observation in 1781, its distance never very greatly varying from $5\frac{1}{2}''$. The motion of A and B round their common centre of gravity does not appear to be disturbed to any appreciable extent by the influence of C, which is so placed as not to affect their apparent relative motions, even though a very considerable mass be assigned to it, and as a fact Prof. Seeliger finds, for the most probable value of the mass of C, $\frac{m'}{1+m} = 2{\cdot}386$, where 1, m, and m' are the masses of A, B, and C respectively. But there is a periodical retrogression of C itself which is most easily accounted for by supposing the presence of a close companion, one hitherto undetected, and therefore either entirely dark, or but faintly luminous. The distance of this companion is probably only a few tenths of a second, the distance of C from the point, S_2, round which it appears to revolve, and which may be reasonably assumed to be the centre of gravity of itself and of D, the as yet undiscovered fourth member of the family, being only about one-fifth of a second.

The entire group therefore may be considered as a double-double, the following being the definitive elements derived for the two pairs:—

	For A and B.		For C about S_2.
T ...	1868·112	... ...	1860·127
Ω ...	109°·735 } 1850·0	... ...	71°·958 }
λ ...	80·190 }	... ...	109·677 }
i ...	11·135 }	... ...	17·352 }
e ...		... ...	0·1106
a ...	0″·853	... ...	0″·217
ϕ ...	22·450	... ...	
n ...	− 6·0898	... ...	− 20·460

For the motion of S_2 round the optical centre of A and B:—

$\rho_0 = 5''{\cdot}438.$
$\phi_0 = 145°{\cdot}46 - 0°{\cdot}513\,(t - 1850{\cdot}2).$

The concluding portion of this valuable contribution to the study of a most interesting case in stellar physics is devoted to the consideration of personal errors in the observations, and a plate is added giving a graphical representation of the apparent motion of C, and bringing out in a striking manner the evidence the observations afford of the looping of the curve.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1889 *FEBRUARY* 24—*MARCH* 2.

(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 February 24

Sun rises, 6h. 57m.; souths, 12h. 13m. 21·5s.; sets, 17h. 30m.: right asc. on meridian, 22h. 31·6m.; decl. 9° 16′ S. Sidereal Time at Sunset, 3h. 49m.

Moon (New on March 1, 22h.) rises, 2h. 59m.; souths, 7h. 13m.; sets, 11h. 23m.: right asc. on meridian, 17h. 30·3m.; decl. 20° 54′ S.

Planet.	Rises.	Souths.	Sets.	Right asc. and declination on meridian.	
	h. m.	h. m.	h. m.	h. m.	° ′
Mercury..	6 5	... 11 2	... 15 59	... 21 19·9	... 12 49 S.
Venus ...	8 2	... 15 2	... 22 2	... 1 20·3	... 11 1 N.
Mars ...	7 49	... 14 2	... 20 15	... 0 21·1	... 1 46 N.
Jupiter ...	4 1	... 7 56	... 11 51	... 18 13·8	... 23 5 S.
Saturn ...	15 17	... 22 53	... 6 29*	... 9 12·8	... 17 21 N.
Uranus ...	21 40*	... 3 4	... 8 28	... 13 20·8	... 7 49 S.
Neptune..	9 49	... 17 32	... 1 15*	... 3 51·1	... 18 27 N.

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

Feb.	h.	
25 ...	1 ...	Jupiter in conjunction with and 1° 11′ south of the Moon.
27 ...	5 ...	Mercury stationary.
28 ...	2 ...	Mercury in conjunction with and 4° 18′ north of the Moon.

Meteor-Showers.

	R.A.	Decl.	
Near β Trianguli	30° ...	35° N.	
,, δ Virginis	192 ...	2 N.	
,, α Serpentis	235 ...	10 N. ...	Swift; streaks.
	280 ...	17 S. ...	Very swift.

Variable Stars.

