much on account of these floods. It has been calculated that in one year alone the amount of soil carried down by the two rivers, the Loup and the Paillon, was sufficient to have covered the whole department to a depth of 6 centimetres. The Consul adds that, though something has been done to encourage replanting, a more serious effort than has yet been made is needed to reafforest the country.

FROM a recent British Consular Report on the trade of Maranham, it appears that a large number of india-rubber producing trees were discovered last year in the district of Pinheiro. The principal traders, who were suffering severely from the depression in the sugar and cotton industries, formed themselves into a company to work up the new discovery, but up to the present the trees have produced little.

THE *Ceylon Observer*, commenting on the destruction wrought by the scaly insect on the cocoa-nut palm in the West Indies, says that it is most remarkable that in Ceylon the palm has been absolutely free from this and other such pests. This fact perhaps is due to the absence of those long-continued droughts which have so grievously affected Jamaica and its neighbouring islands. While the palm, however, has flourished so well in Ceylon, the coffee-plant is almost extinct in the island, a few isolated fields in each district being all that have survived the ravages of the green scale insect. Frequently the finest coffee-trees, with fresh and vigorous-looking bushes, and with stems as thick as a man's thigh, are so completely under the influence of the pest that no crop is produced. Experiments with soap, lime, kerosene oil, &c., have up to the present produced no satisfactory results. Tea seems to flourish where the coffee-plant dies, and even where the tea plantations are attacked by fungoid or insect pests, the plants can be pruned down till not a leaf is left; or, if the attack is a very severe one, the tea-garden can be burnt to the ground without suffering any permanent injury, for the roots and stems in a very few months again display their luxuriance as richly as before.

THE additions to the Zoological Society's Gardens during the past week include a Green Monkey (*Cercopithecus callitrichus* ♂) from West Africa, presented by Mr. Lishman; a Serval (*Felis serval*) from Malindi, East Africa, presented by Mr. H. C. Hunter; a Common Fox (*Canis vulpes* ♂), British, presented by Mr. E. Baldwin Cashel; a Common Fox (*Canis vulpes* ♀), British, presented by Lieutenant H. F. Sparrow, "The Buffs"; a Chough (*Pyrrhocorax graculus*) from Ireland, presented by Mr. A. Mudge; a Gold Pheasant (*Thaumalea picta* ♂), a Silver Pheasant (*Euplocamus nycthemerus* ♂) from China, presented by Mrs. Theodore Lloyd; a Sharp-nosed Crocodile (*Crocodilus acutus*) from the West Indies, received in exchange.

OUR ASTRONOMICAL COLUMN.

ROUSDON OBSERVATORY, LYME REGIS.—The observations at Mr. Peek's private observatory have been carried on during the past year. 163 nights were available for observations, as compared with 165 in 1887. As last year, the attention of the observers has been chiefly directed to transit-observations for time, and to observations of variables of long period. The object of the observations of variables is to determine the exact dates of maxima and minima, and, as far as possible, the light-curve of each star. The list of stars under examination is gradually being revised, circumpolar stars being substituted for those withdrawn, in order that uninterrupted observations may be made throughout the year. Owing to the lengths of the periods of the stars taken, the complete observations are not yet ready for publication. The importance of these light-curves cannot be over-estimated, as they will undoubtedly throw much light on the origin of the variability.

A sidereal clock, by Grubb, has been added to the equipment of the observatory.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1889 FEBRUARY 3–9.

(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 3

Sun rises, 7h. 36m.; souths, 12h. 14m. 7·4s.; sets, 16h. 52m.: right asc. on meridian, 21h. 9·6m.; decl. 16° 22′ S. Sidereal Time at Sunset, 1h. 48m.

Moon (at First Quarter February 7, 21h.) rises, 9h. 25m.; souths, 14h. 58m.; sets, 20h. 43m.: right asc. on meridian, 23h. 54·3m.; decl. 5° 49′ S.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Right asc. and declination on meridian. h. m.	° ′
Mercury..	8 3 ...	13 19 ...	18 35 ...	22 14·9 ...	9 24 S.
Venus.....	9 0 ...	15 7 ...	21 14 ...	0 3·3 ...	0 40 N.
Mars	8 47 ...	14 26 ...	20 5 ...	23 22·3 ...	4 51 S.
Jupiter....	5 8 ...	9 3 ...	12 58 ...	17 57·8 ...	23 6 S.
Saturn....	16 53*...	0 26 ...	7 59 ...	9 19·7 ...	16 48 N.
Uranus ...	23 5*...	4 28 ...	9 51 ...	13 22·1 ...	7 58 S.
Neptune..	11 11 ...	18 54 ...	2 37*...	3 50·8 ...	18 25 N.

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

Feb.	h.	
3 ...	20 ...	Venus in conjunction with and 5° 37′ north of the Moon.
5 ...	12 ...	Saturn in opposition to the Sun, southing at midnight.
5 ...	12 ...	Mercury stationary.
8 ...	16 ...	Neptune stationary.

