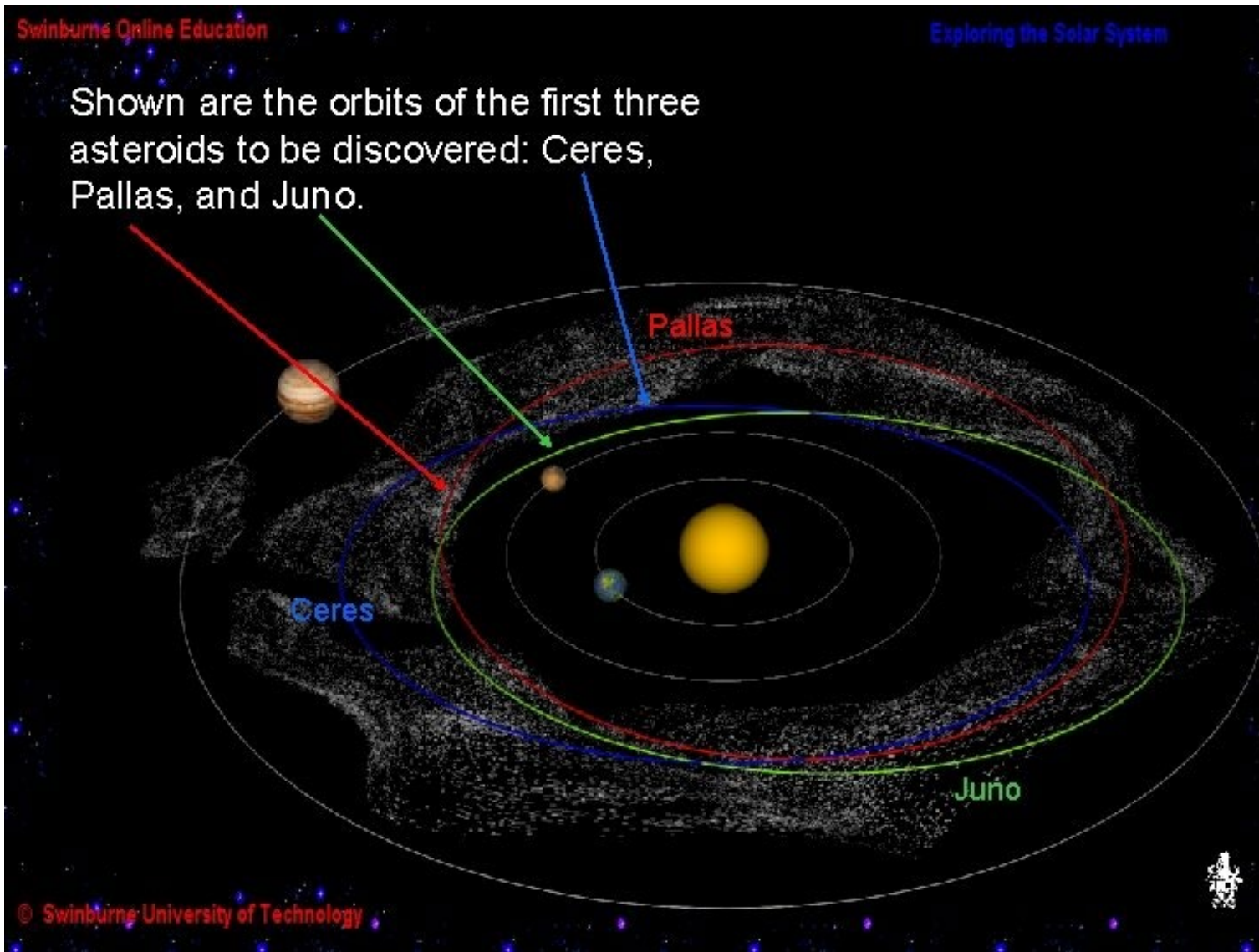
Die „Himmelpolizey“



*Franz Xaver von Zach
Herzogl. Sachsischer Major und
Hofastronom in Gotha.
geb. zu Pest in Ungarn 1754. d. 13. Jun.*