Star.	R.A. h. m.	Decl. ° ′		h. m.	
U Cephei	0 52·5 ...	81 17 N. ...	Feb. 27,	18 28	*m*
T Arietis	2 42·1 ...	17 3 N. ...	,, 27,		*M*
Algol	3 1·0 ...	40 32 N. ...	,, 28,	5 52	*m*
R Geminorum ...	7 0·7 ...	22 53 N. ...	,, 26,		*m*
R Canis Majoris ...	7 14·5 ...	16 11 N. ...	,, 25,	1 30	*m*
		and at intervals of		27 16	
T Geminorum ...	7 42·6 ...	24 1 N. ...	Mar. 1,		*M*
U Virginis	12 45·5 ...	6 10 N. ...	,, 2,		*M*
U Coronæ	15 13·7 ...	32 3 N. ...	Feb. 25,	5 8	*m*
X Cygni	20 39·0 ...	35 11 N. ...	,, 28,	2 0	*m*
T Vulpeculæ ...	20 46·8 ...	27 50 N. ...	Mar. 2,	0 0	*m*
Y Cygni	20 47·6 ...	34 14 N. ...	Feb. 24,	17 40	*m*
			,, 27,	17 40	*m*
δ Cephei	22 25·0 ...	57 51 N. ...	,, 28,	3 0	*m*

M signifies maximum; *m* minimum.

GEOGRAPHICAL NOTES.

AN Antarctic Expedition is being again talked of. A New Zealand colonist (of Norwegian origin) has come to Europe for the purpose of taking out a contingent of his countrymen accustomed to fishing. His object is to endeavour to organize an Antarctic whale fishery. He hopes to equip two steamers with which to explore the region generally, and, if possible, he will leave a contingent of men on Victoria Land, or some other suitable point, for a whole year. One or more scientific men will be taken, so that if the proposed expedition be carried out we may expect some important results.

DR. HUGO ZÖLLER (sent out by the *Kölnische Zeitung*) has been doing some original exploring work in German New Guinea. He made an excursion for a considerable distance into the interior. In November last he ascended the Finisterre Mountains to a height of 9000 feet. Some of the peaks in this and the Bismarck Ranges rise to a height of over 10,000 feet.

CAPTAIN PAGE, who recently read a paper on the Gran Chaco at the Royal Geographical Society, proceeds shortly to the Argentine Republic for the purpose of thoroughly exploring the Pilcomayo. He will probably be accompanied by a naturalist.

THE French are endeavouring to raise the funds for a Congo railway which will pass entirely through French territory, in opposition to the scheme for a railway from Vivi to Stanley Pool, for which a survey has recently been made by Belgian engineers. The French railway would run from Brazzaville, on the north side of Stanley Pool, to the River Kwilu, 100 kilometres. Steps, it is stated, will be taken to render the Kwilu navigable, and so establish direct communication between the Congo and the Atlantic.

IN a long article in the new number of the *Mouvement Géographique*, the question of the origin and course of the Lomami, one of the great southern tributaries of the Congo, is discussed. The conclusion is that it is the same river which Cameron crossed far to the south, and which has been crossed at various points further northwards. It enters the Congo some distance below Stanley Falls. Its course is probably about 1000 miles in length.

DR. OSCAR BAUMANN contributes to the February number of *Petermann's Mitteilungen* a short monograph (with map) on the district of Usambara, in East Africa. The monograph ought to be specially interesting to geologists.

THE February number of the *Scottish Geographical Magazine* contains several very useful articles. Colonel Cadell, Chief Commissioner of the Andaman Islands, gives a highly interesting account of the group, and especially of its people, who, he maintains, have been very much maligned from the days of Marco Polo downwards. The people are fast dying out. Dr. Guppy sends a preliminary note on the geological structure of the Sindang-Barang district on the south coast of Java. Dr. Guppy sums up the structure of the sea-coast of this part of Java as follows: a basis of massive volcanic rocks overlain by submarine tuffs and volcanic muds as far as twelve miles from the coast, and by older and allied tuffs farther inland. The upheaval in post-Tertiary times has been very great, and can only be measured by several thousands of feet. Mr. S. P. Ford gives a brief *résumé* of our knowledge of the geography of the Transvaal; and Mr. W. A. Taylor supplies a real want in his account of the Philppine Islands, compiled from various recent sources.