Variable Stars.

Star.	R.A. h. m.	Decl. ° ′		h. m.	
U Cephei	0 52·5 ...	81 17 N. ...	Feb. 7,	19 50	*m*
Algol	3 1·0 ...	40 32 N. ...	,, 8,	4 10	*m*
λ Tauri...	3 54·6 ...	12 11 N. ...	,, 5,	21 55	*m*
R Canis Majoris ...	7 14·5 ...	16 11 N. ...	,, 6,	21 16	*m*
		and at intervals of		27 16	
W Virginis	13 20·3 ...	2 48 S. ...	Feb. 9,	5 0	*m*
S Virginis	13 27·2 ...	6 38 S. ...	,, 9,		*M*
U Coronæ	15 13·7 ...	32 3 N. ...	,, 7,	22 52	*m*
R Draconis	16 32·4 ...	66 59 N. ...	,, 5,		*m*
T Vulpeculæ ...	20 46·8 ...	27 50 N. ...	,, 7,	19 0	*m*
			,, 8,	21 0	*M*
Y Cygni	20 47·6 ...	34 14 N. ...	,, 3,	17 40	*m*
		and at intervals of		36 0	

M signifies maximum; *m* minimum.

Meteor-Showers.

	R.A. °	Decl. °	
Near η Aurigæ	74 ...	42 N.	
,, λ Draconis	168 ...	71 N.	
,, θ Draconis	240 ...	61 N. ...	February 6.

GEOGRAPHICAL NOTES.

THE paper read at Monday's meeting of the Royal Geographical Society was on the Gran Chaco of the Argentine Republic and its rivers, by Captain John Page, of the Argentine Navy. The Gran Chaco, Captain Page said, is a vast central tract of country lying between the southern tropic and 29° S. lat., bounded on the north by Brazil and Bolivia, on the south by the Argentine province of Santa Fé, on the east by the Paraná and Paraguay Rivers, and on the west by Santiago del Estero and Salta. It contains about 180,000 square miles, or considerably more than the superficies of Great Britain and Ireland. About one-third part of this vast area belongs to Paraguay. The Gran Chaco has been called, particularly in allusion to the low-lying Paraguay section, the *oceano firme*, or solid ocean. This section and the central section of the Argentine rise from the Paraguay River towards Bolivia almost imperceptibly, having numerous and very extensive marshes and jungle, which are drained by many small streams likely to become, as the country progresses, important local waterways. The monotonous level of these sections is relieved by various prominent points of great beauty along the Paraguay River. Both are well wooded, although the predominating woodland

feature is the great and almost interminable palm forests, which, singularly enough, in the Chaco are a sure indication of marshy lands subject to inundation, although in the province of Entre Rios, and other parts of the world, they are the exact contrary. On the northern and eastern borders of the River Bermejo the Central Chaco rises sensibly, as if to form a barrier to the waters of that river in their easterly progress. The Chaco Austral of the Argentine is the most favoured in natural riches of the three great sections. Its surface rises gradually from the Paraná River, and is intersected by several small streams, which are even now useful as a means of water-carriage to the many colonists settled along their courses; after rising thus up to the parallel of 25° 40′ S., the ground dips towards the valley of the San Francisco, sending its waters with those of that river to the Bermejo, sometimes in untimely floods. This depression extends across the Central into the Paraguayan Chaco, taking in the sections of the two rivers that are subject to yearly overflows between long. 61° and 62° W. of Greenwich, thus making a point of analogy between the two. The Austral is favoured with extensive primæval forests, notably that on the north-western border extending into Salta and covering a superficies of many hundreds of miles, quite unexplored, and sometimes designated by the name of "impenetrable." The principal water-courses of these territories are the Pilcomayo and Bermejo, which are undoubtedly destined to become highways of commerce. The waters of these rivers differ in colour, those of the Pilcomayo being dark and sometimes brownish, and those of the Bermejo red, as its name indicates; both are long, narrow, and tortuous, as are most of the interior rivers of the La Plata system; both run in a general south-east direction, preserving a remarkable parallelism throughout their entire course, running distant from each other as nearly as possible 180 miles. Neither of these streams receives tributaries of any kind over the greater part of their course, and their waters are consequently subjected to a great and constant drain from evaporation, in a climate whose average temperature is 80° F., as well as from absorption by the deep alluvial covering overlying the compact argillaceous bed, which is a geological characteristic of the whole Chaco subsoil. The impermeability of this bed probably arrests the effect of absorption, and in a great measure accounts for the non-diminution of the wealth of waters delivered into the Paraguay; such a geological formation may also account for the saline properties of the waters found in the Chaco, wherever wells have been made. The density of the Bermejo water is greater than that of the Pilcomayo; the amount of sediment it brings down is enormous, and it is deposited with such extraordinary rapidity that it cannot but be considered a peculiarly strong feature of the mechanical work of this river, by which its geological formations are rapidly made, and, indeed, unmade as well; this swift precipitation of its detritus, which it replaces by an increasing abrasion of the banks, may be caused, to some extent, by the quantity of salt contained in its water. This constant precipitation goes on in the Bermejo, even when at its height, and when in the exercise of its greatest carrying power, with a speed quite equal to the square of its normal current; a fact which would seem to say that its currents are swifter on the surface than over its bed. Captain Page has seen this river eat away an entire point of land, and, by way of compensation, deposit, just a turning below, an amount of detritus sufficient to form a similar promontory, which, in one season of low water, became covered with a thick and luxuriant growth of red willow. The Pilcomayo—the Piscumayu, as it is called in the Quichua tongue, signifying Bird River—is to a great extent unknown. The section that is *quite* unknown, and that is surrounded by a certain mythical halo which it will be a geographical triumph to dispel, is that comprised between long. 61° and 62° W., and the parallels of 22° and 23° S.; the river at this point was said, by theorists who forgot to account for its reappearance immediately below, to disappear altogether. Captain Page then gave an historical sketch of the various expeditions which have explored the Gran Chaco, concluding with an account of an expedition in a steamer up the River Bermejo, which he himself led, amidst many dangers from banks, and snags, and wrecks, as well as from the widespread flood that suddenly overtook him.

