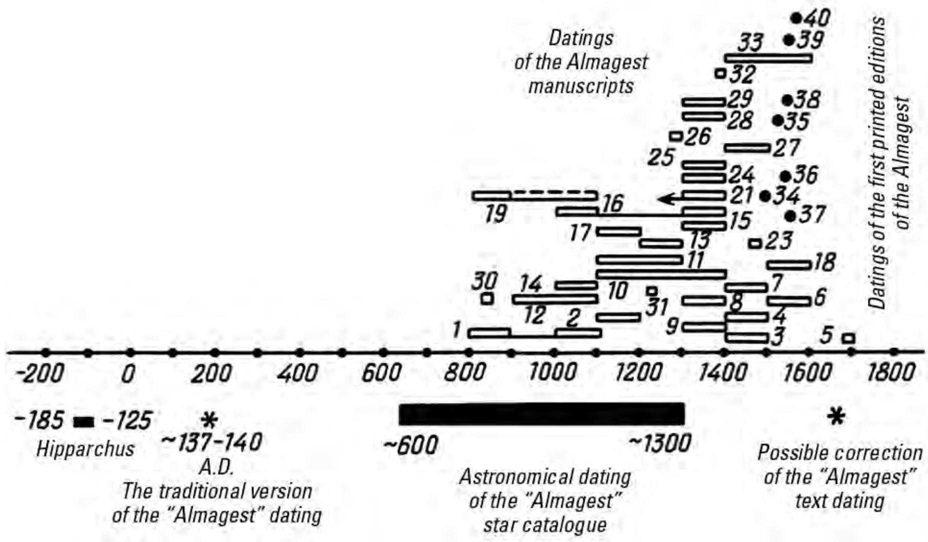


Fig. 11.14. The distribution of Scaligerian Almagest manuscript datings on the time axis. Compiled according to the materials from [1339].

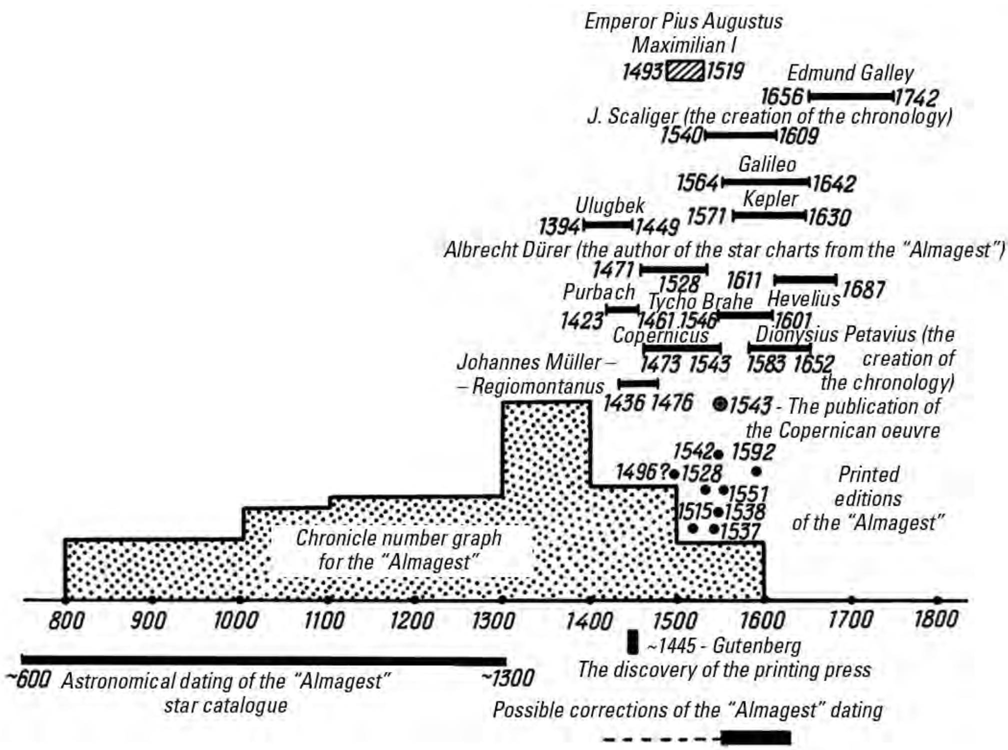


Fig. 11.15. Almagest chronicle dating distribution density graph. Compiled in accordance with the materials from [1339]. Additional chronological data related to the Almagest are also indicated.

### 4.1. Greek manuscripts of the Almagest

1) Paris Codex 2380. This manuscript (likewise text #19, qv below) is considered the oldest Almagest manuscript ([1339], page 19). Presumably, this codex was initially kept in Florence, which is whence Catherine Medici probably took it to Paris. After her death, it ended up in the library (the modern National Library). It bears the golden seal of Henry IV, allegedly regnant in 1053-1106 A.D. There is no unanimous opinion about the dating of this Almagest copy, qv below. We must particularly emphasise the following circumstance of a general nature. The dating of the Almagest manuscripts is often complicated by the fact that they seldom bear any chronological references. In this case, the seal of Henry IV can be regarded as such. We are thus brought to the issue of estimating the reign dates of Henry IV. Scaligerian history ascribes this ruler to 1053-1106 A.D. This is the very reason why the oldest manuscript copy of the Almagest is dated to the XI or the early XII century A.D. However, given the dynastic parallelism between the Holy Roman Empire of the X-XIII century and the Habsburg Empire of the XIV-XVII century as discovered by A. T. Fomenko and described in CHRON1 and CHRON2, it would be more apropos to date this Almagest manuscript to the epoch of the XV-XVI century, since "Henry IV" is but a phantom reflection of Frederick III (1440-1493). The chronological shift forward in time shall roughly equal 360 years in this case.

Nowadays the dating of manuscripts is occasionally performed with the aid of palaeography, or the "method" based on the graphical particularities of how certain letters are transcribed. It is presumed that each century can be characterised by a certain unique manner of writing letters. We shall refrain from a more in-depth analysis of this dating method, and simply point out the fact that it is very vague and arbitrary. Moreover, this "method" is wholly dependent on the Scaligerian chronology, which is used a priori. Such "palaeographic considerations" led Halma to the suggestion that the Almagest manuscript be dated to the VII or the VIII century A.D. Nevertheless, consensual Scaligerian history agrees to date the manuscript in question to the IX century – also on the basis of "palaeographic considerations", as it turns out. This dating is discussed in [1339], page 19. Let us mark both dates in our diagram – the IX century A.D., according to the palaeographic hypothesis, and the XI-XII century A.D. (judging by the seal of Henry IV).

Let us reiterate that our reconstruction implies the correct dating to pertain to the epoch of the XV-XVI century.

As we proceed with the descriptions of the other manuscripts, we feel obliged to state that [1339] most unfortunately fails to discuss the principles of dating manuscripts to one century or another. Most of the information that does actually concern dating once again happens to be of a palaeographic nature. Therefore, for the most part, we shall formally indicate the presumed dating of the manuscript in question accepted as consensual in Scaligerian history. Most Scaligerian datings are accompanied by the word "approximate" in [1339], which once again reveals the sheer complexity of the issue.

2) Paris Codex 2390. Approximately dating from the alleged XII century A.D.

3) Paris Codex 2391. Approximately the alleged XV century A.D.

4) Paris Codex 2392. Approximately the alleged XV century A.D. Incomplete text, a very poor copy.

5) Paris Codex 2394. Copy made in 1733.

6) Vienna Codex 14. Approximately the alleged XVI century A.D.

7) Venice Codex 302. Approximately the alleged XV century A.D.

8) Venice Codex 303. Approximately the alleged XIV century A.D.

9) Venice Codex 310. Approximately the alleged XIV century A.D.

10) Venice Codex 311. Zanetti's catalogue dates it to approximately the XII century A.D. However, Peters is of the opinion that the dating must be replaced by a substantially more recent one. According to Morelli, this manuscript is a later copy of Venice Codex 313, which is approximately dated to the alleged X or XI century A.D., or even a copy of Venice Codex 303, dated to circa the alleged XIV century A.D. ([1339]). Once again, this example demonstrates the ambiguity of the Scaligerian manuscript datings.

Having summarised all the above opinions, we come up with the following interval of Scaligerian datings: between the alleged XII and XIV century A.D.

11) Venice Codex 312. Zanetti suggests the XII

century A.D. as the approximate dating, and Morelli – the XIII century A.D.

12) Venice Codex 313. Zanetti's approximate dating is the X century A.D., whereas Morelli suggests the XI century.

13) Laurentian Codex. Pluteus 28, 1. Approximately the alleged XIII century A.D.

14) Laurentian Codex. Pluteus 28, 39. Approximately the alleged XI century A.D. However, it only contains Books VII and VIII.

15) Laurentian Codex. Pluteus 28, 47. Approximately the alleged XIV century A.D.

16) Laurentian Codex. Pluteus 89, 48. Approximately the alleged XI century A.D. An excellently written manuscript – however, it has got a lot in common with Venice Codex 310, which is dated to the alleged XIV century A.D.

17) Vatican Codex 1038. Approximately the alleged XII century A.D.

18) Vatican Codex 1046. Approximately the alleged XVI century A.D.

19) Vatican Codex 1594. Dated to the alleged IX century A.D. This is the best Greek manuscript of the Almagest. Unfortunately, [1339] does not mention the reason for this particular dating. It is however pointed out that the manuscript in question has common characteristics with Venice Codex 313, "which testifies that they share a common background" ([1339], page 21). However, the manuscript of Venice Codex 313 is dated to either the X or the XI century A.D., qv above.

20) Vatican Codex, Req. 90. According to Peters and Knobel, "this codex isn't likely to be very old" ([1339], page 21). However, they fail to provide its dating for some reason, which is why we cannot put it on our chronological map.

21) Bodleian Codex 3374. Allegedly predating the XIV century A.D. A perfect copy, beautifully written, sans variants.

### 4.2. Latin manuscripts of the Almagest

22) Vienna Codex 24 (Trebizond). An excellent codex under the title of "Magnae compositionis Claudii Ptolemae i libri a Georgio Trapezuntio traducti". It is believed to be a Latin translation of a Greek manuscript. Trebizond's translation was used for the Almagest edition dating from the alleged year 1528. At the end of the codex we see the legend "Finis 17 Marcii, 1467", which stands for "finished on 17 March 1467".

23) Laurentian Codex 6. Dated to the interval between the alleged years 1471 and 1484 A.D. Believed to be a translation from the Greek. The writing is meticulous and clear.

24) Laurentian Codex 45. Approximately dated to the alleged XIV century A.D. A beautifully written manuscript that contains many variants. This manuscript is believed to be a copy of a translation from the Arabic, likewise the next three.

25) The British Museum Codex. Burney 275. Dates from circa the alleged XIV century A.D. Believed to be a translation of the Arabic. This is an excellent copy of the Almagest, beautifully written.

26) The British Museum Codex. Sloane 2795. Considered a translation from the Arabic. Approximately dated to 1300 A.D. according to Thompson, and unlikely to predate 1272 A.D. Written well enough, but with numerous errata.

27) Crawford Codex. Roughly dated to the alleged XV century A.D. An excellent manuscript (presumably translated from the Arabic).

28) New College, Oxford No 281. A rather imperfect copy of the translation made by Gerard of Cremona, which permits to date it to the XIV century A.D. the earliest.

29) All Souls College, Oxford No 95. Once again, a translation of Gerard of Cremona; however, some of the books have been omitted. Unlikely to predate the alleged XIV century A.D.

### 4.3. Arabic manuscripts of the Almagest

30) Laurentian Codex 156. A very meticulously written manuscript. Believed to be a copy of the translation made by al-Mamon around the alleged year 827 A.D.

31) British Museum 7475. This copy of the Almagest is incomplete. It is dated to year 615 of Hijrah, which yields the alleged year 1218 A.D. in accordance with the consensual conversion of Hijrah (Hejira, Hegira etc) dates into A.D. equivalents. Many longitudes and latitudes are at odds with other manuscript (!).

