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Николай Томов

On the Dating of the Ugarit Solar Eclipse

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On the Dating of the Ugarit Solar Eclipse

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In this paper we present a new dating of the famous Ugarit eclipse.

The meeting with Ugarit begins at a place known as Minet el-Beida - "The White Harbour", situated on the eastern coast of the Mediterranean Sea north from Beirut, now known to be in Syria.

The seaport has been considered important through Antiquity till nowadays. When the first excavations began in 1929, the site's main inhabitants were the members of the tribe of Alaouites, who claimed they had descended from a nephew of the prophet Mohammed. It is a fact that even the Muslims regard them as an inferior minority practicing a sort of secret religion.

This is the place where the ruins of a big city, situated on an important commercial route, connecting Cyprus and the western curve of Euphrates, were found. There were a temple, a castle and a library in the city, which looked like a fortress, surrounded by massive walls. Three archeological layers and remnants of layers of unfired bricks were detected at a depth of 7-9 metres. The Necropolis with the funerals is on a rock above the ancient seaport. The ruins of the city and the objects found in it suggest the continuing existence of a slave-holding state. The main city of this state, called Ugarit, was connected commercially with the Hittite tribes of Asia Minor, the states of Mesopotamia, the Aegean region and Egypt. Various objects of Aegean, Hittite and Egyptian origin found in the ruins of the city are testimonies of that. Especially interesting are the monuments of cuneiform writing - business documents and works of Phoenician literature, found here (see [1]) .

The current name of the city comes from the spice growing on the hill underneath which the ruins were found. The hill was covered with aromatic fennel - a perennial or biennial herb from the Umbelliferae family with strong smell, used as a flavouring agent and sometimes as a medicine. According to Greek mythology, Knowledge was brought to people from Mount Olympus in the form of a blazing coal tied to a stem of fennel, and thence came the amusing name "Fennel Promontory", known now by its Arabic form - Rash Shamra.

The identification of Rash Shamra with Ugarit was actually made a few years after the first archaeological excavations, when the ancient name Ugarit was read on the discovered tablets with cuneiform writing (see [2]).

We must note that the chronological order of the dynasties of Egypt and the Middle East recognised by modern archaeology are dated from around 3000 BC till the middle of the first millennium BC. This chronological structure is based on relatively few remaining documents containing facts about the period of the reign of a given ruler. Its foundation was based on the so-called relative methods of dating, which involve surviving notes of kings and priests, genealogical notes, pottery styles, geological research, stratigraphy and the cycle of Sothis (Sirius), giving a "stretched"-in-time chronological model (see [3]).

There are some more precise methods for dating though - the absolute ones. In other words this is the dating based on astronomical events, radio-carbonic analysis and dendrochronology (for details see [4]).

Later on we will use what is perhaps the best-known method today - the astronomical one.

In a letter by Abi-Milku, ruler of Tyre, found in el-Amarna we read (see [5]):

"To the King, my Sun, my Lord, my god. A message from Abi-Milku, your servant... A fire burned the Palace in Ugarit; (rather) it destroyed half of it so one half of the Palace disappeared."

Another discovered correspondence proves this letter was written some time after the death of Amenhotep III. We have the opportunity, with the help of an astronomical retrospective calculation, to date back the fire that demolished the palace of king Nikmed II. In a small hall of the so-called "Western archive", close to the entrance of the palace, the archaeologist find strongly fired-blackened clay tablet - they mark it as KTU-1.78 [fig.1]. Sawyer and Stephenson [6] consider that it describes the occurrence of a total solar eclipse. The translation of the text by de Jong and van Soldt [7] is as follows [fig.2]:

Obverse: ***"On the day of the new moon in (the month) Hiyaru the Sun went down, its gate-keeper was Rashap."***
Reverse: ***"Two livers were examined: danger."***

Both Sawyer and Stephenson, and de Jong and van Soldt identify the deity Rashap as the planet Mars, on the basis of texts listing Rashap alongside the Akkadian deity Nergal. The latter being uniquely used to denote the planet Mars (Salbatanu) in a single Assyrian astrological text. There is another suggestion: Gray [8] translates Rashap as "the Venus star", but the first one is acknowledged by the majority of Egyptologists.

On the identification of the month Hiyaru, Sawyer and Stephenson suggest equivalence with the Babylonian month Ayyaru (Aiaru) and the Hebrew Iyyar, which is equivalent to April/May (Julian calendar). However, de Jong and van Soldt believe that an Egyptian calendar was in use at Ugarit and that Hiyaru, according to other calendar texts, is equivalent to February/March.

Another controversy concerning the translation is found in the problematical phrase "**btt**". The word "**tt**" is usually translated as "six", and the verb "**bt**" - "be ashamed". Currently many scholars accept that "**btt**" is the regular passive L-stem. More details can be found in [9].
In view of the fact that such a celestial phenomenon is an extremely rare one, it is inevitably associated with a forthcoming disaster. That is why there is a warning about a disaster that is going to befall the kingdom by the astronomer-priest, given on the reverse side on the tablet.

What does actually stand behind the name of Rashap or Reshep?
In Ancient Egypt he was known as the god of war and his origin is traced back to Syria.
"...Reshep's characteristic stance is brandishing a mace or axe over his head. His beard appears Syrian in style and he normally wears the Upper Egyptian crown adorned with a gazelle head in front and a ribbon behind. The gazelle connects Reshep iconographically with the god Seth, but it is the Theban war god Montu that he is most closely related. His martial temperament makes him an ideal royal deity, especially in an era boasting of the military and sporting prowess of its monarchs. A good example of this comes from the stela of Amenhotep II set up near the Sphinx at Giza where Reshep and the goddess Astarte are described as rejoicing at the crown prince's diligence in looking after his horses. Perhaps not too much stress should be placed on some of the Egyptian epithets which he receives, such as "Lord of the Horizon" or "Lord of Eternity" but his status in the New Kingdom was high. One region on the east bank of the Nile was even named the "Valley of Reshep". He appears on Theban stelae alongside the Egyptian god Min and the Syrian goddess Qadesh.

Reshep becomes (possibly because of Syrian enclaves among the Egyptian population) an approachable deity who can grant success to those praying to him. Also, his force for destruction of royal enemies in battle can be turned against diseases affecting ordinary people. For example, Reshep and his wife Itum are called upon in a magical spell to overpower the "akha" demon that causes abdominal pains. As a deity combining the polarities of life and death, he is known both in Egypt and the Near East as Reshep-Shulman..." (see [10]).

