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,

as regards the errors of the instruments employed and the heights above the sea, so far as known. The heights of places not yet determined trigonometrically are approximated to barometrically by a comparison with other stations whose heights are known. From these data the monthly and annual isobars for each millimetre (0·039 inch) are drawn on thirteen maps. It is to be regretted that so much work, characterised not only by general accuracy, but also by an attention to minute accuracy of detail in certain directions, can only be regarded as to a great extent thrown away, at least in so far as regards the inquiry in hand, viz., the representation of the facts of atmospheric pressure in Russia, as that pressure varies by latitude and season, in their relation to configuration of surface and the relative distribution of land and water. The author has failed to see that, in order to give a satisfactory solution of this problem, one of the first requisites is that the observations at the different stations be for the same terms of years, or be reduced to the same terms of years, by the process of differentiation. As regards the thirty Russian stations, the averages are for periods varying from seven to fifty years, and excepting Lugan and Catherinenburg, no two places are for the same terms of years. As regards the months the result of this method of discussion is great unsatisfactoriness. Thus at several places where the averages are only for a few years, they not unfrequently are very different from the isobars which have been drawn for the districts where they are situated. Still further, the anomalous directions of several of the isobars, such as the isobar of 759 millimetres for March, cannot be accounted for by the physical peculiarities of the region traversed by the anomalous portion of the curve; but an examination of the facts suggests that the anomaly is probably due to the simple circumstance that exceptionally high or low monthly means of particular years are included in the averages of some stations, whilst at other neighbouring stations observations were not made during these exceptional months. The annual isobars are necessarily more satisfactory. It may, however, be noted that if allowance be made for the correction for gravity, according to latitude, which has been employed, a correction which for several reasons is objectionable, the annual isobars for Russia are substantially the same as those published by Mr. Buchan, even though these were confessedly a first approximation, giving only the broad features of the distribution of atmospheric pressure over the globe. Much more is now required than this, seeing that the data since acquired would enable us to draw the isobars with a precision sufficient to show not merely their general change of position with season and latitude, but also the exact forms impressed on the curves by their position with reference to large masses of land and water. In solving this problem, what is required from Russia are tables of the monthly means of each year during which observations have been made at each station, corrected for instrumental errors now ascertained—tables, in short, similar to those published by Dr. Buys Ballot for many places in Europe, in the *Annals* of the Dutch Meteorological Institute for 1870.

METEOROLOGY OF MAURITIUS—The *Mauritius Meteorological Results* and *Meteorological Reports* for 1874 and 1875, have been received, which are deserving of special notice from the increased vigour and efficiency with which they show meteorological research to be prosecuted in that part of the globe. In addition to the usual elaborate summaries, the *Results* for 1875 contain a noteworthy addition in the form of two Tables, one giving the hourly means of the atmospheric pressure of the months during 1875 deduced from the barograph curves, and the other the same means from the term-day observations made at the observatory from 1853 to 1871. Tables showing the hourly readings for each day were prepared but are not printed in the *Results*. If this be due to want of funds to meet the expense of publication it is to be hoped that the difficulty will be got over in next publication, on account of the great value of such hourly readings in many meteorological inquiries, but more particularly in connection with the gales and hurricanes of the Indian Ocean, which are so carefully detailed by Dr. Meldrum in the *Results*. The examination of these readings and the hourly observations of the wind could not fail to suggest conclusions of the utmost value in their bearings on systems of storm warnings for tropical countries such as we recently sketched in NATURE (vol. xv. p. 261) for the Bay of Bengal. In the *Annual Report* for 1875, it is stated in the course of a discussion on sunspots and rainfall, that since the photoheliograph has been in use at the Observatory the sunspots have been compared with the daily weather, and that, so far as the observations have gone, the results are in conformity with those for longer periods, both the rainfall and the velocity of the wind having been greater when the spots were most numerous. This increase of the velocity of the wind with an increase of sunspots is a point of first importance when viewed in connection with Mr. Lockyer's suggestion that increased sunspot area implies increased solar radiation, with Mr. Blanford's confirmation of this idea from an examination of the results of the solar radiation thermometers in India, and with the result arrived at by Mr. Clement Ley, showing that with like conditions of pressure the wind's velocity is greatest during those months of the year when temperature is highest.

EXPLORING BALLOONS FOR METEOROLOGICAL PURPOSES.—Since the beginning of February, M. Secretan, the optician of the Pont-neuf, in Paris, has been sending up regularly every day at noon small exploring balloons for the purpose of ascertaining the direction of the several streams of air and the height of clouds. The results are daily published in the *Petit Moniteur*. The balloons are given gratuitously by the *Grand Magazin du Louvre*, and are of india-rubber filled with pure hydrogen. The diameter is ninety centimetres. M. de Fonvielle finds by calculation and by several experiments, that the mean velocity of elevation is about four metres per second. Hence to obtain the altitude of the clouds it is sufficient to observe the balloon with an opera-glass, to count the number of seconds necessary to lose sight of it owing to the opacity of the clouds, and to multiply the number of seconds by four. It was found that the altitude of clouds varies from 400 to 800 metres, and prospects of fair weather are increased in proportion to the elevation of clouds. The clouds follow the direction of an aërial stream in which they are wholly immersed, and are not placed, as has been repeatedly stated, at the surface of separation. The direction of the air for the first 100 metres is almost always very uncertain and varies according to unknown causes. This shows that anemometers give a very poor idea not only of the velocity but also of the direction of prevailing winds, and that no real progress is to be expected in the knowledge of atmospheric calculation as long as meteorologists confine themselves to taking into account anemometrical observations. Very often two different streams of air are observed, the lower one extending from 100 to 200 or 300 metres; under these circumstances the weather seems to be particularly uncertain and unsettled. Meteorologists, we think, might make use of this method of observation with great advantage.

BIOLOGICAL NOTES

A CHYTRIDIUM WITH TRUE REPRODUCTION.—Botanists are indebted to Dr. L. Nowakowski for a memoir on *Polyphagus euglenæ*, in which they will find recorded for the first time the whole life-history of one of the most interesting of the group of vegetable parasites known as Chytridia. First described in 1855 by Bail, who was a pupil at Breslau of the illustrious F. Cohn, this species has now had all the mysteries of its life cleared up by the researches of Nowakowski, studying at the same university and under the same master. The Euglenæ on