

Ongoing News

concerning the
long suspected new primary planet
of our Solar-System.

OCTOBER, 1801.

From around the end of August to the middle of September, we have made many and various attempts to seek out the so eagerly awaited new arrival in the morning hours. The universally prevailing poor weather did not particularly aid us in this occupation. First the dawn was too bright, then the moonlight; finally, the rainy weather, mist, and hazes all made the seeking out [of the star] impossible. The entirety of our foreign astronomical friends and correspondents, our most renowned French and German comet-scouts, MESSIER, MÉCHAIN, and BOUVARD; HERSCHEL, OLBERS, BODE, and SCHRÖTER, have not been any luckier in their pursuits. All of the reports which we have received up until now agree in that all attempts employed have remained unsuccessful due to the universally prevailing poor weather.

However, most astronomers not only hold evermore the well-founded opinion that this newly discovered star were definitely of a planetary nature, but also the further calculations and investigations verify this presumption more and more.

Thus has Dr. OLBERS put to the test, for example, whether three complete observations could be satisfied by parabolic elements. The result of his calculations turned out *negative*. He was not able to represent more than *three* longitudes and *two* latitudes, or *two* longitudes and *three* latitudes with a parabola from the *three* observations upon which the calculations were based. He has duplicated his calculations, and in order for our reader to see *how little a parabola fits*, we here include, as a trial, *one* result of his calculation.

Parabolic Elements for PIAZZI's star, calculated by Dr. OLBERS.

| | From 3 Longitudes and 2 Latitudes | From 2 Longitudes and 3 Latitudes |
|--------------------------------|--------------------------------------|--------------------------------------|
| Longitude of the Ω node | 2 ^S 19° 50' | 2 ^S 21° 7' |
| Inclination of the orbit | 10 38 | 9 48 |
| Longitude of the perihelion | 3 25 24 | 4 10 6 |
| Time of the perihelion | June 8th, 1801 16:00 16' | June 25th, 1801 7:00 38' |
| Distance of the perihelion | 2.53510 | 2.13268 |

This parabola approaches that which BURCKHARDT had recently calculated, and which we have communicated in volume IV of the *M. C.*, pg. 60. Dr. BURCKHARDT had already assured us then, and once again repeated this assurance upon the occasion of SOLDNER's orbit,¹ that he hardly believed that any parabola other than his could be given, which would more closely satisfy the observations. All in all, from this follows the quite certain conclusion, *that PIAZZI's observations cannot be tolerably represented by any parabola, and that consequently, only a planetary or elliptical motion could accomodate them.*

Dr. OLBERS was thus actually about to calculate a new elliptical orbit for this planetary heavenly body [*planetarisches Himmelskörpers*] from the complete, above-mentioned *improved* series of PIAZZI's observations, since he fostered such a great confidence in the *immense precision* of the observations, wherefore he not merely made the estimation in decimals and hundredths of seconds, but PIAZZI's name as well, his otherwise proven great precision, and the renowned excellence of his instruments. However, Dr. OLBERS very quickly realized that the given *right ascensions* must have considerable errors here and there; he found in part the same falsities from the traversed differences, which we have already censured and denounced in volume IV of the *M. C.*, pg. 156; and in February, he even assumed errors of nearly 20 seconds of time, which could not be well improved by any probable conjecture.

[missing section in original]...for such a task, as thankless as it is superfluous, especially since our BURCKHARDT had already accomplished everything herein, which could be accomplished. He thus contented himself to test to what extent these new PIAZZI observations deviate from a circular hypothesis. Thus, he first sought a circle from the observations from Jan. 1st and Feb. 11th; and after we had communicated to him our table of calculations of PIAZZI's observations in the preceding issue, pg. 280,² he improved these circular elements as follows:

¹*M. C.* Vol. IV, pg. 160.

²On this occasion Dr. OLBERS communicated the following printing errors to us in PIAZZI's printed observations, on page 280 of the preceding issue, which we communicate here for improvement. The Sun longitude for Jan. 19th is around a minute too large, and should read 9^S 29° 18' 53.8".

Mon. Corr. Volume IV, 1801.