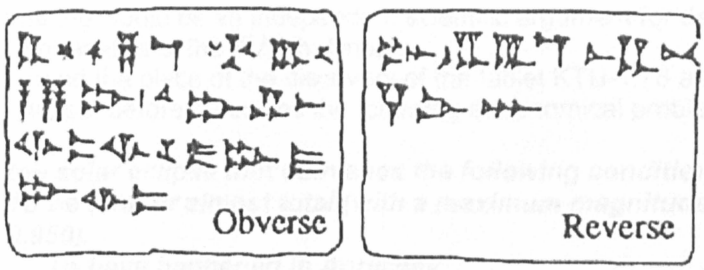
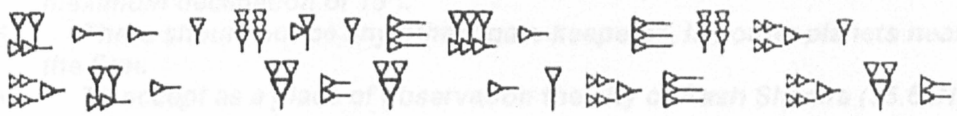
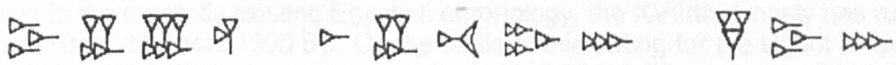


Fig. 1



btt.ym.hdt hyr.
rbt shpsh tgrh rsp



kbdm tbqrn skn

Fig. 2

btt - (was) put to shame
ym hdt - the day of the new moon (in)
hyr - (the month) Hiyaru
rbt(1) **shpsh** - the Sun went down (goddess); (at) sunset (goddess)
tgrh rsp - (its) gate-keeper was Rashap

kbdm - two livers
tbqrn(2) - were examined
skn(3) - danger

(1) past tense, a form of the feminine gender of the verb "**rb**"- enter

(2) future tense, third person, masculine gender, plural number of the verb "**bqr**"- examine

(3) also meaning "supervisor"

But let us advance towards the most interesting part - when was this spectacular event observed? Its dating would be an independent scientific argument for determining the years of the reign of the pharaohs of the XVIIIth dynasty.

Having in mind the place of the discovery of the tablet KTU-1.78 and its most common interpretation, we set before ourselves the following astronomical problem:

To find the solar eclipse that convenes the following conditions:

1. ***To be total or almost total (with a maximum magnitude not less than 0.950).***
2. ***To have happened in April/May.***
3. ***To have reached a maximum magnitude a little before/during sunset.***
4. ***For the planet Mars to attend at the celestial hemisphere at some moment during the eclipse, close enough to the Sun (approximately with a maximum declination of 15°).***
5. ***There should not be any other "gate-keepers", i.e. other planets near the Sun.***
6. ***To accept as a place of observation the city of Rash Shamra (35.62N; 35.78E).***

Unfortunately, it is hard to achieve a greater accuracy in setting the criteria, due to lack of data.

As you will see later on, some researchers offer different interpretations of the name "Rashap" or "joggle" with the month and the time of the eclipse due to the inability to find a solution at the commonly accepted space of time. Following [11] we will examine most of them.

According to the currently existing Egyptian chronology, the XVIIIth dynasty has ruled from around 1570 BC till about 1300 BC. On the basis of this dating for the Ugarit eclipse is chosen the 3rd May 1375 BC (a maximum magnitude M=0.964±0.05, according [6] M=0.993) [fig.3], and in this case the scientists suggest that Aldebaran - the reddish star (situated around 8 deg from the Sun) with a magnitude of $+0.85^m$, is the candidate for Rashap. If we accept the possibility that on the tablet KTU-1.78 is written "...the sixth hour of the day...", then the given eclipse suits the condition, but another chronological difficulty arises. The tablet is blackened by fire - a fact that leads to the following confusion:

"If, as some suppose, this were the same fire as the one mentioned by Abi-Milku of Tyre in a letter to Akhenaten, it would have to be dated c. 1365 BC." (see [9])

Based on van Soldt's translation and de Jong and van Soldt's approximate dating of the tablet (1250-1175 BC), Dutch researchers came up with the eclipse on the 5th March 1223 BC (M=0.889±0.05; authors give: M=0.952) [fig.4] They chose the $+1.49^m$ magnitude planet Mars, within a proximity of 3.5 deg of the Sun as their candidate for Rashap. Here the difficulties are that the eclipse has happened a little after noon and that Mars could not have been visible.

If we accept that "**rbt**" simply means "by sunset" and not "by the going down of the Sun", then the following datings could be candidates for the Ugarit eclipse: the 23th February 1138 BC (M=0.794±0.05) [fig.5] and the 27th March 1084 BC (M=0.894±0.05) [fig.6]. But in this case the low maximum magnitude, the presence of other planets near the sun and not so convenient hour are still weaknesses of the datings.

A really interesting interpretation of the event described on the tablet is made by Murrell Selden. He offers a large number of dates between 1079 and 1012 BC [12], however almost all of them, except the eclipse of the 20th May 1078 BC (M=0.939±0.05) [fig.7] are not suitable candidates. In the last case there are other discrepancies such as the early hour.

By now the most attractive eclipse is that of the 9th May 1012 BC (M=0.973±0.04). In this case the candidates for Rashap are several (see fig.8 - it depicts the position of the heavenly bodies around 20 minutes before the maximum magnitude of the solar eclipse). And these are: 1) the formidable conjunction of Mars ($+1.81^m$), Mercury ($+1.15^m$) and Jupiter (-1.80^m) (see [7]); 2) the declining Orion constellation (see [13]); 3) the gigantic star that is going to explode as supernova about 2000 years later and is going to form the Crab Nebulae (see [5]). In the fist case it is strange that the combination of the three planets was named after the least

visible one. In the second case we can ask ourselves how the most prominent constellation in the night sky, known in Egypt by the name of Sah and described as the "glorious soul of Osiris" could have been confused with a small planet such as Mars. The third candidate for Rashap was only about 4.3 deg of the Sun and probably was "lost" in its corona.

By now it is obvious that the attempts for dating of the eclipse are between 1450 and 1000 BC. But let us see whether such an event has happened later, perhaps in the next 2700 years, i.e. until 1700 AD. In order to cover a greater number of candidates we will weaken the condition (2) by presuming it possible that the description concerns the Egyptian month Hiyaru, corresponding to February/March in the Julian calendar. Also all the eclipses that reached their maximum magnitude not more than three hours before the Sun went down, we will regard as having happened "at sunset".

A very good candidate is the eclipse of the **19th May 557 BC (M=0.924±0.05)** [fig.9]. It happened almost 2 hours before sunset. Mars (+1.67m) is at about 7 deg eastward and the nearest planet is Venus (-3.75m) - at 26 deg to the east from the point of the eclipse. **So this is one solution of the problem.**

Later on we come across another interesting date - the 30th April 59 AD (M=0.958±0.03) [fig.10]. This eclipse reaches its maximum two hours before sunset. Mars is 10 deg eastward with a magnitude of +1.61m but there are a lot of bright objects near it (Mercury: -1.76m, Saturn: +0.86m and Aldebaran: +0.85m, Venus is on the horizon: -3.71m), so a planet such as Mars could not possibly have made any impression whatsoever if it had been visible at all.