32) Bodleian Arabic Almagest, Pocock 369. Dates

from the year 799 of Hijrah, or the alleged year 1396 A.D. A well-written copy.

33) British Museum Arabic Manuscript, Reg. 16, A. VIII. A beautiful manuscript approximately dated to the alleged XV or XVI century A.D.

We shall depict the Scaligerian datings of all the Almagest manuscripts mentioned above as white intervals in our chronological diagram (fig. 11.14), which correspond to the temporal limits of a given manuscript's possible dating. For instance, the interval that begins in 1272 and ends in 1300 corresponds to the interval of possible datings for Manuscript 26. If we only know the alleged century that the dating in question is ascribed to, the corresponding white interval on our diagram shall cover the entire century in question.

Now let us list the first printed editions of the Almagest. In order to avoid confusing their datings with those of the manuscripts in the diagram, we shall mark them with black dots, accompanied by their numbers in our list.

## 4.4. The first printed editions of the Almagest

Let us cite some data concerning the first editions of the Almagest that N. A. Morozov gathered from the book archive of the Pulkovo Observatory ([544], Volume 4).

34) Joannis de Monte Regio et Georgii Purbacho Epitome in Cl. Ptolemaei magnam compositionem. Venice, allegedly 1496 (?).

This is what Morozov observes about this edition: "There is, for example, a printed book by John Regiomontanus and George Purbach entitled 'A Brief Version of the Magnum Opus of Claudius Ptolemy', which bears the legend 'Venice, 1496', if my sources are correct" ([544], Volume 4, pages 218-219). According to the information available to the authors of the present book, this edition only contains the text of the Almagest and no tables, which means it doesn't include the star catalogue. See also [544], Volume 4, pages 195-196.

35) Almagestu Cl. Ptolemaei Phelusiensis Alexandrini. Anno Virginei Partus 1515 ([544], Volume 4, pages 195-196). This Latin edition was published by Liechtenstein in Venice in 1515. Bailey ([1024]) believes it to be translated from the Arabic, unlike the 1537 edition, which he considers a translation from the Greek. The edition dating from the alleged year 1515 is exceptionally rare – according to Bailey, Laland saw this book, which had existed as a single copy kept by the Royal Astronomical Society in London. N. A. Morozov reports that it was also part of the Pulkovo Observatory collection.

36) Claudii Ptolemae I Phelusiensis Alexandrini. Anno Salutis, allegedly 1528, Venice, translated by Trebizond. A copy is kept in the archives of the Pulkovo Observatory. We have studied the star catalogue of this edition alongside the catalogue cited by Peters and Knobel in [1339]. The results that we got from the edition of 1528 coincide with the results of our analysis of the catalogue contained in [1339].

The two most famous editions of the Almagest are as follows: the Cologne edition of the alleged year 1537 (Latin), and the Basel edition of the alleged year 1538 (Greek).

37) The Latin edition allegedly dating from 1537: Cl. Ptolemae i. Pheludiensis Alexandrini philosophi et mathematici excellentissimi Phaenomena, stellarum MXII. Fixarum ad hancae tatem reducta, atque seorsum in studiosorum gratiam.

Nunc primum edita, Interprete Georgio Trapezuntio.

Adiecta est isagoge Ioannis Noviomagi ad stellarum inerrantium longitudines ac latitudines, cui etiam accessere Imagines sphaerae barbaricae duodequinquaginta Alberti Dureri. Excusum Coloniae Agrippinae [presumably identified as the modern city of Cologne – Auth.], Anno M. D. XXXVII, octavo Calendas Septembres.

38) The Greek edition of the alleged year 1538: Κλ Πτολεμαΐου Μεγάλης Σύνταξεως Βίβλ. ΙΓ. Θεώνος Ἀλεξανδρεώς εΐς τά αΰτά ύπομνηατών Βίβλ. ΙΑ. (Claudii Ptolemaei Magnae Constructionis, id est perfectae coelestium motuum pertractationis Lib. XIII. Theonis Alexandrini in eosdem Commentariorum Libri XI. Basileae [Basel – Auth.] apud Ioannem Walderum An. 1538. C. puv. Caes. Ad Quinquennium.)

39) The second Latin translation of the edition dating from the alleged year 1542 ([544], Volume 4, pages 195-196).

40) The third Latin translation of the edition dating from the alleged year 1551 ([544], Volume 4, pages 195-196).

41) Claudii Ptolemaei inerrantium stellarum Apparitiones, et significationum collectio. Federico Bonaventura interprete. Urbini 1592.

Let us now mark the interval between 600 A.D. and 1300 A.D. on our chronological diagram (fig. 11.15) – the astronomical dating of the Almagest star catalogue that conforms to our results pertains thereto. It is very obvious that the interval in question concurs well with the sum total of the datings of the surviving Almagest manuscripts and the first printed editions of the work in question. The very multitude of manuscripts, especially from the XIV century onwards, might indicate that the Almagest was created during that epoch, and instantly started to propagate as an important scientific oeuvre regarded as an actual scientific textbook and not a vestige of the history of astronomy. It was a collection of methods applicable to the solution of actual astronomical, navigational and likewise problems. Such concurrence between our astronomical dating and the independent information concerning the distribution of the surviving Almagest manuscripts' datings seems to be the furthest thing from a chance coincidence to us.

Basically, it turns out that the Almagest did not lie as a dead weight for many centuries that are presumed to have passed between the beginning of the New Era and the Renaissance epoch. On the contrary, its creation was immediately followed by its introduction into scientific circulation – there were many copies and lots of commentaries; finally, the first large-scale printed editions came out in the XVI-XVII century A.D. Let us note that handwritten books by no means became an anachronism after the invention of the printing press (see CHRON1, Chapter 1:12 for more details). Scribes and copyists kept on making copies of manuscripts for decades to follow – sometimes even copying printed editions. This is very easy to explain – in the very beginning, handwritten copies of manuscripts were cheaper to manufacture than printed versions. The production of handwritten copies ground to a halt only when the prices of printed books got sufficiently low. It is therefore possible, that some of the Almagest manuscripts considered very old today (predating the epoch of the printing press, in other words, and thus presumably created between the X and the middle of the XV century A.D.) may have been written as late as in the XVII-XVIII century A.D.

It would be apropos to cite a number of known facts here, which clearly demonstrate that the handwritten book survived the early days of printing by a long while. See [740], pages 19-25, for more details.

The library of John Dee, an English mathematician and astrologer of the XVI century, contained 3000 handwritten books (amounting to 4000 copies in total, qv in [740], page 56). That is, the majority of the books in Dee's collection were handwritten.

The scribes of the Greek monasteries attained a special renown – and that already in the epoch of printing. An important detail is that many such copies were made from printed books ([740], page 120).

## 4.5. Questions concerning the Scaligerian datings of the Almagest manuscripts

Let us revert to the description of tables in figs. 11.14 and 11.15. Fig. 11.15 contains graphical representations of auxiliary data useful for the reconstruction of the correct Almagest chronology.

*Johannes Müller (Regiomontanus),* the alleged years 1436-1476.

*Copernicus,* the alleged years 1473-1543. His book "On the Revolutions of the Celestial Spheres" was published in the alleged year of 1543, being the immediate heir of the scientific tradition of the Almagest, whose handwritten and printed copies become abundant in the epoch of Copernicus.

*Tycho Brahe* (1546-1601).

*Purbach (Peuerbach),* the alleged years 1423-1461.

*Albrecht Dürer,* the author of the star charts included in the first editions of the Almagest – the alleged years 1471-1528.

*Ulugbek,* the alleged years 1394-1449.

*Kepler,* 1571-1630.

*Galileo,* 1564-1642.

*Edmond Halley,* 1656-1742. Believed to have discovered proper star motions in 1718.

*Johannes Hevelius,* 1611-1687.

Roman emperor *Pius Augustus Maximilian I,* 1493-1519. His portrait is reproduced in fig. 11.13. Let us remind the reader that, according to the Scaligerian version, Ptolemy's Almagest was written in the reign of the "ancient" Roman emperor Antoninus Pius Augustus (the alleged years 138-161 A.D.).

*Joseph Scaliger,* the creator of the consensual chronology of the antiquity, 1540-1609. His fundamental work on chronology was published in 1583 ([1387]).

*Dionysius Petavius,* Scaliger's follower – another author of the modern version of the ancient chronology (1583-1652). His oeuvres on chronology can be found in [1337] and [1338].

*Johannes Gutenberg,* the inventor of the printing press (circa the alleged year 1445 A.D.)

Let us conclude by going back to the problem of dating the Almagest manuscripts. We have already noted that their Scaligerian dating is based on palaeography for the most part. Even if we disregard the general vagueness of this method, it is compromised additionally by the known fact that the manufacture of handwritten book copies continued well into the printing epoch (the XV-XVIII century). It is also possible that some XVII-XIX patrons of the arts could specifically order the manufacture of manuscripts that would look "ancient" from the point of view of handwriting, artwork etc. A revision of datings ascribed to the surviving manuscripts of the Almagest would be extremely useful in this respect. The following issues would have to be addressed in the course of this work.

1) The location of the manuscript (archive, museum, private collection etc).

2) The history of the manuscript's discovery, the year it can be traced back to, the identity of the discoverer and the discovery circumstances (as well as the availability of documents describing the latter).

3) The dating of the manuscript. The identity of the party responsible for the very first dating, and their motivations. Is the dating in question unique and unambiguous? Are there other versions? In mathematical terms – how many solutions does the problem of a given manuscript's dating have?

4) Given that the author claims to have written the book in the reign of "Emperor Pius", it would be expedient to learn the exact identity of this Pius character. Is he likely to be identified as the famous Pius Augustus Maximilian, the Roman emperor of the XV-XVI century A.D.?

5) One must also bear in mind that most ancient names can be translated – Pius, for instance, stands for "pious" ([237], page 773), which means that the text in question was written in the reign of some emperor renowned for piety. It is obvious that the scribes could give such monikers to a great many different rulers of different lands. The lack of an unambiguous solution leads to a perfectly arbitrary choice of dating.

6) Sometimes we encounter considerations of the following type: "Such-and-such astronomer refers to Ptolemy; ergo, Ptolemy lived earlier than Such-and-such". This is a very controversial claim. First of all, we must find out which Ptolemy the astronomer in question referred to. Apart from that, the name "Ptolemy" can also be translated, which gives us even more options for identifying this character as an actual historical figure and more epochs to date his lifetime to.

7) Another postulation one often hears is as follows: "Such-and-such astronomer reports having read Ptolemy's Almagest; therefore, the Almagest was written before the epoch of this astronomer".

This conclusion is also ambiguous. It would make sense to enquire about the exact version of the Almagest referred to by this hypothetical astronomer. How does one prove that the text in question was the same that we know under the name of the Almagest today? After all, it is very possible that the ancient original was heavily edited in the early XVII century, say, and that the work that we know as the "Almagest" today differs a lot from what the astronomer in question read in the XV century, for instance.

Another question that one might ask is as follows: when did this hypothetical astronomer of ours actually live? Could it be the XVI-XVII century, and not the XV?

One mustn't regard any of the above as an extraneous cavil – on the contrary, the only way of providing the datings with a more or less reliable foundation is to answer each and every one of those questions. Otherwise, each date will do little more but reflect the subjective opinion of a single researcher. In general, it would be expedient to locate the original source of every Scaligerian dating and provide the "table of Scaligerian dates" with such commentaries as "the event in question took place in year X … according to such-and-such mediaeval chronologist". By naming the author of each and every "ancient" date in each and every case, we can finally reconstruct the original sources that the Scaligerian version relies on and make the dates available for objective verification.

## 5. SO WHAT IS THE ALMAGEST, ANYWAY?

It must be said that the name "Ptolemy's Almagest" is used for referring to a host of manuscripts and printed editions, some of which differ from each other quite substantially.

For example, some of the versions omit the star catalogue, or certain other parts of the Almagest (there are many examples of such discrepancies in [1339]).

The consensual opinion of today's scientists is that all these handwritten and printed versions can be traced back to a common "ancient original", which "was naturally lost" – and "a long time ago", at that.