Radius of the circle 2.730185
 Longitude of the ascending Ω $2^{\text{S}} 20^{\circ} 23' 45''$
 Inclination of the orbit 11 3 36
 Heliocentric distance from the $\delta\Omega$ }
 of the orbit, in the first observation } 11 46 53.5
 Time to traverse [Period] 1647.75 Days
 Daily heliocentric motion $13' 6.528''$

With these circular elements the observations which lie in between now accord in the following manner:

| 1801 | Calculated Longitude | Calculated Latitude | Error | |
|---------|--------------------------------------|------------------------|--------------|-------------|
| | | | in Longitude | in Latitude |
| Jan. 18 | $1^{\text{S}} 23^{\circ} 12' 24.3''$ | $2^{\circ} 16' 28.3''$ | + 1' 46.7'' | - 0' 30.9'' |
| 19 | 1 23 28 16.2 | 1 53 11.3 | + 2 17.0 | - 0 26.9 |
| 31 | 1 24 40 3.2 | 1 10 36.4 | + 1 56.1 | - 0 18.2 |

From these miniscule deviations from the circular hypothesis, Dr. OLBERS reaches the following conclusions:

1) PIAZZI's star is, in consequence of the observations, *actually a planet*, and moves in a not very eccentric ellipse.

2) It is probable, that this planet, when observed, was not so far from the line of apsides, either the perihelion or the aphelion.

3) It hardly seems possible to ascertain anything certain concerning the dimensions of the actual ellipse from so few deviations from the circular hypothesis, among such close observations. And also, as BURCKHARDT had found, and as all parabolic elements confirm, if the planet's heliocentric velocity increased somewhat over the course of its observation, and its distance from the Sun had somewhat decreased: then it will be very difficult indeed, to account for such a small arc (the circular hypothesis gives $8^{\circ} 57'$), and such a minor eccentricity with certainty, whether PIAZZI's star went through its aphelion shortly before the 1st of January, or through its perihelion not long after the 11th of Febr. Dr. OLBERS admits that BURCKHARDT had found an ellipse that harmonized very well with the observations, in which the aphelion fell upon the 1st of January; only it seemed to him, that one has to be able to find an ellipse that does not accord much more poorly, if one places the perihelion a few days after the 11th of February or before the 11th of February.

4) The uncertainty whether PIAZZI had observed his star near to the aphelion or the perihelion, has an influence upon the positions given in advance for the future seeking out of the star. If the new planet went through its aphelion before the 1st of January, then its heliocentric velocity increases, and its geocentric longitudes must be *greater* in August and September as well, than according to the circular hypothesis. If, however, it went through its perihelion in February, then the heliocentric velocity had decreased, and its geocentric longitudes had to

be *smaller* in August and September, than according to the circular hypothesis. Because it cannot now be known, which of both cases occurs, then it is more sure for seeking out the star in the future, to base the deduced positions upon the circular hypothesis, which cannot deviate very much from the true, and which maintains the mean between the two possible cases.

From those of BURCKHARDT, these positions do not deviate more than two degrees in latitude, and only around a few minutes in longitude. The new planet will thus most certainly be found again, if one assumes these points, determined from OLBERS's circular hypothesis, and searches a few degrees back and forth in the same latitude parallel, and takes note of all the small stars found there.

Regarding the objection made by some astronomers, that the striking inclination found for the orbit of PIAZZI's star could yield a well-founded doubt against the planetary nature [*Planetismus*] of this star, OLBERS himself elucidated it thus: "The great inclination, so uncommon for a planet, which the elliptical elements give for PIAZZI's star, appears to me to be no reason, for whose sake one should not find it more believable that this star were a planet. We know no given physical reason why the planets even have to have such a small inclination. The hypothesis of the great LA PLACE himself that the planets were displaced by the Sun's atmosphere [which is] contracting bit by bit, is not only hardly probable, but actually, I think it can be said, obviously false, because the motions, namely, the thrown-velocities?? [*Wurfgeschwindigkeit*] of the planets, are not in agreement with it, and indeed this is taken, to my knowledge, from BUFFON's musings [*Träumerey*], the sole hypothesis of which one has sought to give a physical cause for the slight inclinations of the planet's orbits. NEWTON found generally known, even in these slight inclinations, a convincing proof of the arbitrary structure of an almighty Creator. Thus, it has not ever been wholly proven, that a planet could not have an inclination of 11 to 12 degrees."