A less possible candidate is the eclipse of the 14th May 1333 AD (M=0.968±0.005) (see [fig.11]), one hour before sunset. However Mars (+0.66m) is 90 deg eastwards.

We come upon another interesting event in this interval - **the total solar eclipse on the 18th April 1539 AD**, with a maximum magnitude **M=1.052±0.001**, reached at **17:54** local time (fig.12 shows the picture about 20 minutes earlier), half an hour before sunset. A shocking date at first glance, in view of popular chronology. But it fully matches the description of the astronomical event written on the clay tablet found in Ugarit. The planet **Mars (+1.28m) is 7.5 degrees to the west** and perfectly identifies with Rashap as the gate-keeper of the Sun. The nearest other celestial bodies are Aldebaran (+0.85m) and Jupiter (-1.89m), accordingly at about 27 to the south-east and 47 deg to the east, but they are far enough not to distract attention from it. Only a slight detail dilutes the picture - it was not visible during the eclipse, because it was low to the horizon and it goes down several minutes before the full magnitude. But again it is not a secret that in the XVI century and in Egypt, the Middle East and Europe the positions of the planets on the sky were known with sufficient accuracy. What is more, during their conquests of Syria and Phoenicia, the Assyrians inevitably imported their traditions in the field of astronomy, especially in astrology - the foretelling of the destiny of the king and the state by the celestial bodies and phenomena. It is assumed the belief in the power of the stars to predestine the road of life came to Egypt and then to Syria a little before Ptolemy (c.100-165 AD) visited it.

And as one last note we should remember the high position that Rashap - the god of war - held among the ordinary people, the priests and the belligerent rulers.

Why do we need all these explanations? In order to clarify that even if the planet Mars (Rashap) was not visible during the total solar eclipse of the 18th April 1539 AD, the priests-astronomers knew well its position in the sky - of the "gate-keeper" and "Lord of Horizon", leading the setting Sun beyond the Horizon, into Eternity!

These ideas lead to the conclusion that there are only two solar eclipses between 2000 BC and 1700 AD, which suits the conditions (1) - (6): the first one is that of the 19th May 557 BC and the second one - of the 18th April 1539 AD.

But we have a reason to claim the most serious candidate for the real eclipse, described on the fire-blackened tablet of Ugarit is that on the 18th April 1539 AD.

For a more comprehensive investigation we made two additional assumptions for the conditions (1) and (3) in the formulation of the astronomical problem. These are the maximum magnitude of the eclipse and the exact hour of its occurrence. An eclipse accepted as a solution with one of the mentioned compromises would be a passable candidate, but accepted

with both - not nearly.

Bearing in mind the telling comment by the Assyriologist Walker [14] about the clay tablet KTU-1.78 :

"At first sight the text refers to an event occurring at sunset.",

and its translation [7], we should reject the eclipse of the 19th May 557 BC as a less appropriate candidate in comparison with that of the 18th April 1539 AD, because the first was not a total one and had happened two hours before sunset.

This new dating of the Ugarit eclipse (18th April 1539 AD) fully convenes the New chronology of Egypt, constructed by academic A. Fomenko and his associates. It is based on new experimental and statistical methods of analysis of ancient events [15,16,17], as well as on the decoding and dating of the Dender horoscopes (20th March 1185 AD and 22-26th April 1168 AD), the zodiacs of the Esna temples (31st March - 3rd April 1394 AD and 6-8th May 1404 AD), the Atribian horoscopes of Flinders Petri (15-16th May 1230 AD and 9-10th February 1268 AD), the Henry Brufsh`s horoscope (18th November 1861 AD), the Tyva Color zodiac (5-8th September 1182 AD) and the horoscopes of the Petosyris tomb (several dating between 1227 and 1714 AD); for details see [18]. All these results are sufficiently close to the surprising date of the Ugarit eclipse suggested above.

The sole fact that two independent approaches (based on horoscopes and the eclipse, respectively) lead to one and the same "shift" of the oldest period of the Egyptian history is amazing! Isn`t it really possible that Ancient Egypt is not as ancient as it seems?

Note: The data about the eclipses, the sunrise and the sunset, as well as the figures from the appendix are taken from the programs StarCalc 5.72 [19], Thomas Pfleger and Oliver Montenbruck`s ECLTIMER (1993), Fred Espenak`s Catalogue [20] and Ephemeris Generator [21]. For the calculation of the parameter ΔT was used the Robert van Gent`s program 'Javascript Delta T Calculator' [22]. The corrections to the maximum magnitudes of the eclipses are evaluated on the basis of these sources.

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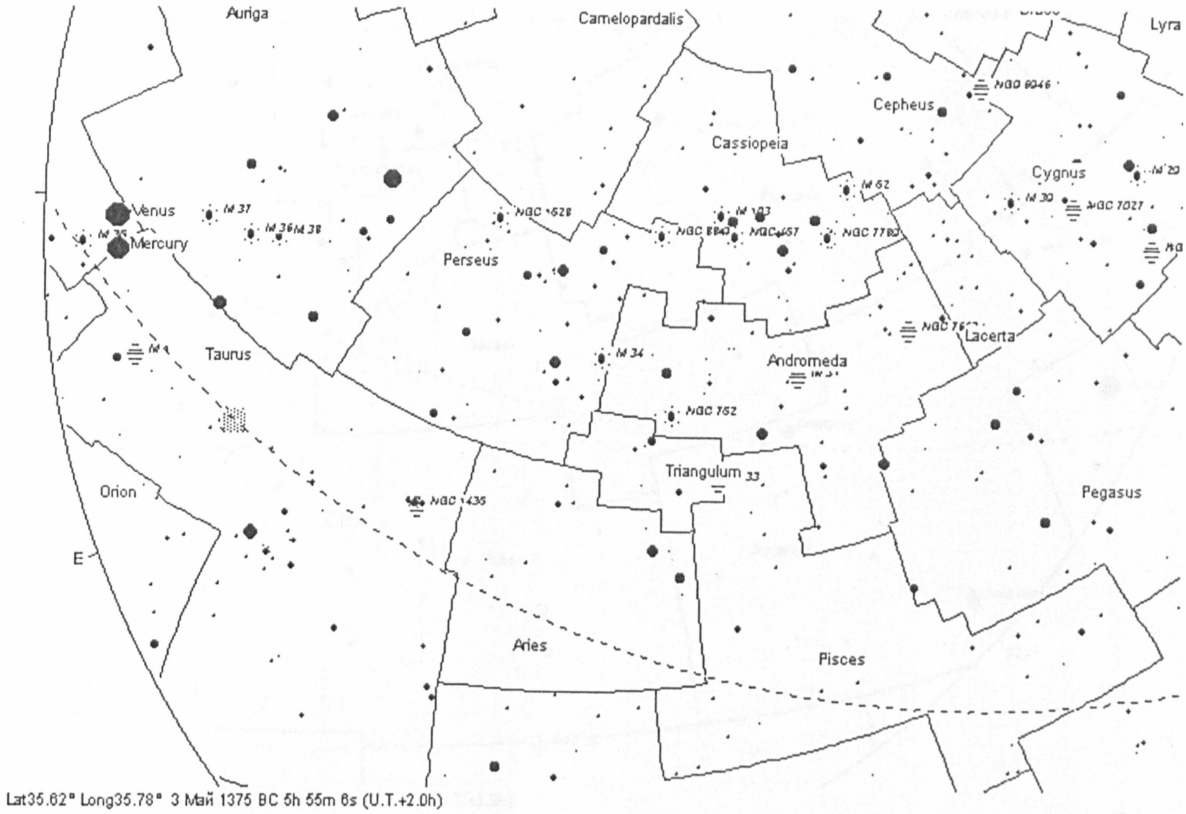