However, the discrepancies between different versions (handwritten and printed) go far beyond the regular "scribe errata".

The text and the composition of the book can also differ from one another greatly.

We have discussed one of such cases at length above – there are substantial differences between the editions of 1537 and 1538. The longitudes of all the stars in the catalogue differ by 20 degrees, no less.

One gets the impression that "Ptolemy's Almagest" was the trademark name of all the oeuvres published by a whole school of mediaeval astronomers. Our idea is that the version of the Almagest that has reached us is not the original work of a single author, who is also to be credited with all the observations, but rather a collective "mediaeval astronomy textbook", containing a revision of results obtained from the research of a prominent mediaeval school of astronomy.

The authors and the editors of the Almagest may have gathered together a plethora of individual observation results, as well as theories, calculations and "chronological exercises", all of them contributed by different astronomers who might have been decades apart from one another chronologically. In particular, the Almagest star catalogue could have been compiled by a single observer in the epoch of the X-XIII century, whereas the final text of the Almagest was written and edited by other people in the XVI-XVII century.

## 6. ODDITIES IN THE DEVELOPMENT OF THE ASTRONOMICAL SCIENCE AS PORTRAYED IN THE "SCALIGERIAN TEXTBOOK"

### 6.1. The efflorescence of the so-called "ancient astronomy"

According to the history of astronomy in its Scaligerian version, many great astronomical discoveries were made by "the ancients". Let us name a few of them briefly. It is presumed that some textbook on navigational astronomy existed in the "ancient" Greece, which was compiled in the beginning of the alleged VI century B.C. – most probably, by Thales of Miletus, who lived in the alleged years 624-547 B.C. ([395], page 13). Already in the alleged IV century B.C. Theophrastus of Athens, an ancient Greek philosopher and natural scientist, observed solar spots ([395], page 14). Methon, born around the alleged year 460 B.C., made the discovery that 19 years are almost exactly equal to 235 lunar months. The discrepancy is indeed smaller than 24 hours. Almost a century later, Calippus introduced a minor correction into Methon's formula ([65], pages 34-35).

"There is a great shortage of definitive information concerning the life of Pythagoras. He was born in the beginning of the VI century B.C. and died at the end of the same century or the beginning of the next one" ([65], page 36). Pythagoras claimed that the Earth, likewise other celestial objects, had the shape of a sphere and was floating among other luminaries without any support. "Greek philosophers have remained convinced about the spherical shape of the Earth ever since Pythagoras" ([65], pages 36-37).

A detailed cosmology based on the Pythagorean concepts was devised by Philolaus, who lived in the alleged years 470-399 B.C. He opined that the centre of the world wasn't earthen, but rather had the nature of a central fire, and that the Earth, the Moon, the Sun, the planets and the celestial sphere revolved around it. The Earth was also said to revolve around its own axis apart from that in such a manner that no observer could see the central fire at any one moment ([395], page 23). "Philolaus claimed that the distances between the central fire and various celestial bodies grew in geometric progression, each next luminary located at three times the distance between itself and the previous luminary. Had he claimed the distance to be double, not triple, he would have anticipated the rule of Titius-Bode by more than two thousand years" ([395], page 31).

Already in the alleged VI century B.C. Hycetes the Pythagorean voiced the idea that the earth, located at the centre of the world, makes a full revolution around its central axis over the course of a day. The philosopher Heraclides Ponticus, who lived in the alleged years 390-310 B.C., claimed that the planets Venus and Mercury revolved around the Sun and also around the Earth ([395], page 24). "Later authors name three other Pythagoreans who believed in the motion of the Earth – namely, Hycetes, Heraclitus and Ecthantes, who lived in the late VI and the V century B.C." ([65], page 38).

Democritus, who is believed to have lived in the alleged years 460-370 B.C., claimed that the Universe consisted of an infinite variety of worlds, which had come into existence as a result of collision between atoms. All these worlds had different sizes – some lacked the Moon and the Sun, others sported luminaries of a larger size, and others still would have a different number of luminaries. Certain worlds would have no water, animals, or plants. Some of the worlds would thus be nascent, others in their prime, and more still in the phase of destruction. "Democritus made a number of amazing guesses, which were confirmed centuries later. In particular, he claimed that the size of the Sun was several orders greater than that of the Earth, that the Moon shone with reflected sunlight and that the Milky Way was an agglomeration of a great many stars" ([395], page 25).

Plato, whose lifetime is dated to the alleged years 428-347 B.C., didn't write any oeuvres of a purely astronomical nature. In particular, he was of the opinion that the centre of the Universe was not the Earth, but rather a more perfect body ([65], page 38). In particular, Plato describes celestial bodies in the order of their remoteness. He believed this order to be as follows: the Moon, the Sun, Mercury, Venus, Mars, Jupiter, Saturn and the stars.

Eudoxes, Plato's apprentice who lived in the alleged years 408-355 B.C., "placed" the immobile Earth at the centre of the universe. Obviously, the Earth was considered spherical. Furthermore, he made the assumption that the motion of each planet was regulated by several concentric spheres ([395], page 27). A complex theory of these spheres was constructed as a result; in particular, Eudoxes aimed to explain the planetary declinations from the ecliptic and their retrograde motion. He managed to explain all visible planetary motion as caused by the rotation of 27 spheres.

Aristotle, who lived in the alleged years 384-322 B.C., claimed that the planets were further away from the Earth than the Sun and the Moon, and that the distance between the Earth and the celestial sphere was nine times greater than the distance between the Earth and the Sun at the very least" ([395], page 30). "Aristotle considered the issue of telluric and lunar shape in the most serious manner, approaching it from every possible angle. He used the above argumentation (concerning the phases of the Moon, the shape of the Earth's shadow etc) to prove both the Earth and the Moon to be spherical" ([395], page 30). Aristotle was familiar with the theories of other scientists about the Earth revolving around the Sun accompanied by other planets as opposed to the Earth being immobile and the Sun revolving around it. However, he came up with the following counter-argumentation. If the Earth were indeed mobile, this motion would cause regular changes of angular distances between two arbitrarily chosen pairs of stars, which wasn't observed by any astronomer known to him ([395], page 30). This consideration is perfectly valid, since it is associated with the real effect of parallax stellar motion. The ancient astronomers could not have observed it due to the extremely small shift rates. "The annual parallax motion of stars was discovered a whole 2150 years after Aristotle" ([395], page 30).

The astronomers of the Alexandria school mentioned most frequently are Aristarchus of Samos, Aristyllus and Timocharis – all of them near-contemporaries from the first half of the alleged III century B.C. ([65], page 44).

It turns out that "the ancients" had "a Copernicus of their very own" ([127]). This part was played by Aristarchus of Samos, who is presumed to have lived in 310-250 B.C. He was struck by the realisation that certain measurements and calculations made it possible to estimate the distances between the objects of the Sun – Earth – Moon system. This theory was implemented in his oeuvre "On the Size and Distance of the Sun and the Moon". His basic postulations are as follows.

1) The Moon borrows its light from the Sun.

2) The Sun is the central point in relation to the lunar sphere.

3) When we see the Moon as divided in two, the larger circle that separates the light half from the dark half pertains to the plane that comprises our line of eyesight.

4) When we see the Moon as divided in two, its distance from the Sun is less than a quarter of the circumference with a thirtieth part of this circumference subtracted.

5) The width of the Earth's shadow covers two Moons.

6) The Moon occupies a fifteenth part of a given Zodiacal sign.

Apparently, "the oeuvre in question was the first work in the history of astronomy that estimated the distances between various celestial bodies as a result of observation. However, the actual results of these calculations left a lot to be desired in terms of precision" ([395], page 33). Nevertheless, "apparently, these calculations eventually led him to the conclusion that the Sun, being a large body, is located at the centre of the world, with the Earth and other planets revolving around it" ([395], page 33).

This is what Archimedes, who lived in the alleged years 287-212 B.C., wrote about this heliocentric cosmology: "Aristarchus of Samos … comes to the conclusion that the size of the world is much greater than it has been stated above. He opines that the immobile stars and the Sun do not alter their positions in space, that the Earth moves around the Sun in a circular trajectory, and that the centre of the stellar sphere coincides with that of the Sun, whereas its size is so great that the circumference he believes to be the trajectory of the Earth is in the same proportion to the distance of the immobile stars as the centre of the sphere is to its surface" ([395], page 34).

This viewpoint is virtually identical to Copernican – in reality, what we hear is the voice of the scientists who lived in the XVI-XVII century A.D. Furthermore, it is believed that the "ancient" Aristarchus was aware of the true value of the Moon's angular diameter.

Aristotle had conducted measurements of the Earth as a sphere. The size of the Earth was subsequently calculated with greater precision by Eratosthenes, who lived in the alleged years 276-194 B.C. It is believed that the error made by Eratosthenes equalled a mere 1.3%. Another assumption is that Eratosthenes had calculated the angle between the ecliptic and the equator, which he claimed to equal 23° 51'. It is noteworthy that Ptolemy's Almagest refers to this very value (see Chapter 8 of the present book). As we have already pointed out, this value of the ecliptic declination angle permits a more precise estimation of the possible Almagest compilation date.

S. V. Zhitomirskiy performed a reconstruction of the cosmological model devised by the "ancient" Archimedes in [280], using the numeric data provided by the latter as the basis. According to I. A. Klimishin, "the reader is confronted by an elegant geo/heliocentric cosmological model where Mercury, Venus and Mars revolve around the Sun, which accompanies them in their rotation around the Earth, likewise Jupiter and Saturn. The relative radius values of Mercury, Venus and Mars are in good enough correspondence with their true values" ([395], page 38). Archimedes created an "autonomously mobile instrument" – the mechanical "celestial globe" used for demonstrating the visibility conditions of the luminaries as well as solar and lunar eclipses. All this research is most likely to date from the XV-XVI century in reality, transposed into ages immemorial by Scaligerian chronology.

The "ancient" Cicero pointed out that "the solid sphere without cavities was invented a long time ago; the first such sphere was made by Thales of Miletus, and the next one – by Eudoxus of Cnidus, named as Plato's apprentice, who drew the celestial positions of the stars and constellations upon it … Many years later, Aratus … wrote verses about the construction of this sphere and the position of the luminaries upon it, which he had borrowed from Eudoxus … The invention of Archimedes is amazing by the very fact that he devised a method of preserving the heterogeneous trajectories of different motions resulting from a single revolution. Whenever Gallus would set this bronze sphere in motion, the Moon changed positions with the Sun for as many times as it did in the sky, which would lead to similar eclipses taking place in the sky of the sphere, with the Moon obscured by the shadow of the Earth" ([948], page 14).

A similar cosmosphere is said to have been constructed by Posidonius, already after Archimedes. According to Cicero, "if somebody took the sphere (sphaera) that our friend Posidonius has made recently to Scythia or Britain, with its individual rotations reproducing the motions of the Sun, the Moon and the five planets on different days and nights, would any denizen of these barbaric countries doubt this sphere to be a creation of the perfect mind?" ([951], page 129).

One cannot help recollecting the epoch of the XVI-XVII century, when Tycho Brahe was one of the first to construct the famous cosmosphere, which his contemporaries believed to be a miracle of science and art. Therefore, the "ancient" Cicero is most likely to have written his oeuvres in the XV-XVII century A.D., describing the spectacular achievements of his contemporaries.

Nowadays it is believed that one of the greatest merits of Greek astronomy was the development of a mathematical point of view on celestial phenomena. The spheres of rotation were introduced, as well as related elements of spherical geometry and trigonometry etc. "Several minor tractates and reference books have survived until our day, written during the Alexandrian period for the most part and concerned with the above mentioned scientific discipline (known as spherics, or the science of the spheres); an excellent example of such an oeuvre is the "Phaenomena" of the famous geometrician Euclid (circa 300 B.C.)" ([65], page 46). Apollonius of Perga, who lived in the second part of the III century B.C., is to be credited with the discovery that the motions of the celestial objects can be represented by a combination of even circular motions with much greater ease than the rotating spheres of Eudoxus and his school could ever allow ([65], page 49).

