

Variable Stars.

Star.	R.A.		Decl.		h.	m.
	h.	m.	h.	m.		
U Cephei ... ..	0	52'5	81	17 N.	Mar.	4, 18 8 <i>m</i>
R Arietis ... ..	2	9'8	24	32 N.	..	4, <i>M</i>
Algol ... ..	3	1'0	40	32 N.	..	3, 2 41 <i>m</i>
R Canis Majoris ...	7	14'5	16	11 N.	..	5, 23 30 <i>m</i>
					and at intervals of	3, 21 6 <i>m</i>
						27 16
V Geminorum ... ..	7	16'9	13	18 N.	Mar.	3, <i>M</i>
V Leonis ... ..	9	53'9	21	47 N.	..	9, <i>M</i>
U Coronæ ... ..	15	13'7	32	3 N.	..	4, 2 50 <i>m</i>
T Herculis ... ..	18	4'9	31	0 N.	..	7, <i>m</i>
β Lyræ... ..	18	46'0	33	14 N.	..	4, 22 30 <i>m</i>
						8, 4 0 <i>m</i> <sub>2</sub>
R Lyræ ... ..	18	52'0	43	48 N.	..	5, <i>M</i>
Y Cygni ... ..	20	47'6	34	14 N.	..	4, 5 40 <i>m</i>
						7, 5 40 <i>m</i>
δ Cephei ... ..	22	25'0	57	51 N.	..	7, 3 0 <i>M</i>

*M* signifies maximum; *m* minimum; *m*<sub>2</sub> secondary minimum.

GEOGRAPHICAL NOTES.

THE paper read at Monday's meeting of the Royal Geographical Society was by Captain Vangèle, giving an account of his exploration of the Welle-Mobangi river, the great northern tributary of the Congo. His first exploration was made in the end of 1886 in a flat-bottomed boat, the *Henry Read*, with a stern paddle-wheel. On this first journey Captain Vangèle did not succeed in getting beyond Mr. Grenfell's furthest, the Zongé Falls, just where the river turns sharply to the east. He gives an interesting account of the Ba-Ati, the people who inhabit the banks of the river, and who are in every way of a superior type, though cannibals. A little distance above its mouth the Mobangi or Ubangi measures about 2730 yards in breadth; its greatest depth is 5 fathoms, its lowest 1 fathom; it flows at the rate of 3½ feet a second. Under the 4th degree, just below the rapids, it still has a breadth of 1300 yards, a depth of 4 fathoms, and a velocity of 4 feet a second. Between these two points, though continually varying in breadth, it never exceeds about 4000 yards, including the islands. The general appearance of the river is pretty much the same as that of the Congo near Bolobo—strewn with islands, and having low wooded banks. The colour of the water is a light brown. Captain Vangèle's second journey was made a year later, and with better means of forcing his way up the rapids of the Mobangi. This time, though he encountered several obstacles, he managed to push his way up the river to over 22° E. longitude, and to within sixty miles of Junker's furthest point on the Wellé. This has been accepted as clearly proving the identity of these two rivers, so that the long-standing problem of the Wellé may be regarded as solved. At his furthest point Captain Vangèle had to turn back owing to the hostility of the natives, the only instance in which he met with real opposition. Between rocks and islands, rapids and cataracts, the navigation of the lower Mobangi is beset with difficulties, though it is evidently practicable with suitable vessels, and a thorough knowledge of the river. The river is subject to great variations of level, according to the season of the year. Above the Zongo Falls, the people, named Bakombé, differ considerably from those on the lower river, and evidently spread far inland. From above the Zongo rapids the river opens out, flowing straight from the north-east, and the outlook is described as superb. It is free from all obstacles, from 900 to 1000 yards wide, with a depth of 12½ fathoms, flowing between banks 6 to 10 feet high, grassy plains alternating with clusters of trees. After thirty miles in the north-east direction the river turns due east, which direction it maintained to the end of the voyage, 170 miles. The banks are densely inhabited, and provisions of all kinds abound. Between the Zongo Falls and the steamer's furthest point only one tributary was met with—the Bangasso—coming from the north. After the paper was read, Sir Francis De Winton made some remarks with regard to the position of Mr. Stanley. He totally disbelieves the conjecture of Lieut. Baert that Stanley has any intention of taking Khar-toum. On the contrary, Sir Francis believes he is now on his way home by the east coast.