Auriga
Camelopardalis
Lyra
Cepheus
Cassiopeia
Cygnus
Venus
Mercury
Perseus
Taurus
Andromeda
Lacerta
Triangulum
Pegasus
Orion
Aries
Pisces
E
Lat35.62° Long35.78° 3 Май 1375 BC 5h 55m 6s (U.T.+2.0h)

Fig.3

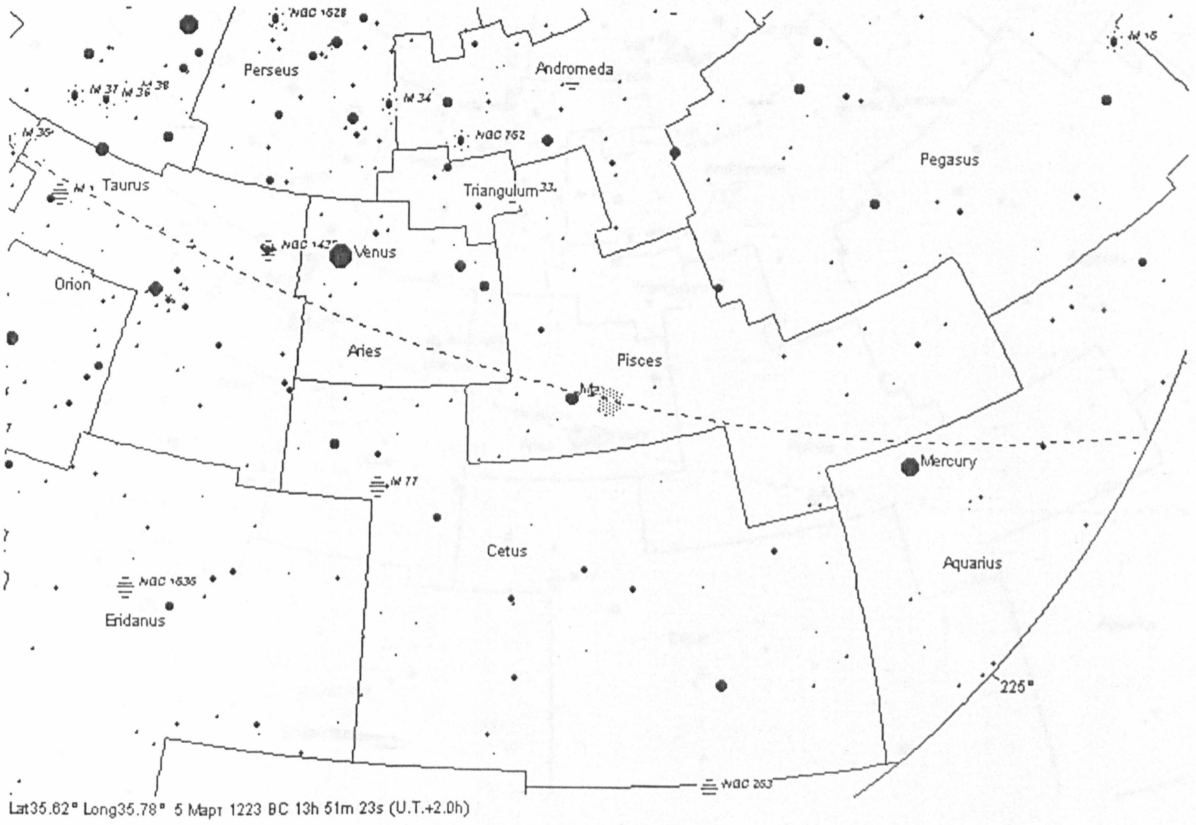

Perseus
Andromeda
Pegasus
Taurus
Triangulum
Venus
Orion
Aries
Pisces
Mercury
Cetus
Aquarius
Eridanus
225°
Lat35.62° Long35.78° 5 Март 1223 BC 13h 51m 23s (U.T.+2.0h)