The consensual opinion is that the "ancient" astronomy started to transform into a natural science owing to the labours of Hipparchus, whose lifetime is dated to the alleged years 185-125 B.C. "Hipparchus was the first one to conduct systematic astronomical observations and perform an exhaustive mathematical analysis of the resulting data. He has developed the theory of solar and lunar motion as well as the method of forecasting eclipses with the tolerance margin of 1-2 hours, also laying down the foundations of spherical astronomy and trigonometry" ([395], page 43). Hipparchus has introduced the distinction between the stellar year and the tropical year, and discovered the phenomenon of precession – the motion of the spring equinox point towards the Sun along the ecliptic. 169 years before Hipparchus, the astronomers Aristyllus and Timocharis recorded the positions of 18 stars. Hipparchus used their data in order to calculate the precession effect ([395], pages 43-44). Hipparchus has also compiled a star catalogue containing 850 items, indicating the ecliptic coordinates and the magnitude of every star. According to the consensual opinion of our days, "the constellations mentioned by Hipparchus are virtually identical to the constellations of Eudoxus; their list has undergone very few changes to date, if we don't take into account a certain number of new constellations from the Southern Hemisphere, unknown to the civilised nations of the ancient world" ([65], page 56).

Jean-Baptiste Delambre (1749-1822), a French scholar of the history of astronomy, wrote the following about Hipparchus in his "Histoire de l'Astronomie Ancienne": "Once you consider everything that was invented or perfected by Hipparchus and ponder the sheer number of his works and the volume of calculations they contain, you cannot help calling him one of the most amazing men of the ancient times and the greatest of them all" ([65], page 63). However, our primary source of information about the works of Hipparchus is Ptolemy's Almagest. The only surviving work of Hipparchus is the commentary to the poem of Aratus and its source (the work of Eudoxus).

The achievements of the "ancient" astronomers are believed to have been repeated after many centuries of stagnation and decline by the mediaeval astronomers of the Renaissance epoch. The level of astronomical knowledge in the "ancient" society was so high that it became reflected in a variety of aspects wholly unrelated to science. For instance, some of the "ancient" military tribunes in the regular Roman army were capable of reading bona fide scientific lectures to their troops on the theory of lunar eclipses. This is what we learn from the eminent "ancient" historian Titus Livy. The fifth decade of his "History of

Rome" contains an amazingly precise description of a lunar eclipse. "Caius Sulpicius Gallus, the military tribune of the second legion … gathered his troops by leave of the consul and declared that the Moon would disappear from the sky between the second and the fourth hour of the night to follow, and that nobody should take it as an omen … This … is a normal occurrence, which conforms to laws of nature and takes place in its due time. After all, it surprises no one that the Moon is a radiant disc on some nights and a thin crescent as it wanes, since the luminaries rise and set in a regular manner. The fact that the Moon gets obscured by the shadow of the Earth should not be considered a miracle, either. When the eclipse did come to pass that night, on the eve of the September nonnae, the very hour that was named …" ([482], XLIV, 37; also [483], pages 513-514).

Today we are told that this involved lecture, which we have reproduced only partially, was read to the iron legions of the "ancient" Rome about 2000 years before our day and age (see Ginzel's [1154], pages 190-191, No 27). Anyone familiar with the history of science is greatly impressed by this "lecture for the ancient soldiers" – even greater so considering the next time interval, namely, the mediaeval period between the alleged II century A.D. and the X century A.D. in Scaligerian history of astronomy.

## 6.2. The beginning of the mysterious "decline of the ancient astronomy" in Scaligerian history

And so, Scaligerian history claims the "ancient" astronomy to have reached an unprecedented period of efflorescence. However, it is believed to be followed by "the three centuries that passed after the death of Hipparchus, when the history of astronomy seems to have been shrouded by utter darkness" ([65], page 63). Presumably, this was the beginning of the great stagnation epoch, known for nothing but the propagation and popularisation of the great discoveries made by Hipparchus ([65], page 64). Virtually the only conspicuous peak of the next three centuries in the "darkening" history of Greek astronomy is Ptolemy's Almagest, regarded as "the final chord of the ancient astronomy". It is followed by a period of great darkness and taciturnity in Scaligerian history of astronomy. According to A. Berry, "the last great name that we encounter in Greek astronomy is that of Claudius Ptolemy" ([65], page 64). It is assumed that Ptolemy was born in Egypt. His observations were conducted in Alexandria in the alleged years 127-141 A.D. His death is dated to the alleged year 168 A.D. ([65]).

## 6.3. The alleged millenarian "return to infancy" and the primitive character of mediaeval astronomy

It would be most edifying to contrast the above brilliant scientific lecture of an "ancient" military tribune read to the Roman legionaries by a voyage to the alleged VI century A.D. for the sake of hearing the cosmological explanation of the famed Cosmas Indicopleustes, a recognized authority in mediaeval cosmography. He made a special study of the Sun, the Moon and the stars in the alleged VI century A.D.

Cosmas Indicopleustes is of the opinion that the Universe is constructed like a primitive box. This famous ancient drawing of the world is reproduced in "The History of Cartography" ([1177], page 262). In fig. 11.16 we see a drawn copy thereof (the original is reproduced further, in fig. 11.40). What do we see? Inside the box there is a flat Earth washed by the Ocean, with a gigantic mountain reaching for the sky. The celestial dome is supported by the four walls of the Universal box. The Sun and the Moon hide behind this mountain for a certain part of the day. The lid of the box is decorated with tiny stellar nails. This viewpoint, expressed by a "renowned professional", reflects the whole set of the rudimentary and therefore very primitive cosmological concepts of the antiquity – most likely, the X-XIII century.

The oeuvre of Cosmas Indicopleustes entitled "Christian Topography", which includes the above cosmological model, was created around 535 A.D., as it is believed today. It was extremely popular in the Christian world. Modern commentators suggest the following explanation of this phenomenon: "If we take a closer look at it [the work of Cosmas], we might just discover that the immense popularity of the 'Christian Topography' had nothing to do with the cosmological ideas expressed in this book, and simply reflected the appetite of the mediaeval reader … for the colourful miniatures that adorn the oldest copies of the tractate in question" ([395], page 77).

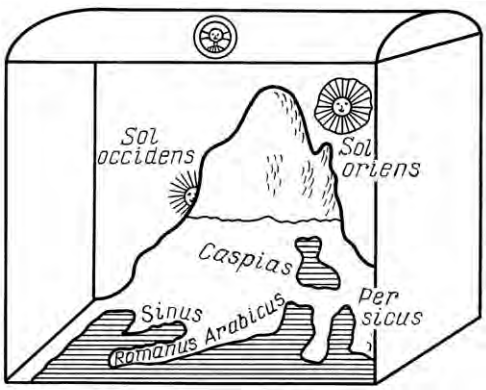


Fig. 11.16. A drawn copy of the "World Map" by Cosmas Indicopleustes. The oldest map can be found in the ***History of Cartography***, for instance ([1777], page 262). We shall reproduce it below, in fig. 11.40.

This "explanation" is hardly acceptable. In reality, the map, as well as the entire work of Indicopleustes, must have been created in the XIII-XIV century A.D. the very earliest (see CHRON1 for more details). This book reflected the concepts of its epoch, and was at some point considered a great advance of scientific thought, hence its popularity.

Anyway, what dire fate could have befallen the ancient cosmological concepts, if we are to believe Scaligerian history? How did the human understanding of astronomy plummet to the Stone Age level of the alleged VI century A.D.? Or is it just the ignorance of Cosmas Indicopleustes, his reputation of a prominent scientist notwithstanding? Apparently, this isn't the case – we are presented with a general picture of the "mediaeval darkness". Let us quote from certain specialists in history of astronomy. This is what they write about this period: "The decline of the ancient culture. The amazing efflorescence of the ancient culture on the European continent was followed by a lengthy period of certain stagnation (and, in some cases, degradation), spanning over 1000 years and commonly referred to as the Middle Ages … No astronomical discoveries of any importance were made by anyone during this period" ([395], page 73). The consensual explanation of this phenomenon (which strikes us as rather constricted) is as follows: mediaeval Christianity was incompatible with science.

According to A. Berry, "the history of Greek astronomy de facto ends with Ptolemy. The art of observation degraded to such an extent that there were hardly any observations of any scientific value performed over the 8.5 centuries that separate Ptolemy from Albatenius … The handful of Greek writers that emerged after Ptolemy comprised compilers and collectors in the vein of Theon (365 A.D.) at best; not one of them can be credited with so much as a single original or valuable thought" ([65], page 72).

All the scholars who specialise in the history of sciences are obliged to conform to Scaligerian chronology, which is why they write such passages about the mediaeval "relapse of infancy" as this one: "Figuratively speaking, the conception of a flat Earth can be dated to the epoch of humankind's infancy … We have already seen how the Greek philosophers managed to come up with scientific proof of the spherical shape of the Earth, calculate its size and estimate the distance to the Sun and the Moon … But we see new generations of people gripped by religious fanaticism … They destroy every achievement of their predecessors. Everywhere we see … relapses of infancy afflicting human ideas of the world around them. In particular, we see the "resurrection" of the flat earth conception – many centuries will pass before it is vanquished once again (in the XI century, no less)" ([395], pages 74-75).

A. Berry comments the Scaligerian history of astronomy as follows: "Some fourteen centuries have passed between the publication of the Almagest and the death of Copernicus (1541) … This period … has not yielded a single solitary astronomical discovery of any importance … The theory of astronomy hardly managed to make any advances at all – in some respects, it simply degraded, since the popular doctrines, some of them even more correct than Ptolemy's, were approached with infinitely less understanding in this epoch, and nowhere near as conscientiously as in the antiquity. As we have already seen, no remarkable discoveries were made in the first five centuries after Ptolemy. Next we have an almost total blank, with hundreds of years to pass until the interest in astronomy is revived" ([65], page 75).

A. Berry sums up as follows: "Inasmuch as Europe is concerned, the Dark Ages that followed the decline of the Roman Empire [in the alleged VI century A.D. – Auth.] … strike one as a blank spot in the history of astronomy, as well as pretty much any other natural science" ([65], page 81).

Our idea is very simple. These "blank spots", "gaps", "centuries of utter silence", "global catastrophes" etc are nothing but a product of the erroneous Scaligerian chronology followed by the researchers of the history of science. As we have come to realise, this chronology contains "ancient" phantom reflections, or duplicates, as well as their consequences, such as the "Dark Ages" between the "antiquity" and the "Renaissance". Our new amended chronology eliminates all such oddities, lacunae and sinusoidal curves from the history of science and culture.

## 6.4. The astronomical boom of the Renaissance: original, not repetition

### *6.4.1. The astronomical "renaissance" of the Arabs*

According to the European historical science, one must make many allowances to consider the scientific movement of the Islamic countries a true resurrection of the "ancient" ideas. This is what A. Berry points out in his review: "We cannot credit any of these astronomers, be they Arabic or not [the names of all the astronomers in question shall be cited below – Auth.], with a single original idea of any significance. Nevertheless, all of them possessed the remarkable ability to digest other people's ideas and develop them further to a certain extent, even if they didn't go all that far. They were all patient and accurate observers and skilful calculators. We owe them a great many observations, as well as inventions and important improvements of mathematical methods" ([65], page 80). The astronomical "renaissance" of the Arabs looks more like the actual nascence of astronomy as a science. This is confirmed by "a great many observations", which always serve as a foundation of an exact science. Let us cite relevant chronological data concerning the key figures of the Arabic astronomical renaissance.

The consensual opinion of our age is that "the first translation of the Almagest was ordered by Almansor's successor, Haroun al-Rashid (765 or 766-809), known as a character of the famed 'Arabian Nights'. This task must have been truly formidable: a new attempt to translate Ptolemy's work was made by Ghoneyn Ben-Isaac (? – 873) and his son Isaac Ben-Ghoneyn (? – 910 or 911), and the final version, established by Sabit Ibn-Korra (836-901) appeared by the end of the IX century … These endeavours of the Arabs have preserved many Greek works for us, whose originals perished" ([65], pages 76-77). As a matter of fact, the original of the Almagest is considered lost as well.

