

between the exact co-ordinates and those obtained with any assumed limit to the terms of the series. The application of this principle to the case of Groombridge 1119 is explained, and the formulæ formed for reducing the stellar co-ordinates to any date between 1875 and 1955, and also between 1875 and 1755. The results obtained by Miss Winlock will doubtless be very useful to astronomers discussing the positions of close Polar stars.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 JANUARY 9-15

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on January 9

Sun rises, 8h. 6m.; souths, 12h. 7m. 20'2s.; sets, 16h. 9m.; decl. on meridian, 22° 6' S.; Sidereal Time at Sunset, 23h. 24m.

Moon (Full) rises, 4h. 11m.; souths, oh. 9m.*; sets, 8h. 3m.*; decl. on meridian, 18° 44' N.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian
Mercury	7 4	10 55	14 46	23 45 S.
Venus	8 42	12 46	16 50	21 45 S.
Mars	9 19	13 47	18 15	18 4 S.
Jupiter	1 47	6 52	11 57	11 28 S.
Saturn	16 5*	0 10	8 15	21 55 N.

* Indicates that the rising is that of the preceding evening and the southing and setting each that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

Jan.	Star	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image
			h. m.	h. m.	
9	B.A.C. 2432	6½	19 6	19 40	106° 175°
10	f Geminorum	6	3 5	4 9	111 303
11	54 Cancrī	6½	8 6	near approach	205
12	18 Leonis	6	6 21	6 55	54 346
12	45 Leonis	6	21 11	21 50	83 171
12	p Leonis	4	23 29	0 30†	61 199
13	49 Leonis	6	1 29	near approach	320 —

† Occurs on the following morning.

Jan.	h.	
9	5	Venus at greatest distance from the Sun.
9	14	Saturn in opposition to the Sun.

Variable Stars

Star	R.A.	Decl.	h. m.
	h. m.		
U Cephei	0 52.3	81 16 N.	Jan. 11, 23 22 m
Algol	3 0.8	40 31 N.	" 13, 5 52 m
R Persei	3 22.8	35 17 N.	" 13, M
λ Tauri	3 54.4	12 10 N.	" 9, 1 4 m
			" 12, 23 56 m
U Monocerotis	7 25.4	9 33 S.	" 13, m
V Cancri	8 15.3	17 39 N.	" 9, M
W Virginis	13 20.2	2 48 S.	" 11, 5 0 m
Z Virginis	14 4.3	12 46 S.	" 14, M
δ Libræ	14 54.9	8 4 S.	" 10, 19 15 m
U Coronæ	15 13.6	32 4 N.	" 13, 23 56 m
R Draconis	16 32.4	67 0 N.	" 10, m
U Ophiuchi	17 10.8	1 20 N.	" 9, 5 4 m
		and at intervals of 20 8	
β Lyræ	18 45.9	33 14 N.	Jan. 9, 23 0 m ₂
			" 13, 4 0 M
R Lyræ	18 51.9	43 48 N.	" 13, M
S Delphini	20 37.9	16 41 N.	" 14, m
R Vulpeculæ	20 59.4	23 22 N.	" 12, m
δ Cephei	22 25.0	57 50 N.	" 11, 23 0 m

M signifies maximum; m minimum; m₂ secondary minimum.

GEOGRAPHICAL NOTES

THE latest news from Dr. Oscar Lenz is of much interest. Three letters have been received from him, the latest dated June last from Kasonge, a large Arab town, three days south-east from Nyangwe, on the Upper Congo. Dr. Lenz, it will be

remembered, went out for the purpose of reaching Dr. Junker and Emin Bey. The latest rumours state that he has been compelled to abandon this object, and may therefore be soon heard of at Zanzibar. Dr. Lenz, in canoes furnished by the famous Tippoo Tip, journeyed up the Congo from Stanley Falls, taking fifty days by the way. This, however, included frequent stoppages. He found great changes had taken place since Mr. Stanley made his memorable voyage down the river ten years ago. Then there were few Arabs to be seen beyond Nyangwe, and the river over a great part of its length was peopled by natives, between whose villages the expedition had to run the gauntlet. Now Dr. Lenz finds the whole country practically in the hands of Arab and Zanzibari slavers and traders. The natives in many places have retired into the recesses of the forest, and large Arab settlements have taken their place at several points along the river. There is a constant traffic up and down the river between Nyangwe, or rather Kasonge, and Stanley Falls. Immense rice-fields occupy the swampy and unhealthy areas round these Arab settlements, and all round Nyangwe and Kasonge the country is covered with rice, and plantations of bananas and other fruits. Nyangwe is no longer the important centre it was in the days of Livingstone. It is an irregular collection of Arab settlements, covering a considerable area. Kasonge, three days' journey off further up the river, is, on the other hand, a large town, with broad streets and many well-built houses. This is the head-quarters of Tippoo Tip and other Arab traders, who have their agents for their ivory in Muscat and India. It is evident that we have here a great and increasing intrusion of a foreign element among the native population. In some cases the natives are on friendly terms with the Arabs, and in other cases hostile. At any rate the result will in the end be a very serious modification of the population over a great area of Central Africa, and a marked change in the face of the country by the introduction of rice and other exotic cultures.

MM. BONVALOT AND CAPUS, the French travellers in Central Asia, lately turned back by the Emir of Afghanistan, write to the French Geographical Society, giving some account of their recent journeys. They refer especially to the country between Teheran and Meshed, which they traversed in April last, and which, as they say, is so much frequented that no one thinks it worth while to observe its special features. They found it much cut up by broad rivers with pebbly beds, and irrigation canals which nourish the rare oases along the base of the Elburz Range. The travellers found themselves almost always in the steppe region, on the edge of an immense basin, the bottom of which is the "Khevir" or great salt desert. It is incrustated on the surface with a great quantity of saline crystals, especially soda and magnesia, which often spoil the water and render cultivation impossible. The flora, the fauna, and the geology are those of the steppe, and MM. Bonvalot and Capus make out that the region forms a geographical unit with Central Asia. Not a tree, not a bush even, unless a few garden fruit-trees, with willows and poplars along the canals, relieve the monotony of the country. From the bridge of Saugil to the Thian-Shan, going from west to east, such a thing as a forest is unknown.

HERR QUEDENFELDT, in a paper in the last number of the *Verhandlungen* of the Berlin Geographical Society, on a recent journey in Morocco, mentions a fact of some geographical interest. For more than two years a commission of three or four Spanish staff officers, with a colonel as chief, has been stationed at Tetuan, and have quite publicly been carrying out a topographical survey. They have in this way already surveyed a considerable part of the Garb region, as far as Tangier, Arsila, Lاراish, Alkasar, and even Fez.

IN the December *Petermann*, Count Pfeil describes his journeys of exploration last year in the Ulanga and Ussagora regions, with a map. But the article which will attract most interest now—a melancholy interest in some respects—is the preliminary report of the late Dr. Fischer, on the expedition for discovering Dr. Junker; this, too, is accompanied by a map. Dr. Emil Jung continues his essay on the effect of the last Indian famine on the movements of the population, basing the discussion on the official census. A special part of the *Mittheilungen* has been issued, containing an elaborate and systematic index of the contents of the periodical for the ten years 1875-84, including ten annual volumes and eight supplementary volumes. By an ingenious system of colouring, a glance at the maps of the various continents shows