Fig.4

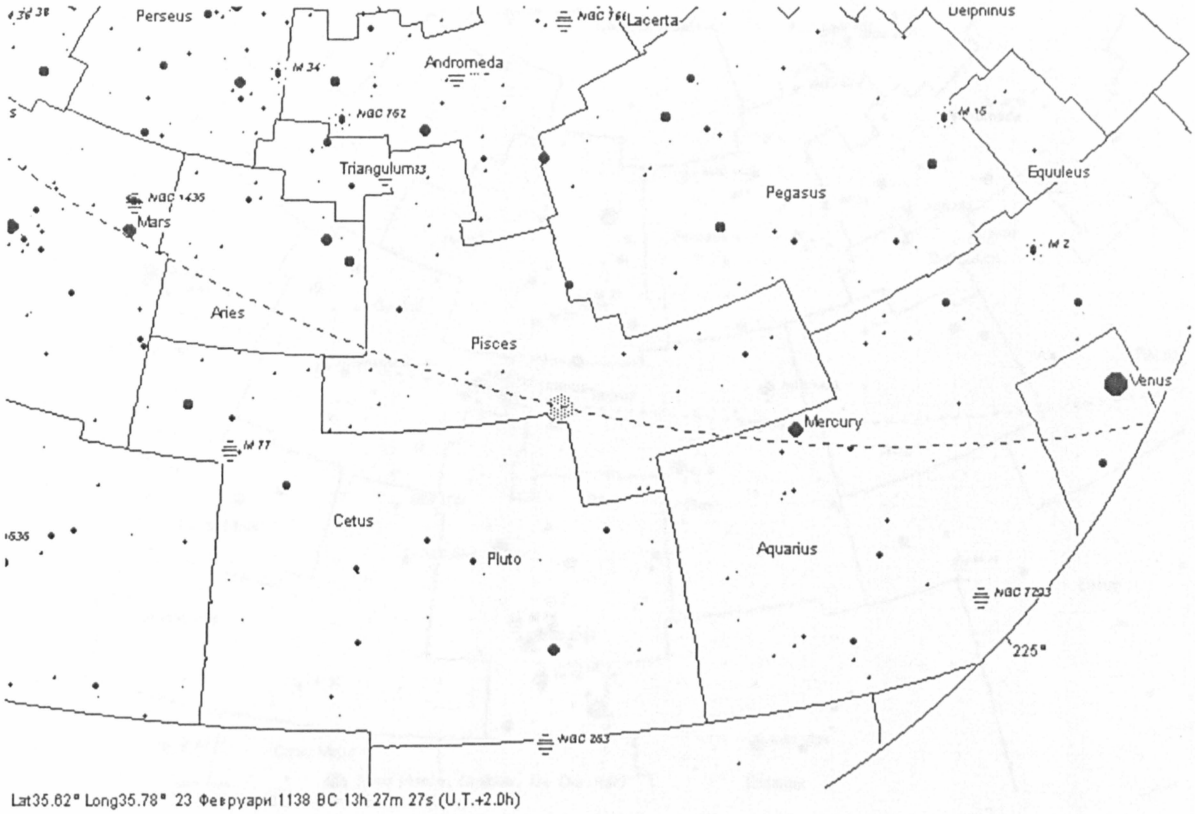
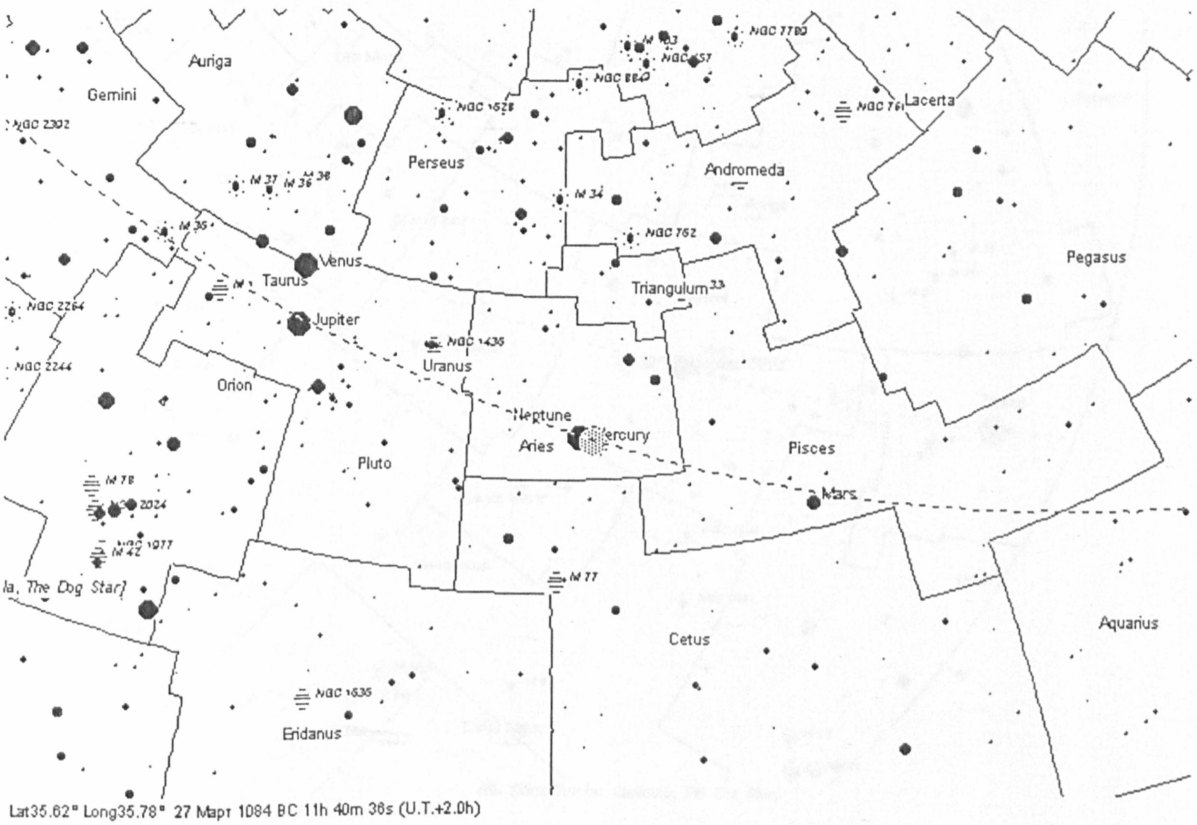

Perseus
Lacerta
Andromeda
Triangulum
Pegasus
Equuleus
Mars
Aries
Pisces
Venus
Mercury
Cetus
Pluto
Aquarius
225°
Lat35.62° Long35.78° 23 Февруари 1138 BC 13h 27m 27s (U.T.+2.0h)

Fig.5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Lacerta
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Venus
Taurus
Jupiter
Triangulum
Uranus
Orion
Neptune
Aries
Mercury
Pisces
Pluto
Mars
Cetus
Aquarius
Eridanus
Lat35.62° Long35.78° 27 Март 1084 BC 11h 40m 36s (U.T.+2.0h)