The Damascus Observatory was built during the period when the Caliphs resided in that city. Another observatory was built in Baghdad by Caliph Al-Mamoun in the alleged year 829 A.D. "Al-Mamoun ordered his astronomers to verify the Ptolemaic estimate of the size of the earth. Two independent measurements of a meridian's fragment were made as a result – however, they are so close to one another, and also to the erroneous result of Ptolemy, that they can hardly be perceived as accurate and wholly independent; one might rather consider them a rough verification of Ptolemaic calculations" ([65], page 77).

On the other hand, this opinion is contradicted by the following claim: "The precision of observations received so much attention that, according to some reports, the most interesting ones were registered in formal documents sealed by a united oath of several astronomers and lawyers" ([65], page 77).

In the second half of the alleged IX century, Ahmed Al-Fargani (Alfarganus, the author of the "Elements of Astrology") and Sabit Ibn-Korra worked in Baghdad. It is rather remarkable that this is the very time when the publication of astronomical tables commences. The tables were "based on pretty much the same principles as the Almagest" ([65], page 77). Sabit Ibn-Corra "has the dubious honour of being the discoverer of the hypothetical precession variation … Striving to explain it, he invented a complex mechanism … introducing … an arbitrary complication … which would plague the majority of astronomical tables that came out in the five or six centuries to follow with obscurity and confusion" ([65], page 77).

Al-Battani (Albatenius) is considered a much better qualified astronomer. His observations were conducted in the alleged years 878-918; he died in 929. "The last Baghdad astronomer was Abul-Wafah (allegedly 939 or 940-998), the author of a voluminous astronomical tractate, which was just as famous as the Almagest [sic! – Auth.]; it contained brilliant ideas, and its structure differed from Ptolemy's book, although it was often confused for a translation of the latter [sic! – Auth.]" ([65], page 78).

Could the origins of the Almagest be traced to the works of Abul-Wafah, by any chance? Ibn-Younis was a near-contemporary of Abul-Wafah (? – 1008, or allegedly 950-1009) ([395], page 83). He is the author of the astronomical and mathematical tables (the so-called "Hakemite Tables"), which "would serve as specimens for two more centuries" ([65], page 78).

The "Book of Immobile Stars" by the astronomer Al-Sufi (Abd ar-Rakhman as-Sufi, allegedly 903-986 A.D.), is regarded as an outstanding achievement if the mediaeval observational astronomy. Incidentally, the name "Al-Sufi" translates as "Wise One" ([395], page 80). Let us once again state that most ancient and mediaeval names are translatable. The book was lavishly illustrated and contained a star catalogue. It is presumed that Al-Sufi "verified and corrected Ptolemy's star catalogue" ([395], page 80).

Abu Raikhan Birouni (allegedly 973-1048) conducted independent astronomical observations, calculating the declination angle between the ecliptic and the equator and coming up with the value of 23° 33' 45". He is credited with the construction of "possibly the very first" ([395], page 83) terrestrial globe (or, rather, half-globe) 5 metres in diameter. In the alleged years 1031-1037 Birouni creates his "Masoud Canon" – an encyclopaedia of astronomy. He indicates a slightly different value of angle ε – 23° 34' 0". The true value for his epoch equals 23° 34' 45". He also includes a catalogue of 1029 stars with their coordinates and stellar magnitudes as per Ptolemy and Al-Sufi ([395], page 84). "In general, the 'Masoud Canon' is modelled after the same pattern as the Almagest, in a somewhat geocentric spirit" ([395], page 84).

In the alleged X-XII century A.D. great advances were made by the astronomers working in the Islamic part of Spain. Al-Zarqali, also known as Arzachel, lived in the alleged years 1029-1198. He improved the construction of the astrolabe and published a volume of astronomical tables in the alleged year 1080 (the so-called "Toledo tables"). Individual astronomical issues were also studied by Mohammed Ibn-Rushd, alias Averroes (the alleged years 1126-1198), Moses Ben-Maymon, or Maymonide (allegedly 1135-1204), Al-Bitrujji (died around 1204), who is supposed to have "revived" some of the ideas ascribed to Eudoxus ([395], page 86). According to the conclusion of A. Berry, "we owe certain improvements in instrument construction and observation methods to this school; it has published several works with a critique of Ptolemy – however, without any corrections of his ideas. About this time, the Christian Spaniards started to drive their Mohammedan neighbours out. Cordoba was captured in 1236, and Seville – in 1248; their fall heralded the historical demise of Arabic astronomy" ([65], page 79).

The next hotbed of astronomical science is associated with the reign of Hulegu-Khan, the grandson of Genghis-Khan. In the alleged year 1258 he conquered Baghdad. Several years earlier, the astronomer Nasir Al-Din Tusi (allegedly 1201-1274, born in Tusa, Khorasan) became his advisor. Tusi founded a large astronomical centre and an observatory in the city of Maragha (nowadays part of Iranian Azerbaijan). "The instruments they used were large and very sturdy in construction – most probably superior in quality to any of the instruments used in Europe in the epoch of Copernicus; the first European instruments to excel them were those of Tycho Brahe" ([65], page 79). The astronomers of this group compiled a number of astronomical tables, based on the Hakemite Tables of Ibn-Yunis and known as the Ilkhan Tables. They comprised the tables for the calculation of planetary positions and a star catalogue, "which was based on new observations to a certain extent" ([65], page 80).

It is believed that Samarqand became a prominent astronomical centre during the forty-year reign of Ulugbek (Ulug-Begh), the grandson of Tamerlane (allegedly 1394-1449). A large observatory was built here in the alleged year 1424. Ulugbek "published the new planetary tables; however, his main body of work had been a star catalogue that included virtually the same stars as Ptolemy's catalogue, but with amended coordinates based on newer observations. This was most probably the first completely autonomous catalogue since Hipparchus. The positions of the stars are exceptionally precise; they indicate minutes as well as degrees … Although there are discrepancies of several minutes between this catalogue and the results of modern observations, one must think that the instruments used by Ulugbek were very good indeed … Tartar astronomy ceased to exist after his death" ([65], page 80).

If we forget the Scaligerian version for a few moments (which claims all the research conducted by the Arabic astronomers to be of secondary nature as compared to the past glories of the "ancient" astronomy), we must admit that the Arabs put forth some new and deep ideas. In this case, the sceptical opinion of A. Berry, which we quoted at the beginning of this section, shall be supported by nothing but Scaligerian chronology, which dates the advances of the "ancient" astronomy to imaginary epochs supposed to precede the Arabic astronomical "renaissance" by many centuries.

#### *6.4.2. The astronomical "renaissance" in Europe*

"In the X century, the excellent reputation of Arabic science gradually reached different parts of Europe by proxy of Spain" ([65], page 81). Herbert, the famous scientist who was also a pope (Sylvester II, in the alleged years of 999-1003), had a particular interest in mathematics and astronomy. "Many other scientists were just as interested in Arabic science, but it was only a century later that the influence of the Mohammedans became obvious" ([65], page 82).

Already in the XI century A.D., the Byzantines Michael Psellus (allegedly 1018-1097) and Simeon Seth "revive" and cite numerous (and presumably familiar to everyone since Aristotle, if we are to believe Scaligerian chronology) demonstrations of the Earth's spherical shape, discuss the length of the telluric circumference, the relations between the radiuses of the Sun, the Earth and the Moon etc. See [395], page 78.

"Italy has played a major role in rousing Europe from millenarian slumber" ([395], page 92). It is believed that Latin translations of scientific and philosophical tractates from Arabic originals appeared in the early XII century. Plato of Tivoli translated the "Astronomy" of Albatenius in the alleged year 1116. Then Adelard of Bath translated Euclid's "Elements". After than, Gerard of Cremona (allegedly 1114-1187) translated the Almagest and Arzachel's Toledo Tables ([65], page 82). There is a surge of interest in the works of Aristotle. "European scientists become interested in his works in the XI-XII century; by the XII-XIII century, Aristotle's influence over the mediaeval thought becomes almost overwhelming – many scholastics were just as awed by his works as they were by the works of the most prominent Christian theologians, if not more" ([65], page 82).

Western Europe develops an even greater familiarity with the Arabic astronomy under Alfonso X, King of Leon and Castile (allegedly 1223-1284). He acts as the leader of a group of scientists that compiles a series of new astronomical tables – the so-called "Alfonsine tables", which came to replace the Toledo tables. The Alfonsine tables were published in 1252 and quickly became popular everywhere in Europe. The modern opinion is that they "didn't contain any novel ideas; however, many of the numeric data, especially the length of a year, were estimated with greater precision than before" ([65], page 82).

The book entitled "Libros de Saber" was compiled under Alfonso – a voluminous encyclopaedia summarising the astronomical knowledge of that epoch. Even though it was derived from Arabic sources to a large extent, "it is by no means a mere collection of translations, as some had thought. This book contains a curious diagram of Mercury's orbit, which has the shape of an ellipsis [sic! – Auth.] with the Earth at its centre … This must have been the very dawn of the conception of using non-circular curves for the motions of celestial objects" ([65], pages 82-83). The Alfonsine tables "were used in every European country for 200 years" ([395], page 93).

The English astronomer John Halifax of Holywood, who lived in the alleged years 1200-1256, is known better under the Latinised alias of Sacrobosco. His tractate entitled "Sphaera Mundi" (The Universal Sphere) "enjoyed great popularity for three or four centuries; there were many re-editions, translations and commentaries; it was one of the first books on astronomy ever printed. 25 editions of this book came out between 1472 and the end of the XV century, and 40 more were published in the middle of the XVII century" ([65], page 83).

Nevertheless, the erroneous Scaligerian chronology, which shifts the advances of the "ancient" and Arabic astronomers to epochs that predate the XI-XII century A.D. leads modern researchers to the conclusion that the scientists of the X-XIII century A.D. "contented themselves with collecting and systematising whatever astronomical knowledge they could borrow from the Arabs and the Greeks; we neither see any serious attempts of developing the theory, nor any observations of importance" ([65], page 83).

Jean Buridan, a prominent French scientist (allegedly 1300-1358), is known as the author of a book about the structure of the Universe. In particular, he has conducted an in-depth research of the issue of "whether the Earth was always in a state of calm at the centre of the Universe". His follower Nicholas d'Oresme (allegedly 1323-1382) published "The Book of the Heavens and the Universe", wherein he voiced his support of the hypothesis of daily Earth rotation. Nicholas of Cusa (allegedly 1401-1464), claimed that the Earth could not be the centre of the Universe. He is the author of the tractate entitled "On Learned Ignorance" ([395], pages 96-97).

According to the official version, it was only in the XV century A.D. that "a new school emerged in Germany, contributing to the accumulated body of scientific knowledge, although in no crucial way; it was very independent, and heralded the beginning of a whole new scientific research" ([65], page 83).

Georg Purbach (allegedly 1423-1461) wrote "The Concise Astronomy", presumably based on the Almagest. However, it is believed that he used low quality Latin translations of the Almagest, "packed with errata" ([65], page 84). Purbach's activities were carried on by Johannes or Wolfgang Müller ([395], page 94), alias Regiomontanus (allegedly 1436-1476). Both astronomers (Regiomontanus was Purbach's apprentice) conducted a vast amount of observations ([65], page 84).

It is believed that Purbach was "the first West European to have encapsulated Ptolemy's theory together with the cosmology of Aristotle" ([395], page 94). However, this book of Purbach (the "New Planetary Theory") was only published by Regiomontanus in 1472, already after Purbach's death. After that, Regiomontanus published Purbach's "Concise Astronomy" – in 1472 or 1473, using his own printing press (already in Nuremberg, qv in [65], page 85). It is believed that after the death of Purbach in the alleged year 1461 Regiomontanus went to Italy, where he "got the opportunity" to read the Almagest in Greek ([65], page 84). In 1468 he returned to Vienna with a number of Greek manuscripts, and then moved to Nuremberg, where he got a grandiose reception. Bernhard Walther (allegedly 1430-1504), a wealthy citizen, provided him with lavish funds and became the apprentice and collaborator of Regiomontanus, in spite of his being much older than the latter.

