

The circumference of her orbit, 599,194,000 miles, being a diminution of 25,360,000. Her mean hourly velocity 65,460 miles. The diameter of the sun 850,100 miles, which is smaller by nearly 38,000. The distances, velocities, and dimensions of all the members of the planetary system of course require similar corrections if we wish to express them in miles; in the case of Neptune, the mean distance is diminished by 30 times the amount of correction to that of the earth, or about 122,000,000 miles. The velocity of light is decreased by nearly 8,000 miles per second, and becomes 183,470 if based upon astronomical data alone. These numbers will illustrate the great importance that attaches to a precise knowledge of the sun's parallax, in our appreciation of the various distances and dimensions in the solar system.

The first of the ensuing pair of transits of Venus will take place on the 9th of December (civil reckoning), 1874, and the second on the 6th of December, 1882. I have calculated the circumstances of both phenomena from M. Le Verrier's new tables of the sun and planets, the full details of which may be found in the *Comptes Rendus* of the Paris Academy of Sciences for July 22, 1861. For the transit of 1874, December 9, I find—

"The conjunction in right ascension at 4h. 59m. 13s. a.m. mean time at Greenwich, Venus north of sun's centre by 14 min. 15 sec. External contact at ingress, 1h. 46 m. 56 s. a.m.; internal ditto, 2h. 15m. 57s. a.m.; internal contact at egress, 5h. 57m. 5s. a.m.; external ditto, 6h. 26m. 5s. a.m.

"The first contact at ingress will take place in the zenith in longitude 151 deg. 22 min. east, and latitude 22 deg. 57 min. south, and the last contact at egress in longitude 81 deg. 36 min. east, and latitude 22 deg. 58 min. south. As viewed in an inverting telescope, the planet will enter upon the sun's disc at a point about 131 deg. from the north towards the west, and will leave it about 160 deg. from north towards the east.

Similarly, for the transit of 1882, December 6, my computation gives,—

"The conjunction in right ascension at 4h. 20m. 14s. p.m. mean time at Greenwich; Venus south of sun's centre 11 min. 6 sec. External contact at ingress, 1h. 55m. 38s. p.m.; internal ditto, 2h. 15m. 56s. p.m.; internal contact at egress, 7h. 52m. 29s. p.m.; external ditto, 8h. 12m. 47s. p.m. The first contact at ingress will take place in the zenith in longitude 31 deg. 5 m. west, and latitude 22 deg. 40 min. south, and the last contact at egress in longitude 120 deg. 20 min. west, and latitude 22 deg. 42 min. south. As viewed in an inverting telescope, the planet will enter upon the sun's disc at a point about 35 deg. from north towards the west, and will leave it about 66 deg. from north towards the east."

From the preceding numbers it will appear that no part of the transit of 1874 can be witnessed in this country. The egress only will be visible in the south-east of Europe near sunrise—in Italy Turkey, &c. The entire duration may be observed in Australia, New Zealand, British India, China, Tartary, and the islands of the Indian Ocean, including Madagascar. The astronomical conditions, however, will not be very favourable for the investigation of parallax, either by the first or second method to which allusion has been made. Thus, for observations of the difference of duration of transit, we must rely upon stations selected so as to offer the greatest difference of latitude, without

the possibility of introducing the additional effect of the earth's rotation. The Russian authorities, always energetic in matters of science may provide for the observation of the phenomenon in Eastern Siberia, and observers might be located in various parts of central Asia. For southern stations we have Australia, New Zealand, and several islands in the Indian Ocean, including Kerguelan's Land, but as remarked by the Astronomer Royal (whose lucid address on this subject, published in the *Monthly Notices* of the Royal Astronomical Society for May, 1857, I am here chiefly following) "the observable difference of duration will probably not be half of that in 1882." The successful application of the second method—viz., the comparison of differences of absolute times of ingress only or of egress only, will render necessary a precise determination of many distant longitudes between the Mauritius or the Isle of Bourbon and the Sandwich Islands. In the transit of 1882 the first and preferable may be advantageously used, under certain conditions. The entire duration will be observable in the United States and in a part of British North America, and in this region will be shortened not only by northern position, but by the effect of the earth's rotation, which must carry the observer to meet the motion of the planet. On the contrary the duration would be lengthened by the latter cause and by southern position in those parts where an Antarctic continent was laid down some years since by Admiral Wilkes, but upon the existence of which, if I am not mistaken, geographers will be by no means agreed. Assuming that land is really to be found in that region and may be approached in December, there can be no doubt, on merely scientific considerations, that observers would be very advantageously placed upon it in 1882. For the application of the second method the islands in the western part of the Indian Ocean will have the ingress accelerated, while the Atlantic seaboard of North America will have it retarded. The egress will be retarded in part of the Australian continent, including New South Wales and Victoria, in New Zealand; the New Hebrides and many islands of the Polynesian group, and will be accelerated in the United States, and West India Islands, and the north-eastern part of south America. In this case also, numerous longitudes would require determination with greater accuracy than they are as yet known. The ingress will be visible in England, the first external contact at Greenwich taking place at 1h. 59m. 57s. p.m.

It is scarcely to be doubted that every possible use will be made of the transits of 1874 and 1882 to improve our knowledge of the great astronomical unit, the measure of the sun's distance, and that all the resources of modern science and all the facilities afforded by modern enterprise will be combined for that purpose. No other opportunity of the kind will occur until the year 2004.

Bouquet of Wines.

M. Maumene has found that the odour of some wines can be imitated by a mixture of a few drops of *oenanthic ether* and essence of pears; the addition of a drop or two of *butyric ether* gave some resemblance to other wines. By mixtures of this sort the author thinks that the bouquets of most wines may be imitated.