Fig.6

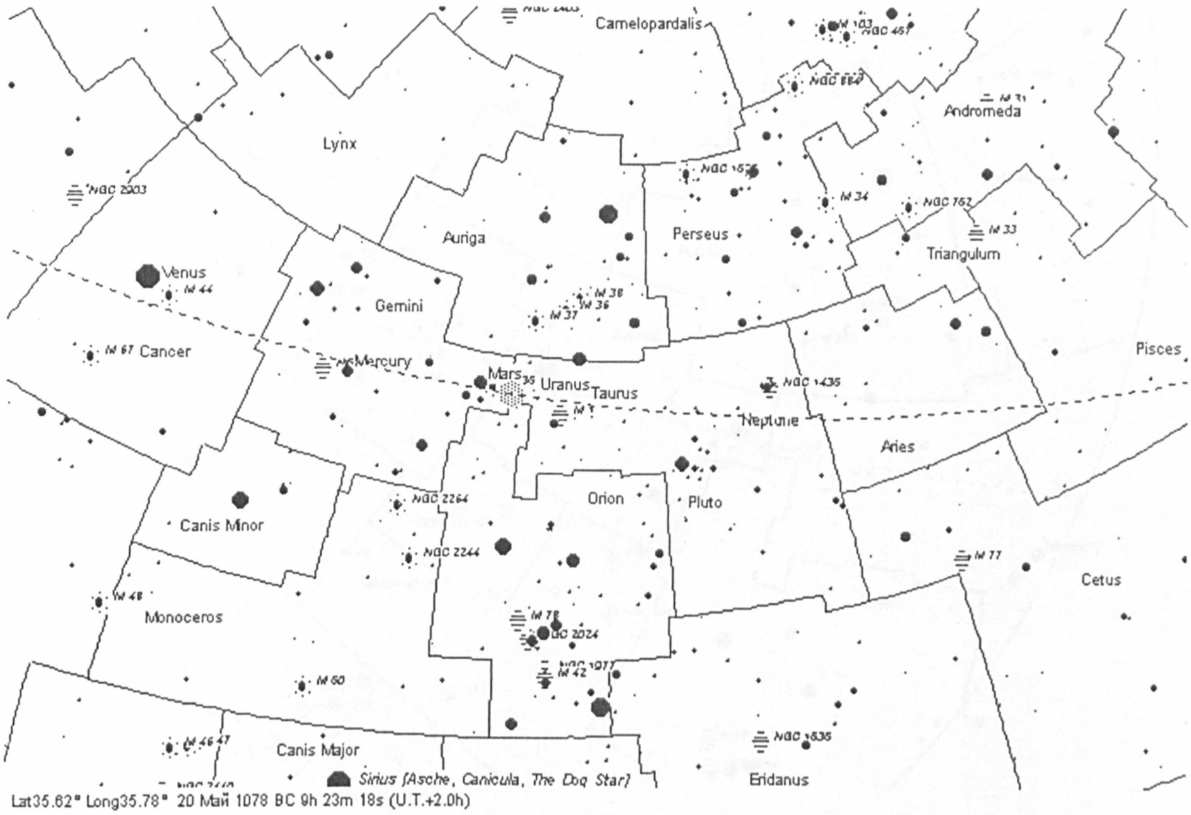
Camelopardalis
Andromeda
Lynx
Auriga
Perseus
Triangulum
Venus
Gemini
Cancer
Mercury
Mars
Uranus
Taurus
Neptune
Pisces
Aries
Orion
Pluto
Canis Minor
Monoceros
Cetus
Canis Major
Sirius (Asche, Canicula, The Dog Star)
Eridanus
Lat35.62° Long35.78° 20 Май 1078 BC 9h 23m 18s (U.T.+2.0h)

Fig.7

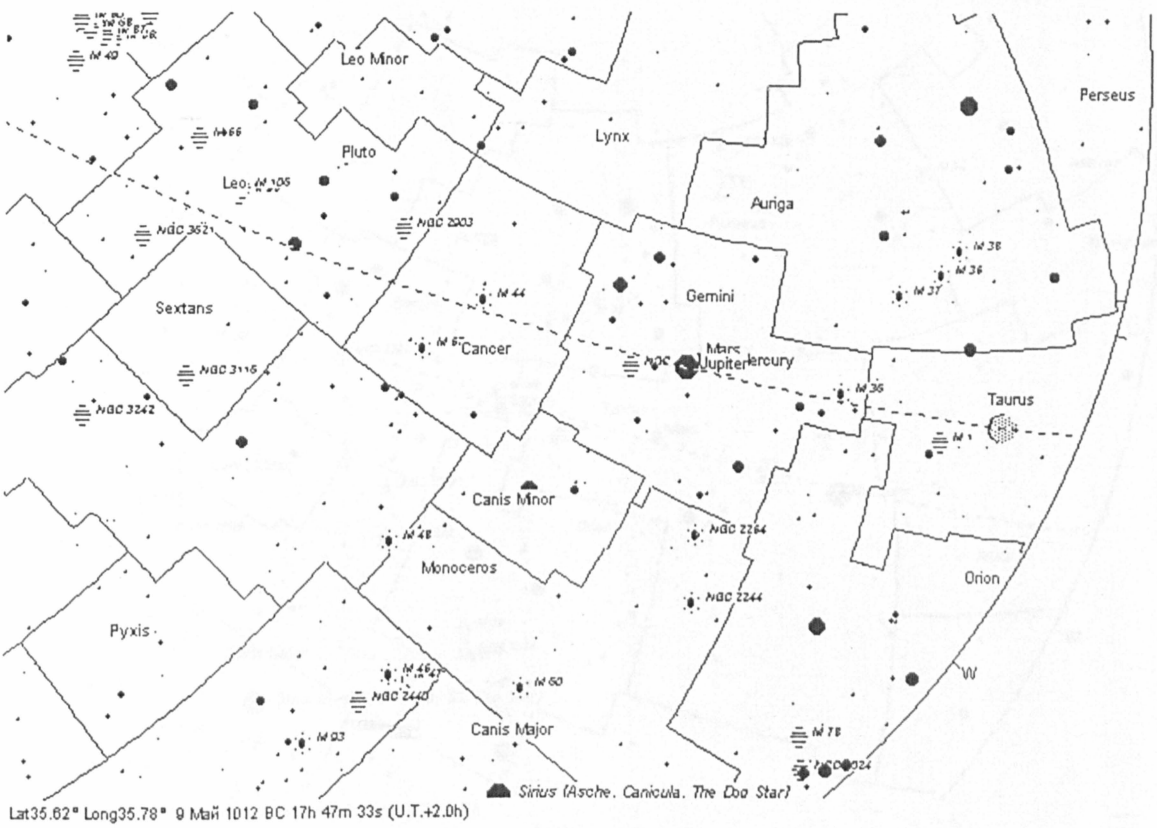
Leo Minor
Lynx
Perseus
Pluto
Leo
Auriga
Sextans
Gemini
Cancer
Mars
Jupiter
Mercury
Taurus
Canis Minor
Monoceros
Orion
Pyxis
Canis Major
Sirius (Asche, Canicula, The Dog Star)
Lat35.62° Long35.78° 9 Май 1012 BC 17h 47m 33s (U.T.+2.0h)