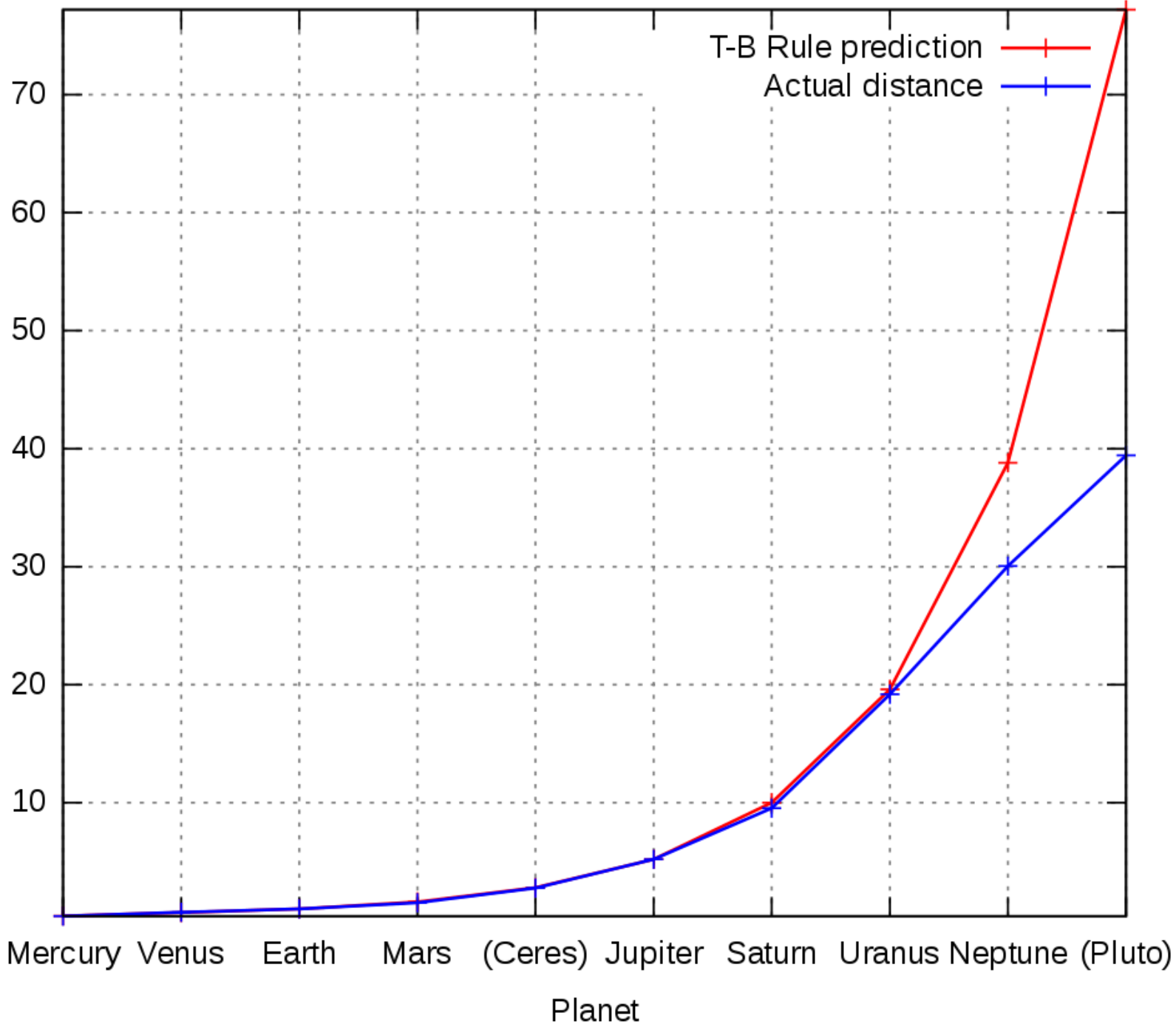


Ceres, Vesta, Juno, Pallas



P
M
V
E
M
C
Ju
Sa
U
Ne
P

Mean distance from Sun (AU)



1922 – man einigt sich auf Sternbilder

Antik: 47 (48 Ptolemäus minus Argo Navis)

Plancius: 3 (Einhorn, Giraffe, Taube)

