centre; this is why latterly I use exclusively cathetometric telescopes, in which the distance of the eye-piece from the objective cannot undergo any change. On the other hand, it is possible to move the lunette if the cathetometer itself is in the rest where it is fixed; which is not seldom necessary in practice. By using a considerable magnifier and an illuminator of the columns of mercury very carefully combined, it is possible to observe the columns with a precision carried to thousandths of a millimetre; so that the error in appreciating the height does not exceed 0·01 mm. Everyone who has worked with the ordinary cathetometers and who has used their scales for measuring heights, knows that the accuracy of the measurement by means of such apparatus never exceeds $\frac{1}{25}$ mm., and that often he makes errors which reach tenths of a millimetre. It is sufficient to refer to the variations of temperature infallibly due to the presence of the observer. In the construction applied by me, these reasons, as well as many other causes of error, do not exist at all.

Although for the barometers and the baromanometers I always use tubes of large diameter, exceeding 17 and very often even 20 millimetres, nevertheless I have thought it proper to verify the capillary depression of the mercury depending on various diameters of the tube and various heights of the meniscus. A very extensive research has been made in my laboratory by Mlle. Goutkovsky, and the results which she has obtained have obliged me to change the data which we possess on the depression of mercury. I cite one example from many which are in my work on "The Barometric Levelling and on the Application of the *Syssotomer* to that purpose." The diameter of the tube being 8·606, and the height of the meniscus—

0·6 0·8 1·0 1·2 1·4 millimetre,

the depressions are—

0·162 0·235 0·312 0·380 0·458 ,,

numbers differing from those generally adopted, according to which for a height of the meniscus 1·0, there ought to be a depression of 0·460 for the diameter 8·606.

DE MENDELEEFF

(*To be continued.*)

OUR ASTRONOMICAL COLUMN

THE SUSPECTED INTRA-MERCURIAL PLANET.—M. Leverrier has issued an ephemeris of positions of the hypothetical planet, interior to Mercury, derived apparently from the two orbits to which reference was made last week as representing the observations upon which the general formula was founded, with equal precision, and if the planet should not be met with in transit across the sun's disc between March 21 and 23, use may be made of M. Leverrier's ephemeris to examine with large telescopes the positions of the greatest elongation westward in the two orbits. The differences of right ascension and declination from the sun about these times are thus given :—

	Orbit I.		Orbit II.	
	Diff. R.A.	Diff. decl.	Diff. R.A.	Diff. decl.
	m.	°	m.	°
March 28 ...	− 38·4	... − 2·6	− 38·8	... − 2·6
29 ...	− 40·4	... − 2·6	− 42·0	... − 2·8
30 ...	− 40·4	... − 2·8	− 44·8	... − 2·9
31 ...	− 39·2	... − 2·6	− 45·2	... − 3·0

The observation of Decuppis at Rome in 1839, one of the five utilised by M. Leverrier, was communicated to the Paris Academy of Sciences on December 16 in the same year. It is thus noticed in the *Comptes Rendus* of that sitting: "M. Decuppis announced that on October 2, while continuing the observations which he has made upon the spots of the sun, saw a black spot, perfectly round, and with well-defined contour, which advanced upon the disc with rapid motion, so that it would have traversed the diameter in about six hours. M. Decuppis thinks that the appearances which he has observed can only be explained by admitting the existence of a new planet." The observation is reproduced here, as it appears to have escaped the notice of several writers who have recently entered upon this subject. Haase mentions it, but does not give particulars.

The observation by Mr. Joseph Sidebotham at Manchester, on March 12, 1849, was communicated to the Literary and Philosophical Society of that city, April 1, 1873, and will be found in the *Proceedings*, vol. xii. p. 105. "A small circular black spot" was "watched in its progress across the disc for nearly half an hour," by Mr. Sidebotham and Mr. G. C. Lowe, also a member of the same society.

D'ARREST'S COMET.—If this comet is not detected before moonlight interferes in the mornings, it may probably be observed in the middle of the ensuing month, where the sky is very transparent down to the eastern horizon; it will then rise rather more than two hours before the sun, and the intensity of light will be greater than when it was last seen by Prof. Schmidt at Athens in December, 1870; still its distance from the earth will be considerable (1·7). When theoretically brightest, in May, observations may be made at the observatories of the southern hemisphere. At the Cape, Melbourne, and Sydney, the comet will rise more than four hours before the sun; the perihelion passage takes place on May 10. The following positions will sufficiently indicate its course about that time :—

At Greenwich Noon.

	R.A.	N.P.D.	Distance from Earth.
	h. m. s.	° ′	
May 2 ...	23 18 16	... 91 17·0	... 1·670
6 ...	23 32 13	... 90 31·9	... 1·659
10 ...	23 46 5	... 89 47·8	... 1·650
14 ...	23 59 51	... 89 4·8	... 1·642
18 ...	0 13 28	... 88 23·3	... 1·635
22 ...	0 26 56	... 87 43·6	... 1·629
26 ...	0 40 14	... 87 5·8	... 1·624

The intensity of light remains sensibly the same during this period. In August and September next observations may be practicable with very powerful instruments, as the comet moves from Taurus into Orion.

According to the elements of M. Leveau, who has continued the investigations on the motion of D'Arrest's comet, commenced on its first discovery in the summer of 1851 by M. Villarceau, the dimensions of the orbit in 1877 are as follow :—

Semi-axis major	3·5414
Semi-axis minor	2·7565
Semi-parameter	2·1456
Perihelion distance	1·3181
Aphelion distance	5·7647

The period of revolution in the ellipse of 1877 is 2434·2 days, or 6 664 years; it has been lengthened 104 days since 1851, by the effect of perturbation from the action of Jupiter, the principal disturbance of its motion having taken place in the spring of 1861, when the comet approached the planet within 0·36 of the earth's mean distance from the sun.

TOTAL SOLAR ECLIPSES.—It might be worth while to collect together and discuss the various notices of the total solar eclipses of 1386, January 1, and 1415, June 7, in the same manner that Prof. Schiaparelli and M. Celoria have done with the eclipses of 1239 and 1241. The eclipse of 1415 in particular was a very notable one from the large excess of the moon's augmented diameter over the diameter of the sun; as Baron de Zach states, "plusieurs historiens et presque tous les astronomes en ont parlé." Both eclipses were total at Montpellier, not a common occurrence at a particular place in an interval of only twenty-nine years.

METEOROLOGICAL NOTES

MEAN ATMOSPHERIC PRESSURE IN RUSSIA IN EUROPE.—A paper on this subject, by M. Rikatcheff, appeared some time ago in the *Repertorium für Meteorologie*. The work is based on monthly averages for various terms of years for thirty places in Russia, to which are added the averages for thirty-three places situated in other parts of Europe. A valuable part of the paper is that which gives the details of the observations at each place,