"The most skilled craftsmen of Nuremberg were busy constructing astronomical instruments with precision previously unheard of in Europe, although they must have been worse than the instruments of Nasir-Eddin and Ulugbek" [which have not survived, and were presumably manufactured several centuries earlier – Auth.] ([65], page 85). After the death of Regiomontanus in the alleged year 1476, "Walther continued with the research commenced by his friend and conducted a series of good observations; he was the first [sic! – Auth.] one who tried to compensate the effect of atmospheric refraction, which Ptolemy must have pictured very vaguely indeed" ([65], page 87). Today it is believed that "Walther constructed an armilla, using the Ptolemaic description of the instrument as a guideline; he used it to measure the positions of planets with the precision margin of 5' (1' in case of the Sun) – substantially more precise than Ptolemy's observations" ([395], page 95).

It is presumed that the astronomical instruments that were allegedly used "since Ptolemy" began to propagate all across Europe in this very epoch. Leonardo Da Vinci (allegedly 1452-1519) "was the first to explain the dim glow of the moon's dark part, when the sunlit part is in the phase of a crescent ([65], page 87). This phenomenon is known as "ash glow" or "ash light". Gerome Fracastor (allegedly 1483-1543) and Petrus Apianus (allegedly 1495-1552) were the first ones to note that a comet's tail always faces away from the Sun. They are the authors of famous books on astronomy. Peter Nonius (allegedly 1492-1577) offered correct solutions to problems concerning the duration of the nighttime. "A new measurement of the Earth's size, first since Caliph Al-Mamoun, was made around 1528 by Dr. Jean Fernel (1497-1558)" ([65], pages 87-88).

We have reached Copernicus in our motion forward along the time axis. A. Berry sums up the historical period in question in the following words: "The life of Regiomontanus overlaps the first three years of Copernicus's lifetime … we can therefore say that we have reached the end of the stagnation period described in the present chapter" ([65], page 88). I. A. Klimishin also notes: "this is how the astronomical observations and cosmological research recommenced in Europe after a millenarian interruption" ([395]). In general, Edmond Whitaker, the English mathematician and astronomer (1873-1956) was correct to point out the following: "In 1500 Europeans knew less then Archimedes, who died in 212 b.c." ([395], page 98).

### 6.4.3. The boom of European astronomy in the XV-XVI century

*Nicolaus Copernicus* (allegedly 1473-1543) is the author of the heliocentric cosmology. It is customary to place him at the very beginning of the European astronomy's independent and rapid efflorescence ([65]). In Chapter 1 we have already pointed out the continuity of ideas and "astronomic observations separated by an interval of almost 2000 years; when Copernicus considers the issue of precession, he cites the observation data of his faraway predecessors" ([395], page 109). Copernicus refers to Timocharis, Hipparchus, Menelaus, Ptolemy, Albatenius etc. One must strive for absolute certainty in the issue whether the work of Copernicus that has reached our epoch could be edited radically in the late XVI or early XVII century.

It is assumed that the theory of Copernicus was carried further and popularized by Rheticus, or Georg Joachim, born in the alleged year 1514. The next prominent astronomer, who was quick in taking to the new ideas, was his comrade Erasmus Reinhold (1511-1553) ([65], pages 114-115). He used the Copernican theory for calculations necessary to compile tables of celestial objects' motions. He published them, and they became very popular under the moniker of "Prussian tables". These turned out much better than the Alfonsine tables, and remained in use for a quarter of a century, to be outshone by the Rudolfine tables of Kepler eventually.

In 1561 Wilhelm IV of Hessen-Kassel (1532-1592) builds the Kassel Observatory, where he begins to compile a catalogue of stars with Christian Rothman and Jost Bürgi, young and very apt astronomers (see Chapter 1; also [65], pages 117-118). By 1586, the positions of 121 stars were measured with the utmost precision. This is when the activities of Tycho Brahe attain supreme renown (see Chapter 1 for more on his works). "Over the 21 years that Tycho spent on the Isle of Guene, a wealth of outstanding observations was accumulated by the astronomer himself as well as his apprentices and assistants. The precision of these observations excelled all the achievements of his predecessors. He also paid a sufficient deal of attention to alchemy and medicine to some extent" ([65], page 123).

The further development of astronomy becomes so rapid that our brief overview can by no means highlight every primary trend in this science. At any rate, this is quite beyond the scope of the present book. We shall therefore simply provide a brief list of certain most prominent scientists and their achievements. Our attention should gradually turn towards the large chronological table that the following section deals with.

*Giordano Bruno* (real name Philip; 1548-1600) insisted that eternity was infinite and that the worlds were multiple. He is the author of a number of books on philosophy, which de facto develop the ideas of Copernicus.

*Galileo Galilei* (1564-1642) – a famous astronomer and the author of several spectacular astronomical discoveries: the first telescopic observations in history of astronomy, the satellites of Jupiter, phases of Venus etc. He was an active proponent of the Copernican system.

*Johannes Kepler* (1571-1630) – an apprentice of Tycho Brahe. He has discovered the fundamental laws that planetary motion conforms to.

"The first measurement of the Earth, which was performed in the XVII century, must be regarded as a definite step forward as compared to the measurements of the Greeks and Arabs" ([65], page 178). These measurements are associated with the names of the following astronomers: Villebrord Snellius (1591-1626), Richard Norwood (1590?-1675), Jean Picard (1620-1682) and Adrien Auzout (?-1691).

We shall end our list here and move on to our next idea, which gives one a very tangible idea of how astronomy and cosmological conceptions are believed to have evolved in Scaligerian chronology.

## 6.5. Bottom-line chronological diagram which demonstrates oddities inherent in the development of the astronomical science in the consensual chronological paradigm of Scaliger and Petavius

Let us consider the epoch between the X century b.c. and the present, attempting to picture the qualitative development of the astronomical science in

Scaligerian dates. Biographical dates shall comprise the "visual material" for the scientists who bore some relation to astronomical issues in one historical epoch or another. Each of the scientists shall be represented by a corresponding horizontal fragment on the diagram, whose beginning and end shall correspond to the dates of the scientist's birth and death. The density of these fragments shall be a very edifying representation of how intensely the astronomical science developed around the epoch in question. This method is arbitrary to some extent, yet has a number of tangible benefits. The matter is that each such name is associated with actual astronomical information in the history of sciences, and we can trace its evolution by the diagram. It goes without saying that the quantity of astronomers per epoch is a very approximate pointer. And yet it reflects the intensity of scientific development to some extent.

We are confronted by the next issue – namely, one of compiling a list of astronomers to encompass the period between "the Scaligerian antiquity" and the present days. We can by no means claim the ability to create an exhaustive list – none such is likely to exist in the modern astronomical literature, either, or the publications on the history of astronomy, for that matter. This is why we have opted for the following approach. We took the following three monographs: "The Crime of Claudius Ptolemy" by Robert Newton ([614]), "Concise History of Astronomy" by A. Berry ([65]) and "The Discovery of the Universe" by I. A. Klimishin ([395]). Apart from its research of the Almagest, Robert Newton's book contains an excellent overview of the "ancient" and partially mediaeval astronomy's achievements. The books of A. Berry and I. A. Klimishin describe the history of astronomy between the "antiquity" and the present epoch. These monographs are focussed on the following three categories of historical figures for the most part.

1) Astronomers, professional scientists, observers etc.

2) Philosophers, writers and thinkers who discussed astronomical observations, phenomena and theories. When the authors' names are unknown, we cite the names of their tractates.

3) Commentators of astronomical works and translators of astronomical books. Let us also mark the foundations of the main observatories.

We have concentrated out attention on these three categories of characters and events, and copied each name pertaining to one of them from [614], [395] and [65] – each and every name, no less! We have estimated Scaligerian biographical dates of all these characters – for the most part, they are indicated in the books in question. Whenever the chronological data related to some astronomer are omitted, we turn to the modern encyclopaedic editions.

The book of R. Newton ([614]) has been processed in its entirety. As for A. Berry's book ([65]), only pages 17-244 have been analysed, with the modern period omitted. We have treated I. A. Klimishin's book ([395]) similarly, omitting the modern period and only considering pages 5-189. In other words, we have gathered all the information that interested us from the "antiquity" to the XVIII century A.D. inclusively. The number of astronomers has been growing rapidly ever since the end of the XVIII century, and we have omitted the statistical data of this period.

It is obvious enough that R. Newton, A. Berry and I. A. Klimishin by no means claim their books to contain an exhaustive list of names pertinent to the three categories mentioned above. However, it is nonetheless obvious that these authors have tried to reflect the history of the astronomical science's development in as many aspects as they could. The selection that they have conducted can be regarded as the effect of the mechanism of the "ordering and obliteration of information". First of all, the most famous names are mentioned, followed by a selection of the more obscure ones. Some astronomers are altogether omitted – one must assume that the history of science knows next to nothing about these characters, or, alternatively, that the author of the review does not consider them worthy of a mention for one reason or another. Without delving into the intricacies of this mechanism's functionality, we might assume it to be more or less objective in reflecting the evolution of information, where large data arrays are involved. It models the same obliteration of names that automatically happens in the history of a given science over the course of time (its justification is an altogether separate issue). Some names are forgotten for one reason or another; others have been preserved in memory.

We have deliberately chosen three books instead of limiting ourselves by just one. We have tried to eschew the influence of subjective motives affecting the selection of information sources. If one author "forgot" some famous name for some reason, there is the possibility that it will be mentioned by another author, and that the name of the prominent scientist will end up as part of our list.

One can learn more about the laws affecting the evolution and obliteration of written information from CHRON1, for instance.

Let us cite the full list of name constructed in the manner described above. The names were numbered 1-220. In other words, the three monographs ([614], [395] and [65]) contain 220 names of characters pertaining to one of the above three categories.

The resulting list of names isn't arranged all too precisely insofar as the Scaligerian scale is concerned. However, we have tried to arrange them by birth date in every known case, without aiming for absolute orderliness, which is of no vital importance presently. It turns out that the multitude of names naturally falls apart into several groups, which do not intersect between themselves, in correspondence to various geographic regions. Our list is therefore divided into the following categories: 37 names for the "ancient" Greece, 2 names for China, 1 name for Babylon, 15 names for Rome (Europe between the II century B.C. and 700 A.D.), 1 name for India, 6 names for Byzantium, 26 names for Islamic countries and 112 names for Europe between 700 A.D. and the XVIII century A.D.

Apart from the names, the list accounts for corresponding lifetime dates or events. In some cases, Scaligerian dates are only known approximately – as the century, for instance, or as the annals registering a certain action of a given historical figure in a certain year. Due to insufficient space, we do not estimate the motives guiding A. Berry, R. Newton and I. A. Klimishin when they mentioned one character or another in their monographs.

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THE "ANCIENT" GREECE.