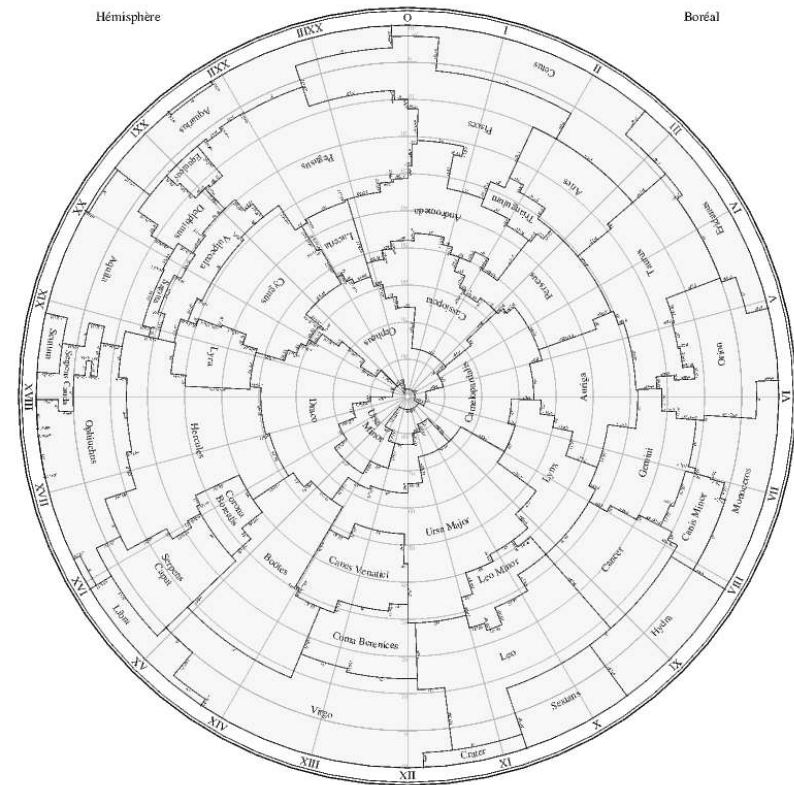
Uranometria: 14 (Chamäleon, Fliege, Fliegender Fisch, Haar der Berenike, Indianer, Kleine Wasserschlange, Kranich, Kreuz des Südens, Paradiesvogel, Pfau, Phönix, Schwertfisch, Südliches Dreieck, Tukan)

