

3) "We again took one of the ancient observations very faithfully recorded, according to which it is quite clear that in the year 45 of Dionysius, Parthenon 10, Jupiter at sunrise occulted the Southern Ass" [327, p. 361; Section XI.3].

4) "We took for this again one of the faithfully recorded ancient observations, according to which it is clear that in the year 82 of the Chaldeans, Xanthicus 5, in the evening, Saturn was 2 digits below the Virgin's southern shoulder." [327, p. 379; Section XI.7].

According to the traditional identifications of Ptolemy's stars with the modern ones [321], we have the following information about occultations:

- 1) Venus covered the star η -Virgo at about midnight.
- 2) Mars covered the star β -Scorpio in the morning.
- 3) Jupiter covered the star δ -Cancer at sunrise.
- 4) Saturn was "2 digits (2 units ?)" below the star γ -Virgo.

We checked all these traditional identifications and they were confirmed. For the calculation of the planets' locations in the past, we used a modern theory and concrete values of the averaged elements of the planets' orbits from the well-known book by G. N. Duboshin [346]. The accuracy of the calculations of latitudinal position is equal to 1' (1 minute). Let us comment on how one needs to understand the words: "a planet occulted the star".

It is well known that the regular human eye can distinguish two points at an angular distance of about 1'. Extremely sharp eyes can distinguish two points at an angular distance of about 30" (30 seconds). Consequently, the occultation ("coincidence") of the star by some planet means in reality that the angular distance between them (from the point of view of the astronomer on the earth's surface) is equal to about 1'. It is clear that it was impossible for Ptolemy to calculate (even in principle) this remarkable astronomical event, because the accuracy of his theory was about 10'. The modern theory allows us to calculate the latitudinal positions of Venus and Mars in the past (for the historical time interval under consideration) with the accuracy of 1'. The accuracy of the calculations of the longitudes of Mars and Venus is equal to about 3'. It is quite sufficient for us because actually only the value of the latitude determines the occultation of the star by the planet. The longitude of the planet changes rapidly (in comparison with the latitude), and we can assume that the longitude is proportional to time. Consequently, the small error in the calculation of the longitude implies only a small error in the calculation of the covering time. Thus, in the cases of Mars and Venus, the covering described by Ptolemy can be calculated with great accuracy on the basis of modern theory.

The theory of the motion of Jupiter and Saturn is more complicated and less accurate than for the case of Mars and Venus. V. K. Abalakin writes: "The averaged elements of the orbits of Jupiter, Saturn, Uranus, Neptune, Pluto cannot be used for solving the stability problem and cannot serve over a period of millions of years... They are suitable for several centuries of our epoch" [328, p. 302].