1. Homer, allegedly around VIII century B.C.
2. Hesiod, allegedly 725 – circa 650 B.C.
3. Numa, allegedly circa 716 – circa 673 B.C., Rome, the beginning of the regal period.
4. Thales of Miletus, allegedly 624-547 B.C. The theory of a round Earth.
5. Anaximander, allegedly 610-546 B.C.
6. Solon, allegedly circa 594 B.C.
7. Anaximenes, allegedly circa 585 – circa 525 B.C.
8. Pythagoras, allegedly circa 580 – circa 500 B.C.
9. Heraclitus of Ephesus, allegedly circa 544 – circa 470 B.C.
10. Hecateus (Hicetius) of Miletus (Syracuse), allegedly the end of VI – V century B.C. Round Earth theory.
11. Ecphantus, allegedly end VI – V century B.C.
12. Anaxagoras, allegedly circa 500 – circa 428 B.C.
13. Empedocles, allegedly circa 490-430 B.C.
14. Philolaus, allegedly circa 470-399 B.C.
15. Meton, allegedly circa 460-? B.C.
16. Democritus, allegedly circa 460-370 B.C.
17. Euctemon, allegedly circa 432 B.C.
18. Plato, allegedly 427-347 B.C.
19. Eudoxus of Cnidus, allegedly circa 408-355 B.C.
20. Theophrastus of Athens, allegedly circa IV century B.C.
21. Heraclides Ponticus, allegedly circa 390-310 B.C.
22. Pitheus, allegedly circa IV century B.C.
23. Aristotle, allegedly 384-322 B.C.
24. Calippus, allegedly circa 370-300 B.C.
25. Epicurus, allegedly 341-270 B.C.
26. Aristarchus of Samos, allegedly circa 410-255 B.C.
27. Aristyllus, allegedly circa IV – III century B.C.
28. Timocharis, allegedly circa IV – III century B.C.
29. Diogenes Laertius, allegedly circa 1 half of III century B.C.
30. Euclid, allegedly circa III century B.C.
31. Aratus, allegedly circa III century B.C.
32. Archimedes, allegedly circa 287 – circa 212 B.C.
33. Eratosthenes, allegedly circa 276 – circa 194 or 196 B.C.
34. Dionysius, allegedly circa 264 B.C.
35. Apollonius of Perga, allegedly circa 262-200 B.C.
36. Hipparchus, allegedly circa 185-125 B.C.
37. Seleucus (of Seleucia), allegedly the middle of the II century B.C.

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CHINA.

38. Chu Kong, allegedly circa 1100 B.C.
39. Shi Sheng, allegedly circa IV century B.C.

BABYLON.
40. Beros, allegedly circa 280 B.C.

ROME AND EUROPE BETWEEN II CENTURY B.C. AND 700 A.D.
41. Posidonius, allegedly circa 100 – circa 50 B.C.
42. Geminus, allegedly circa 100 B.C.
43. Cicero, allegedly 106-43 B.C.
44. Titus Lucretius Carus, allegedly 99-55 B.C.
45. Sosigenes (Alexandria) and Julius Caesar, allegedly first half of I century B.C.
46. Virgil, allegedly 70-19 B.C.
47. Titus Livy, allegedly 59 B.C. – 17 A.D.
48. Ovid, allegedly 43 B.C. – 17 A.D.
49. Eratosthenes II. Historians distinguish him from Eratosthenes I, Alexandria, allegedly the second half of I century A.D.
50. Conon of Samos (Alexandria), allegedly the second half of I century B.C.
51. Seneca, allegedly 3 B.C. – 65 A.D.
52. Pliny the Elder, allegedly 23-79 or 24-79 A.D.
53. Plutarch, allegedly 46-126 A.D.
54. Galen, allegedly circa II century A.D.
55. Menelaus, allegedly circa 98-100 A.D.
56. Theon, allegedly circa I-II century A.D.
57. Ptolemy (Alexandria), ? – allegedly circa 168 A.D. It is suggested to date his observations to circa 127-141 A.D.
58. Abideen, allegedly circa II century A.D.
59. Sextus Empiricus, allegedly circa II-III century A.D.
60. Origen, allegedly 185-254 A.D.
61. Hippolytus, bishop, allegedly 1st half of III century A.D.
62. Censorinus, allegedly circa 238 A.D.
63. Lucius Caelius Firmianus (Lactantius), writer and theologian, allegedly circa 250-320 A.D.
64. Pappus, mathematician, allegedly circa 300 A.D.
65. Theon of Alexandria, allegedly circa IV century A.D.
66. Basil the Great, Bishop of Caesarea, allegedly circa 330-379 A.D.
67. John Chrysostom, allegedly circa 347 – circa 407 A.D.
68. St. Augustine, allegedly circa 354-430 A.D.
69. Proclus, allegedly circa V century A.D.
70. Marcian Felix Cappella (of Carthage), allegedly circa V century A.D.
71. Macrobius, allegedly circa V century A.D.
72. Simplicius of Athens, allegedly circa V century A.D.
73. Heliodorus, allegedly circa 509 A.D.
74. Cosmas Indicopleustes, Alexandrian monk, allegedly circa 535 A.D.
75. Isidore, Bishop of Seville, allegedly circa 600 A.D.

INDIA.
76. Ariabhata, allegedly circa 476 A.D.

BYZANTIUM.
77. John Damascene, allegedly circa 680-760 A.D.
78. Leo Mathematicus, allegedly circa 805-870 A.D.
79. Patriarch Photios, allegedly circa 820-891 A.D.
80. Suidas or Suda – Byzantine encyclopaedia (Lexicon Suidas), allegedly circa 1000 A.D.
81. Simeon Seth, allegedly circa XI century A.D.
82. Michael Psellus, 1018 – circa 1097 A.D.

ISLAMIC COUNTRIES.
83. Ibn-Yusuf, allegedly 786-833 A.D.
84. Al-Khabash Al-Khaseeb, Baghdad, allegedly circa first half of the IX century A.D.
85. Muhammad Ibn-Mussa Al-Khoresmi, Baghdad, allegedly circa 783 – circa 847 A.D.
86. Sabit Ibn-Korra, allegedly 836-901 A.D.
87. Ghoneyn Ben-Isaac, ? – allegedly 873 A.D.
88. Al-Mamoun, allegedly circa IX century A.D.
89. Ahmed Al-Fargani (Alfraganus), Baghdad, allegedly second half of IX century A.D.
90. Abu Abdallah Muhammad Ibn-Jabir Al-Battani (Albatenius), Baghdad, allegedly 850-929 A.D.
91. Issaac Ben-Ghoneyn, ? – allegedly 910 or 911 A.D.
92. Abd Al-Rahman Al-Sufi, Baghdad, allegedly 903-986 A.D.
93. Abu Al-Wafa Al-Buzjani, or Abul Wafa, allegedly 940-998 A.D.
94. Ibn-Yunis (the publisher of the Hakemite tables), allegedly 950-1008 or 1009 A.D.
95. Ibn-Iraq, allegedly circa 961-1036 A.D.
96. Abu-Sahl Al-Kuhi, Baghdad, allegedly circa 990 A.D.

97. Abu-Raikhan Birouni (Berouni), allegedly 973-1048 A.D.

98. Abu-Mahmoud Al-Hujandi, ? – allegedly circa 1000 A.D.

99. Abu Said Al-Sijizi, allegedly first half of the XI century A.D.

100. Al-Zarqali (Arzachel), Mohammedan Spain. Toledo tables, allegedly 1029-1087 A.D.

101. Mohammed Ibn-Rushd (Averroes), allegedly 1126-1198 A.D.

102. Moshe Ben Maimon (Maimonides), Jewish scientist, allegedly 1135-1204 A.D.

103. Al-Bitruji, Moroccan astronomer, ? – allegedly 1204 A.D.

104. Nasireddin Al-Tusi (Iranian Azerbaijan), allegedly 1201-1274 A.D.

105. Ibn Al-Shatir, allegedly 1304-1376 A.D.

106. Kazy-Zade Al-Rumi (Samarqand), allegedly circa 1412 A.D.

107. Ulugbek (Ulug-Begh, Samarqand), allegedly 1394-1449 A.D.

108. Abd Al-Ali Al-Kushchi (Samarqand), ? – allegedly 1474 A.D.

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Europe from 700 A.D. to the XVIII century.

109. Alcuin (at the court of Charlemagne), allegedly 735-804 A.D.

110. Syncellus, allegedly circa 800 A.D.

111. Herbert, Pope Sylvester II, allegedly between 999 and 1003 A.D.

112. Plato of Tivoli, translator, allegedly circa 1116 A.D.

113. Gerhard of Cremona, translator, allegedly 1114-1187 A.D.

114. Albertus Magnus, allegedly circa 1193-1280 A.D.

115. Cecco D'Ascoli, allegedly circa XIII century A.D.

116. John of Holywood (alias Halifax, or Sacrobosco) – allegedly 1200-1256 A.D.

117. Roger Bacon, allegedly circa 1214-1294 A.D.

118. Alfonso X and the compilation of the Alfonsine tables in 1252 – allegedly 1226 or 1223-1284 A.D.

119. Thomas Aquinas, allegedly 1225-1274 A.D.

120. Dante Alighieri, allegedly 1265-1321 A.D.

121. Jean Buridan, allegedly 1300-1358 A.D.

122. Nicolas Oresme, allegedly 1323-1382 A.D.

123. Levi Ben-Gerson, allegedly circa 1325 A.D. We shall be omitting the "A.D." part as self-implied henceforth.

124. Nicolaus Cusanus, allegedly 1401-1464.

125. Georg Purbach, allegedly 1423-1461.

126. Bernhard Walther, allegedly 1430-1504.

127. Wolfgang (Johannes) Müller (Regiomontanus), allegedly 1436-1476.

128. Wojciech Brudzewski, allegedly 1445-1497.

129. Domenico Novara, allegedly 1452-1504.

130. Leonardo Da Vinci, allegedly 1452-1519.

131. Albrecht Dürer, allegedly 1471-1528, the author of the Almagest star charts (1515).

132. Nicolaus Copernicus, allegedly 1473-1543.

133. Gerome Fracastor, allegedly 1483-1543.

134. Petrus Apianus, allegedly 1495-1552.

135. Petrus Nonius, allegedly 1492-1577.

136. Jean Fernel, allegedly 1497-1558.

137. Robert Recorde, allegedly 1510-1558.

138. Georg Joachim von Lauchen, alias Rheticus, allegedly 1514-1576.

139. Erasmus Reinhold and the Prussian tables, allegedly 1511-1553.

140. Wilhelm IV of Hessen-Kassel, allegedly 1532-1592.

141. William Gilbert, allegedly 1544-1603.

142. Thomas Digges, allegedly 1546-1595.

143. Simon Stevin, allegedly 1548-1620.

144. Leonard Digges, ? – allegedly 1571.

145. Porta, allegedly circa 1558.

146. Joseph Scaliger, 1540-1609. He is the author of the consensual chronology of the antiquity (assisted by his helpers and apprentices). Their primary works on chronology were published in the late XVI – early XVII century. The more or less reliable datings come into existence as late as the XVII century (postdating Scaliger and Petavius).

147. Joost Bürgi, 1552-1632.

148. Piccolomini, allegedly circa 1559.

149. Tycho Brahe, 1546-1601.

150. Giordano (Philip) Bruno, 1548-1600.

151. Reimarus Ursus (Nicolaus Reimers Bär), ? – 1600.

152. Hans Lippershey, ? – 1619.

153. Johannes Kepler, 1571-1630.

154. Galileo Galilei, 1564-1642.

155. Christoph Scheiner, 1575-1650.

156. Johann Bayer, 1572-1625.
157. Simon Marius, 1570-1624.
158. Willebrord Snellius, 1580-1626.
159. Dionysius Petavius, 1583-1652. Apprentice of Scaliger, author of the chronology of the antiquity.
160. Thomas Harriot, 1560-1621.
161. Rene Descartes, 1596-1650.
162. Richard Norwood, 1590-1675.
163. Giovanni Battista Riccioli, 1598-1671.
164. Michel Florent Van Langren, 1600-1675.
165. Johannes Fabricius, 1587-1615.
166. Christian Rothman, circa 1577.
167. Michael Maestlin, circa 1589.
168. William Gascoigne, circa 1612-1644.
169. Francesco Maria Grimaldi, 1618-1663.
170. Johannes Hevelius, 1611-1687.
171. Jean Picard, 1620-1682.
172. Evangelista Torricelli, 1608-1647.
173. Bonaventura Cavalieri, 1598-1647.
174. Ismaël Boulliau, 1605-1694.
175. Giovanni Alfonso Borelli, 1608-1679.
176. John Wilkins, 1614-1672.
177. Stanislaw Lubieniecki, 1623-1675.
178. Robert Hooke, 1635-1703.
179. Christiaan Huygens, 1629-1695.
180. Giovanni Domenico Cassini, 1625-1712.
181. Rudolfine tables, 1627.
182. James Gregory, 1638-1675.
183. John Flamsteed, 1646-1720.
184. Abraham Sharp, 1651-1742.
185. Ole Rømer, 1644-1710.
186. Gottfried Wilhelm Leibnitz, 1646-1716.
187. Sir Isaac Newton, 1643-1727.
188. Bernard le Bovier de Fontenelle, 1657-1757.
189. Jacques Cassini, 1677-1756.
190. The construction of the Paris Observatory, 1667.
191. The construction of the Greenwich Observatory, 1675.
192. Samuel Molyneux, 1689-1728.
193. Jean Richet, ? – 1696
194. Edmond Halley, 1656-1742. Believed to have discovered the phenomenon of proper star motion in 1718.
195. James Bradley, 1693-1762.
196. Colin MacLaurin, 1698-1746.
197. Nathaniel Bliss, 1700-1764.
198. Pierre Bouger, 1698-1758.
199. Charles Marie de la Condamine, 1701-1774.
200. Louis Godin, 1704-1760.
201. Pierre Louis Moreau de Maupertuis, 1698-1759.
202. Leonhard Euler, 1707-1783.
203. Józef Aleksander Jablonowski, 1711-1777.
204. Joseph Crosthwaite, circa 1700.
205. Pehr Wilhelm Wargentin, 1717-1783.
206. John Michell, 1724-1793.
207. Nevil Maskelyme, 1732-1811.
208. Charles Hutton, 1737-1823.
209. Henry Cavendish, 1731-1810.
210. Charles Mason, 1730-1787.
211. César François Cassini de Thury, 1714-1787.
212. Tobias Mayer, 1723-1762.
213. Nicolas Louis de Lacaille, 1713-1763.
214. Pierre-Simon Laplace, 1749-1827.
215. Jean-Baptiste Delambre (specialist in the history of astronomy), 1749-1822.
216. Grigoriy Arakelovich, 1732-1798.
217. Joseph-Louis Lagrange, 1736-1813.
218. John Machin, ?-1751.
219. Jens Swanberg, 1771-1851.
220. Johann Franz Encke, 1791-1865.