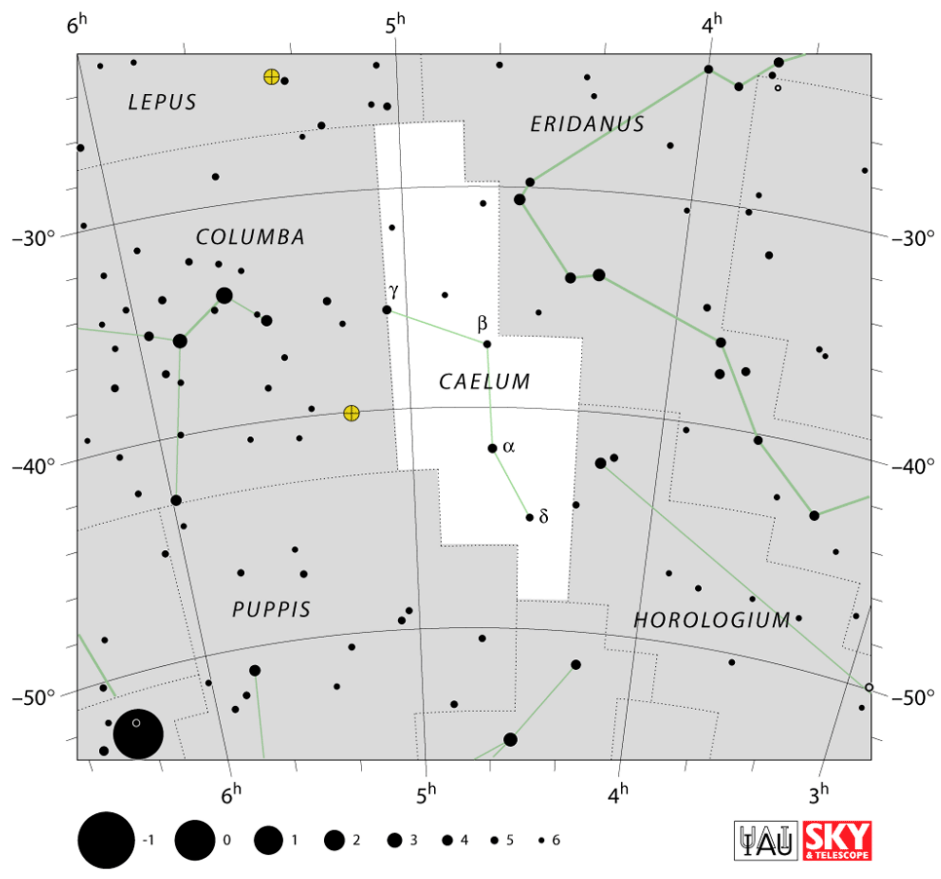
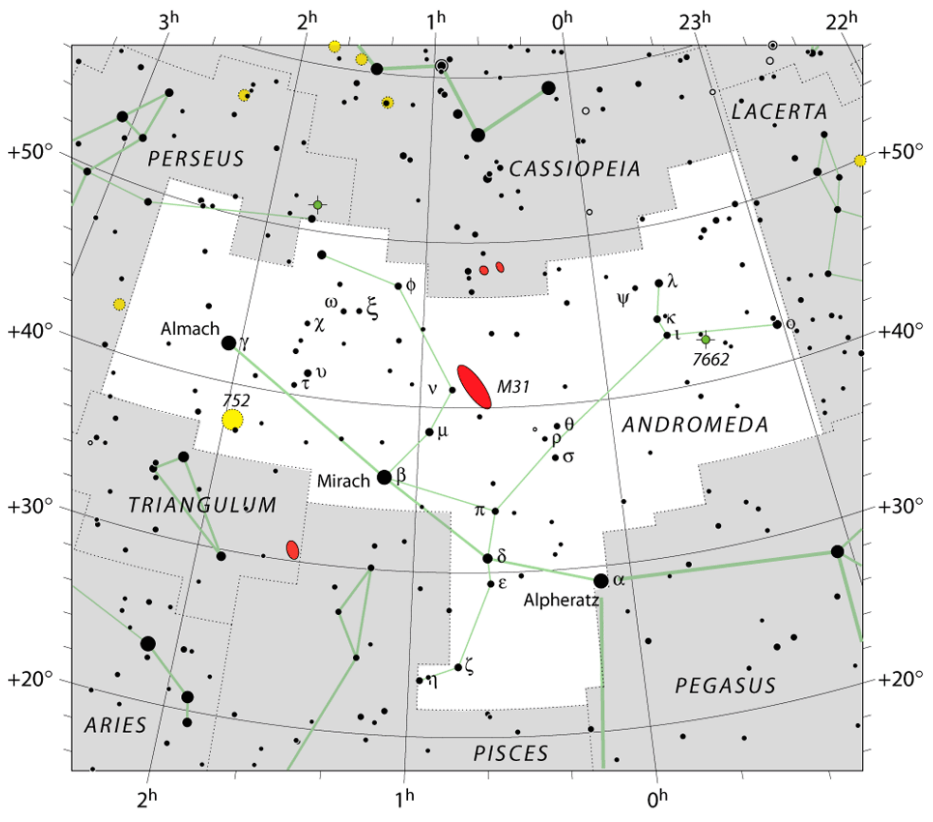
Hevelius: 7 (Eidechse, Fuchs, Jagdhunde, Kleiner Löwe, Luchs, Schild, Sextant)

Lacaille: 17 (Achterdeck, Bildhauer, Chemischer Ofen, Grabstichel, Kiel des Schiffs, Luftpumpe, Maler, Mikroskop, Netz, Oktant, Pendeluhr, Schiffskompass, Segel des Schiffs, Tafelberg, Teleskop, Winkelmaß, Zirkel)

1930 – die Grenzen werden gezogen

- Eugène Joseph Delporte
 - Entdecker von 66 Asteroiden





Die Planetennamen



RESOLUTION B5

Definition of a Planet in the Solar System

Contemporary observations are changing our understanding of planetary systems, and it is important that our nomenclature for objects reflect our current understanding. This applies, in particular, to the designation "planets". The word "planet" originally described "wanderers" that were known only as moving lights in the sky. Recent discoveries lead us to create a new definition, which we can make using currently available scientific information.

The IAU therefore resolves that planets and other bodies, except satellites, in our Solar System be defined into three distinct categories in the following way:

- (1) A planet¹ is a celestial body that
 - (a) is in orbit around the Sun,
 - (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and
 - (c) has cleared the neighbourhood around its orbit.
- (2) A "dwarf planet" is a celestial body that
 - (a) is in orbit around the Sun,
 - (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape²,
 - (c) has not cleared the neighbourhood around its orbit, and
 - (d) is not a satellite.
- (3) All other objects³, except satellites, orbiting the Sun shall be referred to collectively as "Small Solar System Bodies".

¹ The eight planets are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.