THE TRANSIT OF MERCURY, MAY 10, 1891.

Observations taken at Private Observatory, Launceston.

By A. B. Biggs.

The morning of the 10th set in with a dense fog, hiding the sun from view. However, a few minutes before the expected entrance of the planet upon the sun's face (which was set down as 9h. 42min. 15sec. local mean time), the fog partially broke, giving promise of a clear view of the transit, a promise which was by no means fulfilled. A haze again covered the sun just before the critical moment, but a careful watch was kept on that part of the sun's limb where the planet was to enter. At 9h. 43min. 56sec. a partial clearing allowed a decided notch to be seen on the sun's edge. Of course the actual contact must have taken place somewhat earlier. The internal contact, so far as could be judged, occurred at 9h. 45min. 58sec. At 9h. 51min. 17sec. the planet was estimated to be one diameter within the sun's limb. During this time a local cloud condensation was taking place which almost prevented further observation, allowing, however, an occasional glimpse between the clouds, but through a haze at best. The alternate partial brightening and overshadowing was exceedingly baffling, and as a consequence the programme which I had laid out was seriously interfered with, besides necessitating a frequent changing of the apparatus to suit the varying conditions. About noon I found the speculum so bedewed that I could not see my face in it, and I had to take it out and warm it at a neighbour's fire. I feared at first that the silver film was destroyed, as the moisture appeared to have got underneath it. However, after a careful warming it came all right, and I had no further trouble with it.

There was a clear, well-defined spot on the sun's southern hemisphere, not large, about half a minute in diameter as nearly as I could estimate, including penumbra. Between this and the planet I managed to get a few chance micrometer measures, during the intervals of comparative brightness. Whilst engaged in this a *bright spot* on the centre of the planet's disc caught my attention, apparently as if the sun were shining through a hole in the planet. A similar appearance has been noted by some observers of previous transits, but the thing seems so unaccountable and improbable that it has been attributed to optical illusion. However, I could have no doubt of its reality on this occasion. The following note is from Chambers's Astromony:—"The

annulus round Mercury and the *White Spot* on Mercury during transits across the sun may now be regarded as regular concomitants of the phenomenon; but there is no agreement amongst astronomers as to the cause of these appearances. The *White Spot* has been regarded by some as indicative of volcanic action, but this seems mere fancy. Prof. Powell, with more show of reason, suggested that diffraction of light had something to do with the matter. . . . . Huggins rejects this theory. It might conceivably have its origin in the internal reflection of light in a Huygenian eye-piece." (I was using a Ramsden or *positive* eye-piece). Webbe, in his "Celestial Objects," says that it "arises probably from deception from the violent contrast and the fatigue of the eye. . . . No terrestrial analogy will explain a luminosity thus visible close to the splendour of the Sun, and it seems natural to refer it to the exhausted state of the retina" (The haze on this occasion precluded the operation both of "violent contrast and fatigue.") A possible explanation may, perhaps, be found in connection with the *atmosphere* of Mercury. The "annulus," which is usually seen around Mercury during transits, would seem to indicate the existence of an atmosphere of considerable extent. (I failed to see it on this occasion, though, I believe, so far as I can recollect, that I saw it during a former transit; but unfortunately I took no notes at that time. The haze, however, would sufficiently account for my not seeing it this time.) This body of atmosphere would act somewhat as a lens (or rather as a "spot lens") and would form a diffuse focus or image of the sun on this side the planet. We should not under ordinary circumstances see this image, because the rays would cross and pass by on each side of us, unless there were some sort of translucent *screen* on which to receive it. Such a screen might possibly consist of the meteoric matter which is supposed, or I may say is known to exist in interplanetary space, some of which reaches us in meteoric showers, and some probably mere planetary dust, occasioning the phenomenon known as the "Zodiacal Light." (Of course every particle of this would be moving in some regular orbit, in accordance with gravitation law.) This may be deemed a very fanciful theory, and possibly may excite ridicule from mature scientists; but slow progress will be made in scientific knowledge if it is to be impeded by such a fear. I have not overlooked the fact that the outer or upper stratum of Mercury's supposed atmosphere would be more rarefied and less refractive than the lower; in fact it would be unequally refractive throughout; but this, I think, would be rather in favour of the theory, inasmuch as it would lengthen the focus and bring it nearer to us.

The contacts were observed as follows:—

LAUNCESTON MEAN TIME, MAY 10.			AT INGRESS.
hrs.	min.	sec.	
9	46	56·3	Sun's limb notched. Actual contact earlier.
9	45	58	2nd or internal contact, apparent geometrical, but no appearance of solar light outside the planet.
9	47	52	In clear of sun's limb.
9	51	17	About 1 diameter clear of limb.
P.M.			AT EGRESS.
hrs.	min.	sec.	
2	31	38·25	About 1 diameter from sun's limb.
2	35	10·3	Apparent geometrical internal contact, slight ligature (?)
2	36	41·7	Apparently bisected.
2	38	40·7	Clear from sun's limb.

MICROMETER MEASURES

Between Mercury and Sun-spot.

(Mercury South. Preceding.)

Local Mean Time.			Edge of Mer.	Edge of Spot.	Difference Dec.	Mer. Pre.
hrs.	min.	sec.			′ ″	sec.
0	49	8·4	N.	N.	7 27	—
0	54	38·5	N.	N.	7 40	$5\frac{1}{2}$
1	43	26	Centre	Centre	8 52·3	17
1	43	43	Pre.	Pre.	—	$18\frac{1}{2}$
1	53	20	Centre	Centre	—	$19\frac{1}{2}$
1	53	39·5	S.	N.	9 35·2	—
1	58	4	N.	Sun's S. limb.	1 14·6	—

The above were all the measures I had opportunity for obtaining. The chronometer readings are carefully corrected for error and rate. Mr. Sparrow, of Launceston, kindly assisted me by reading the chronometer.