Our readers have already seen in the August issue, pg. 159, that LA PLACE himself has called this objection trifling. However, more, and greatly justified opinions concerning this supposition that PIAZZI's star could be one and the same as the comet of 1770 are communicated. Dr. OLBERS finds this completely improbable. Of this, he writes to us: "The comet of 1770, surrounded with such an enormous atmosphere, could never be seen as a magnitude 8 star without any cloud. However, as it may be that the orbit of the 1770 comet had been displaced by Jupiter's, then it must always be very near to a point of Jupiter's orbit, consequently it could certainly never assume the dimensions, which would agree with those deduced from PIAZZI's observations." Prof. BODE is of the same opinion; this astronomer also expresses his doubts against it to us with the following reasons: "Should such an enormous transformation of the form and position of the orbit of a comet by the attraction of Jupiter be possible? I saw the comet of 1770 in Hamburg on July 1st in Lyra [*der Leyer*] with its ambient cloud, almost the apparent magnitude of the full moon, and completely round. Should this comet be able to appear three times farther away than the Sun, without any cloud? The comet of 1729, which was observed more than four times farther away than the Sun, appeared as large as Jupiter through a 16-foot

telescope with its cloud, seen through the mentioned telescope. I would rather assume that the comet of 1770 is seen only with its approach to the Earth, than at that time in such a luminous envelopment of clouds [*Nebelhülle*]; according to LAMBERT's calculation, it was only seven times farther away from us than the Moon on July 1st..."

Be that as it may, future observations will be soon and surely decided, regarding PIAZZI's star; however, what was encountered with the comet of 1770 might also suspend all searches for this inscrutable planet in an impenetrable obscurity, until some happy chance, brought about by time and circumstance, brings this star again into our sight. Prof. WURM therefore asks: "What shall this star ultimately be? A *Planetary-Comet*, or a mean between both?" We conjecture in this manner in vain; the sole duty of an editor [*Gesichtschreiber*] is to gather all opinions and voices, and to truly report them; since we have now undertaken this duty, we wish to adhere to it diligently.

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Shortly before the printing of these last pages, a very clear morning fell to our lot on the 23rd of September. I had the satisfaction that night, in the society of the royal astronomers and directors of Prague's observatory Prebendary [*Canonicus*] DAVID and Prof. BÜRG, of searching through that quarter, in whose vicinity the presumed planet currently remained, with a parallactic instrument, a $3\frac{1}{2}$ foot Dollond, and a good comet seeker, one degree east and westwards of the anticipated location, until the dawn of the morning twilight. However, up until now we have not been able to note any change in the position of a single star in the surrounding area, nor locate any which were characterized by any likeness to a planet. I fear that we may occupy ourselves with the seeking out of this star even more, and it may cost us many sleepless nights, for, the following consideration seems to rob us of all hope of discovering this inconsiderable new-comer [*Ankömmling*] earlier than until the complete absence of all day or moonlight.

We have above communicated the new elements of a circular orbit to our readers, which the tireless astronomer Dr. OLBERS has calculated from the entire series of PIAZZI's observations. They are uncertain, according to the nature of the thing, in some of the parts of the determination: it follows from this with much certainty, that this new planet [*Wanderer*] *has to appear as exceedingly small in September*. On the 1st of January, 1801, on the day of its discovery, it resembled a star of the eighth or ninth magnitude according to PIAZZI's estimate.³ Its distance from the Earth at that time was 1.968. Now the distance is 3.645 on Aug. 19th, and 3.536 on Sept. 7th, according to OLBERS's elements, that is, already nearly one time as large as at the time of its discovery; and since it is known that the light, or rather the *apparent luminosity* (*Claritas visa*) decreases as the inverse square proportion of the distances: it can therefore easily be calculated, of what brilliance, or better said, of what *invisibility* this planet must presently be.

³M. C. Volume III, pg. 604.

This consideration had not escaped us even in the first announcement of this new star,⁴ and we already expressed the same apprehension at that time, that, if this presumed planetary body [*planetarisches Weltkörper*] appeared in its proximity to the Earth as a telescopic star, it might very well entirely disappear from us with its great distance from the Earth, and might be removed from even our strongest telescopes. The current calculations of OLBERS henceforth justify this entertained supposition.

Thus, we believe that the seeking out of this star will first be able to successfully occur, when its culmination will be able to be observed through a good meridian telescope, which might also not easily occur with the tiniest illumination of the cross-hairs, or before the month of December.

⁴*M. C.* Volume III, pg. 601.