IN the last issued number (4<sup>e</sup> trimestre, 1888) of the *Bulletin* of the Paris Geographical Society will be found a very complete examination of the route for a proposed Euphrates Valley Railway, by M. A. Dumont. M. Adrien Blondel contributes a

detailed account of the Island of Réunion. M. Jules Marcou, in concluding his paper on the origin of the name of America, decides against Vespucci and in favour of an aboriginal place-name.

IT has been arranged that the eighth German *Geographie tag* shall be held at Berlin from April 24 to 26 next.

THE *Ceylon Observer* states that Mr. Stephens, who has recently been amongst the Veddas of Ceylon, and who subsequently explored New Guinea, is now in Ceylon on his way to Singapore to organize an expedition at the instance of Prof. Virchow to explore the unknown portions of the Malayan Peninsula. Mr. Stephens's instructions are to start from Malacca and travel north-west through the vast expanse of unexplored territory which stretches northwards for some 500 miles. There are on the coast various settlements near mines and plantations, but the greater portion of the interior has been hitherto unexplored. The inhabitants are said to be jealous and bloodthirsty.

M. LÆWY'S INVENTIONS AND RESEARCHES.<sup>1</sup>

IT is now my pleasing duty to lay before you the grounds on which the Council have awarded the gold medal to M. Maurice Læwy for his invention of the equatorial *coudé*, of a new method of determining the constant of aberration, and for his other astronomical researches.

On examining the series of memoirs in which M. Læwy has set forth his new methods of astronomical research, we are at once impressed by the originality of conception which characterizes all his ideas, and by the thoroughness with which he has worked out the details necessary for the practical application of his new methods of observation. Observational astronomy has for many years past proceeded on such well-defined lines, that we have not unnaturally come to look rather to improvements of detail than to the introduction of new instruments for the advancement of our knowledge. It is, therefore, a matter of great satisfaction to find that M. Læwy has placed at our disposal various methods of observation based on entirely new principles, and calculated to give astronomers improved and quite independent means of attacking several of the most important problems in our science.

The first of these new instruments with which I will deal is the equatorial *coudé*.

It was in the year 1871 that M. Læwy proposed his new form of equatorial, to which the name of "equatorial *coudé*" has been given, and M. Delaunay, then Director of the Paris Observatory, was so struck with the value of the principle that he arranged for the construction of an instrument on this plan. M. Delaunay's death, however, interrupted the work, and the first equatorial *coudé*, having an object-glass of 0.27 metre, or about 10½ inches aperture, was not completed till the year 1882. The success of this instrument was so marked that its value could not fail to be recognized, and it was not long before the construction of several larger equatorials on the same principle was commenced. At the present time six equatorial *coudés* have been completed, and four of these are already mounted and in regular use at the Observatories of Paris, Lyons, Besançon, and Algiers. The other two are intended for the Observatories of Paris and Vienna.

In principle the equatorial *coudé* may be described as an adaptation of the form of transit instrument with axial view to the requirements of an equatorial, by the addition of a plane mirror inclined at 45° outside the object-glass, this mirror being capable of rotation about the axis of the telescope, so as to reflect into the latter the rays from any object in a perpendicular plane. The axis of the instrument is mounted as a polar axis between two piers, the telescope being broken at a right angle near the lower pivot, so that the rays from the object-glass are reflected by an internal mirror up the polar axis to the hollow upper pivot, where the image is formed. The rotation of the outer mirror thus brings into the field the image of any object in the hour-circle perpendicular to the object-end of the telescope, and by the rotation of the polar axis, as in an ordinary equatorial, the telescope is directed to any hour-angle. The declination-axis in the equatorial *coudé* is the axis of the object-end of the telescope about which the outer mirror turns, and the declination-circle placed at the eye-end, in the same plane with

<sup>1</sup> Address delivered by the President of the Royal Astronomical Society, Mr. W. H. M. Christie, F.R.S., Astronomer-Royal, on presenting the Gold Medal of the Society to M. M. Læwy at the anniversary meeting on February 8, 1889.