Fig.8

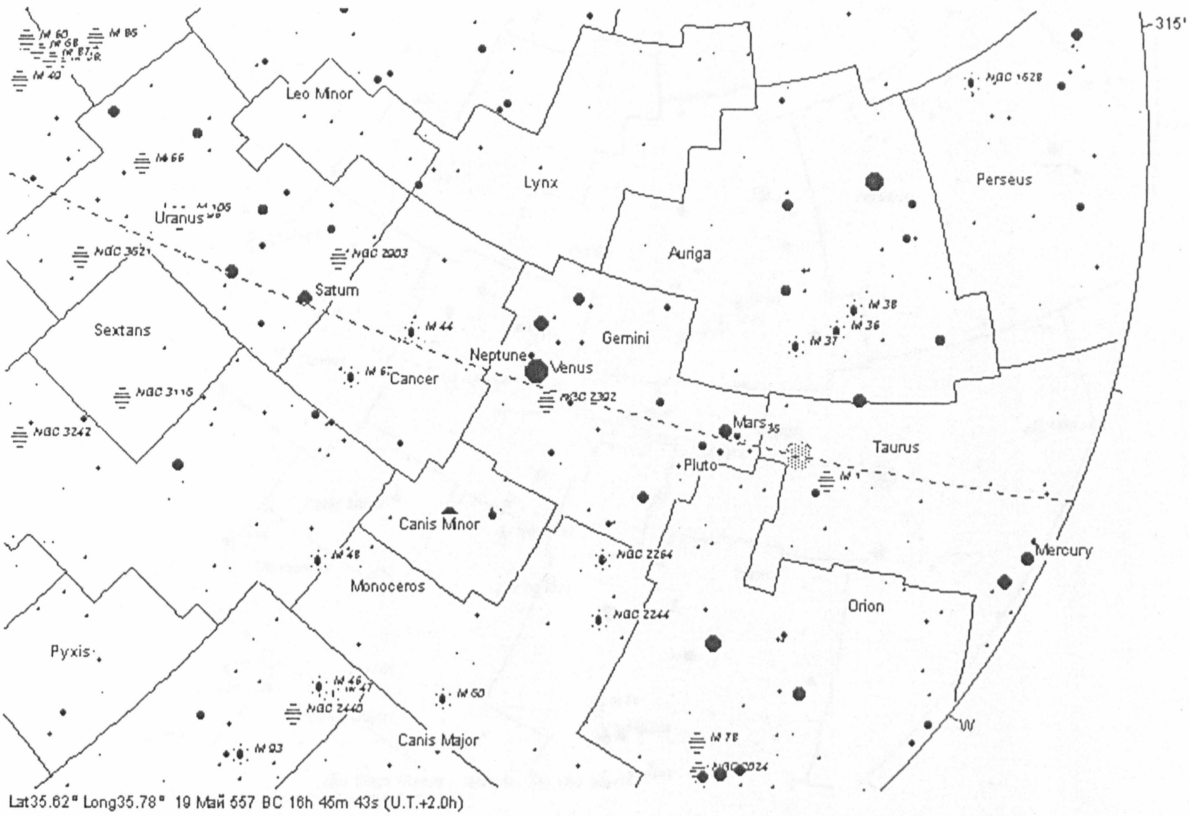
315°
Leo Minor
Lynx
Perseus
Uranus
Auriga
Saturn
Sextans
Gemini
Neptune
Venus
Cancer
Mars
Taurus
Pluto
Canis Minor
Mercury
Monoceros
Orion
Pyxis
Canis Major
W
Lat35.62° Long35.78° 19 Май 557 BC 16h 46m 43s (U.T.+2.0h)

Fig.9

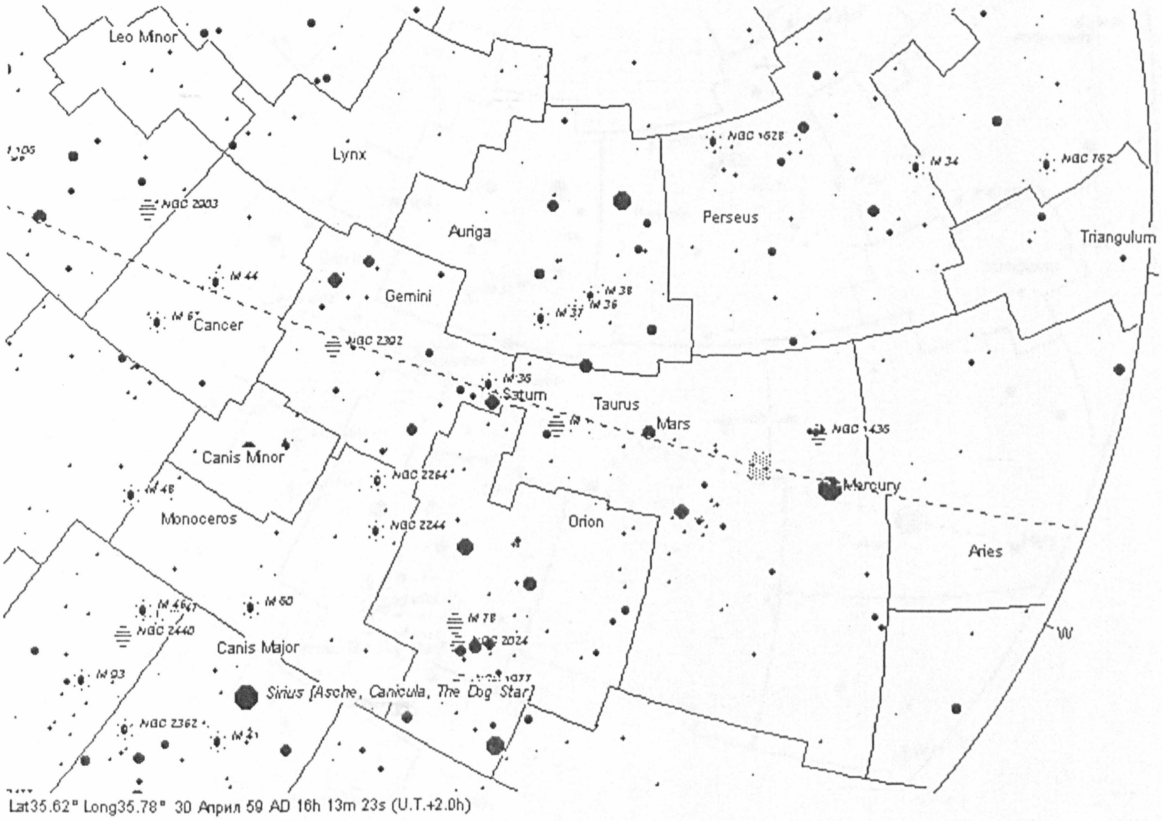
Leo Minor
Lynx
Auriga
Perseus
Triangulum
Gemini
Cancer
Saturn
Taurus
Mars
Canis Minor
Mercury
Monoceros
Orion
Aries
Canis Major
Sirius (Asche, Canicula, The Dog Star)
W
Lat35.62° Long35.78° 30 Април 59 AD 16h 13m 23s (U.T.+2.0h)