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We decided to cut the list here. Joseph Scaliger and Dionysius Petavius (see #146 and #159), aren't mentioned anywhere in books [614], [395] or [65]; nevertheless, we include them in the list, since their activities were directly associated with astronomy. They used the descriptions of astronomical events in dating.

We have drawn all the dates from the list in figs. 11.17, 11.18 and 11.19. The numeration in the illustrations corresponds to the numbers in the list. Due to insufficient space in the drawings, only some of the numbers are annotated. All the "ancient" names are stated, as well as the most famous mediaeval names.

What can one say after a study of the resulting diagram? Lots of interesting details, as it turns out.

Firstly, Scaligerian history clearly contains a strange mediaeval "regress period" in the history of Rome's and Europe's astronomical development. This lapse even affects the quantity of historical characters bearing some relation to astronomy at least in one way or another. We are not even mentioning the "low level"

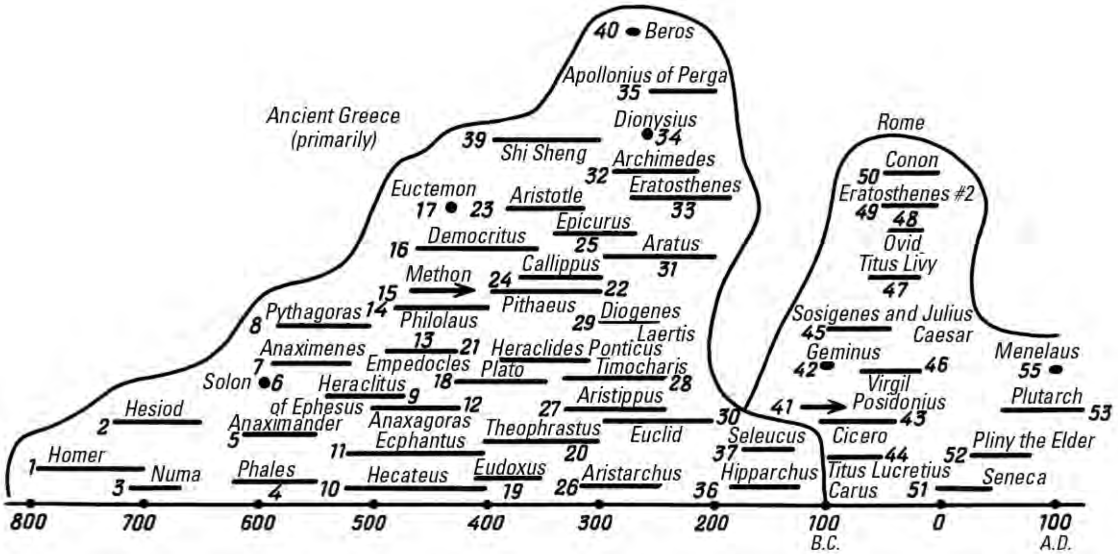


Fig. 11.17. Chronological graph that demonstrates the lifetimes of the "ancient" and mediaeval figures who bore relation to astronomy in one way or another along the time axis. The datings are given according to the Scaligerian chronology. One sees a manifest peak in the "ancient" Greece followed by a strange drop to near-zero.

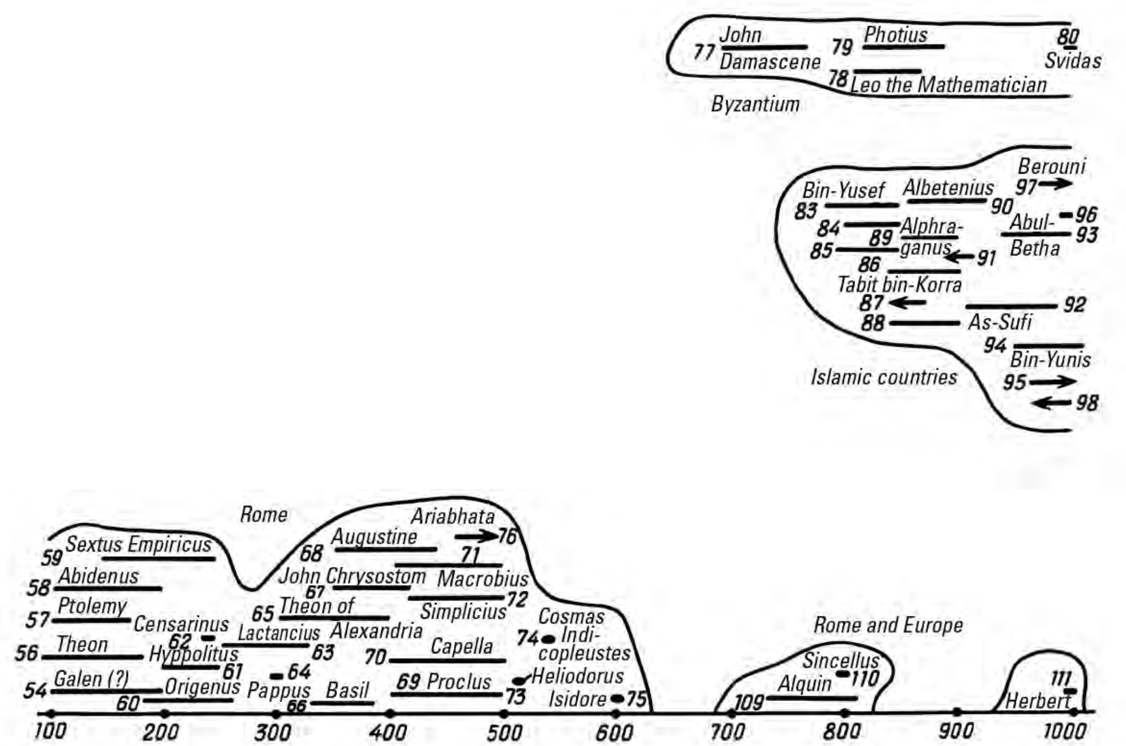


Fig. 11.18. Chronological graph continued. One sees a manifest peak in the "ancient" Rome, followed by a near-total drop.

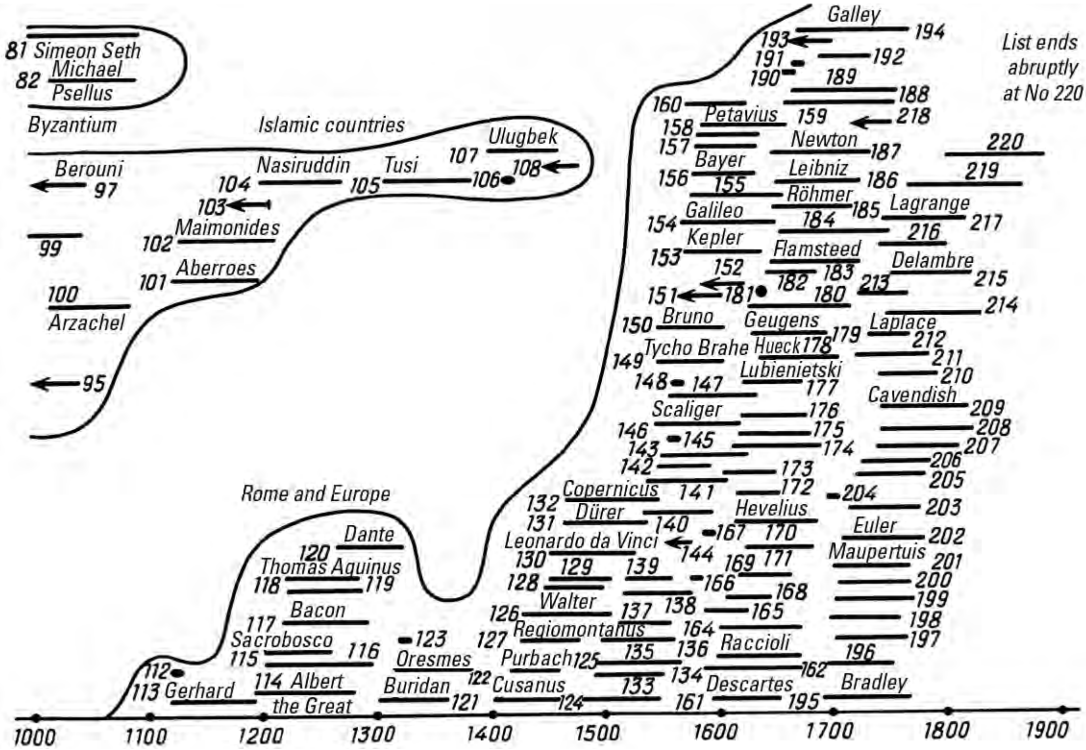


Fig. 11.19. Chronological graph continued. According to Scaligerian history, the European "astronomical Renaissance" began in the XI century A.D., after several centuries of presumed decline and stagnation.

of astronomical concepts prevalent during this "period of decline" – see more on this topic above.

Secondly, a more or less stable growth only begins in the alleged year 1100 A.D.

Thirdly, it is obvious that the "Byzantine part" of the resulting diagram is rigidly localised in time, as well as the part corresponding to the Islamic countries. The Byzantine "renaissance" begins in the alleged VII century A.D. and ends in the alleged XI century A.D. The "Arabic surge" begins in the alleged VIII century A.D. and ends in the alleged XII century A.D. The per century density of Byzantine astronomers falls drastically right then.

In order to get a more demonstrable picture of these effects, let us construct the following density graph. We must count the astronomers with lifetimes pertaining to every century, partially or wholly, keeping in mind that a single character can become split between two adjacent centuries as a result. The graphs constructed on the basis of the above data can be seen in figs. 11.20 and 11.21. The uninterrupted line is the density graph built for the astronomers of the Islamic countries in fig, 11.20, while the dotted line represents Byzantium. You can clearly see the allegedly local character of these two brief surges of astronomical science. The peak of the "Arabic astronomical renaissance" falls over the IX-XI century A.D., as we have noted above.

In fig. 11.21 we see the resulting density graph of astronomers of Greece, Rome and Europe. The "antiquity" is obviously very prominent. We see a massive peak on the left of the graph. Then we see an amazing "mediaeval regress". The "decline lacuna" between the alleged VII and XI century A.D. is the most obvious.

Only starting with the XIII-XIV century A.D. do we see a rapid and even growth – which is manifest on the graph as well, from 1300 A.D. and up until our day