Fig.10

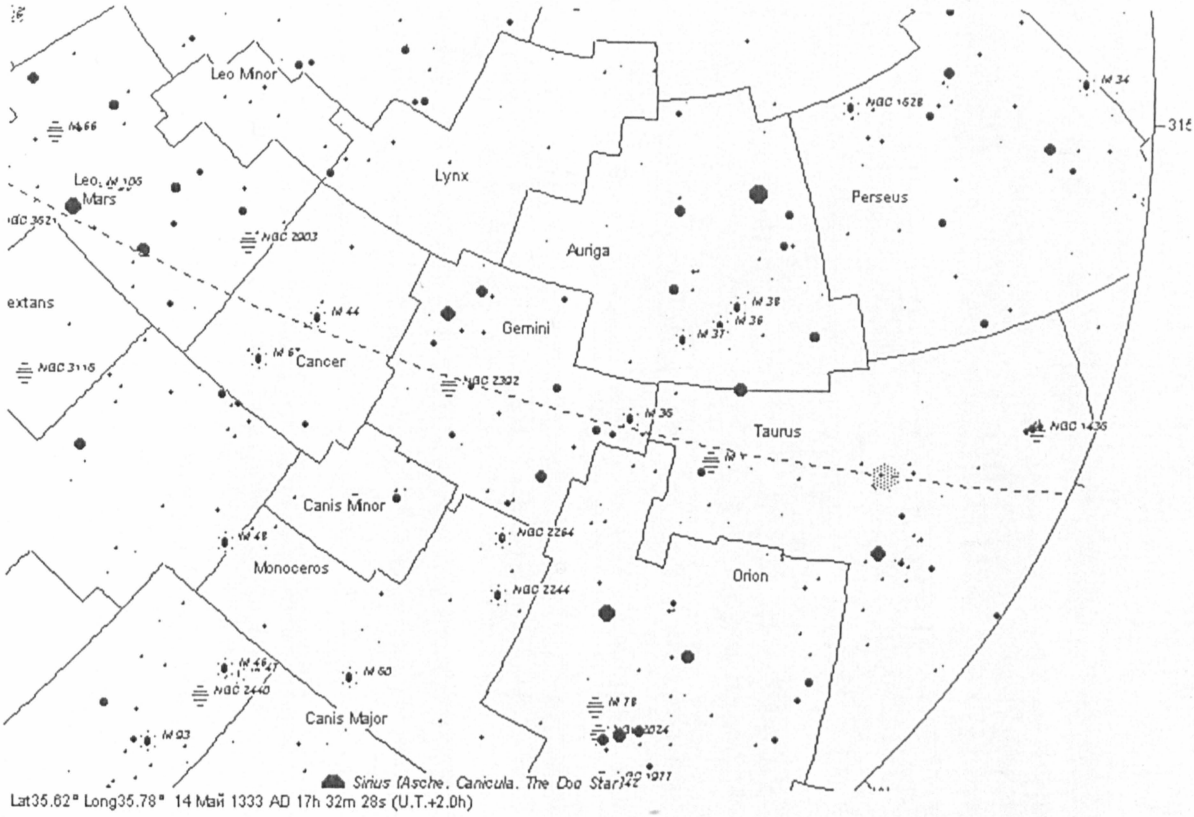
Leo Minor
Lynx
Perseus
Auriga
Leo
Mars
Gemini
Cancer
Taurus
Canis Minor
Monoceros
Orion
Canis Major
Sirius (Asche, Canicula, The Dog Star)
Lat35.62° Long35.78° 14 Май 1333 AD 17h 32m 28s (U.T.+2.0h)

Fig.11

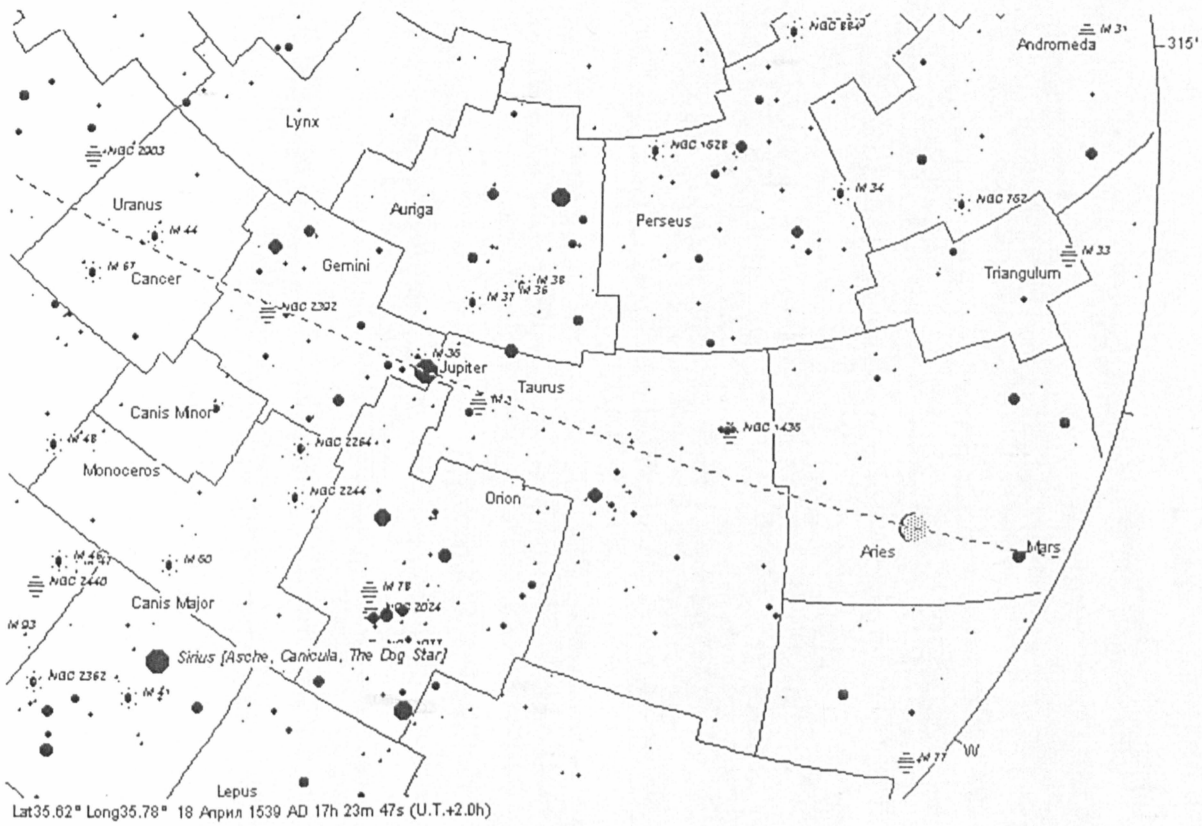
Andromeda
Lynx
Uranus
Auriga
Perseus
Gemini
Cancer
Triangulum
Jupiter
Taurus
Canis Minor
Monoceros
Orion
Aries
Mars
Canis Major
Sirius (Asche, Canicula, The Dog Star)
Lepus
Lat35.62° Long35.78° 18 Април 1539 AD 17h 23m 47s (U.T.+2.0h)

Fig.12