WITH the first number for 1889 a useful modification has been introduced into *Petermann's Mitteilungen*. For the last few years, in addition to the classified list of geographical publications each month, there has been a separately paged supplement containing critical analyses of the more important works. These were often carried to such length that many of the notices were from six to twelve months behind date. Now, the two lists are to be amalgamated, the notices are to be greatly reduced in length, and thus it is hoped that new works in the various departments of geography will be promptly made known to the readers of the *Mitteilungen*. In the first number of this year is an important paper on valleys of erosion, by Dr. V. Hilber. The paper consists mainly of an analysis of the nine theories that have been advanced to account for the formation of such valleys. The author himself favours the regression theory, according to which valleys have mostly been formed by retrogression, through the erosion of a river from its mouth backwards.

CAPTAIN VAN GÈLE, the explorer of the Mobangi-Wellé, was to leave Antwerp on the 29th for the Congo, to undertake a special mission. He is accompanied by Lieut. Le Marinel, Lieut. De Rechter, and M. Ferd. Meunier, as naturalist.

M. MAUREL, who has explored French Guiana, recently described the results of his observations and investigations to the Geographical Society of Toulouse. From the orographical point of view, he stated, French Guiana comprises four zones, rising in stages to the Tumac Humac Mountains. The first consists of a broad band of alluvial country. The second zone is hilly, covered throughout by a series of hillocks and bluffs, not exceeding 650 feet in height, and frequently separated by shallow valleys. The third zone M. Maurel describes as mountainous, with an irregular surface, abrupt slopes, and deep valleys. The Tumac Humac chain constitutes the fourth zone, and it rises by a series of gradations to a height of about 4000 feet. M. Maurel has collected a number of flint objects, which he believes belonged to a pre-historic race that must have inhabited the country before the alluvial period. He accounts for the present formation of Guiana by two long-separated volcanic outbursts, acted on subsequently by a large river, which he believes gave origin to the deposits of the first zone.

MR. J. Y. BUCHANAN, PROF. A. H. KEANE, AND MR. J. T. WILLS, are candidates for the Lectureship in Geography at Cambridge, vacant by the resignation of Dr. Guillemard.

THE Russian Geographical Society has just brought out, as an appendix to the nineteenth volume of its Memoirs, an atlas containing all the measurements made by A. Kaulbars in the delta of the Amu-daria. These measurements, which will be invaluable to those who may hereafter study the changes going on in the delta of the great Central Asian river, could not be embodied in M. Kaulbars's capital work "The Old Beds of the Amu," published by the Society in 1887. Now they are given partly in the atlas (on the scale of 1 : 1,500,000), and in full in the text which accompanies it.

THE PRESENT STATE OF SEISMOLOGY IN ITALY.[1]

THIS group of papers affords the reader a very fair means of forming a mental estimate of what Italy has been doing to study her earthquakes during the last year or eighteen months.

Signor E. Brassart, for some years the Mechanical Constructor of the Central Office of Meteorology and Geodynamics, has produced a seismoscope in which a small slug perched on a thin column was overturned by the earthquake, and fell into an umbrella-like balance-pan surrounding the peg. In this way the direction of the shock was supposed to be indicated by the

[1] "Sismoscopi o Avvisatori Sismici," Ermanno Brassart. "I Sismometri Presentemente in Uso nel Giappone," esaminati e descritti da Ermanno Brassart; con proposta di un Sismometro di Nuovo Modello. "Il Sismometrograph a Tre Componenti con Una Sola Massa Stazionaria," Nota di Ermanno Brassart. "Sulla Sistemazione delle Osservazioni Geodinamiche Regolari," del Prof. Giulio Grablovitz. "Relazione della Sottocommissione Incaricata di Studiare alcune Proposte per l'Ordinamento del Servizio Geodinamico nell' Italia Meridionale e nelle Isole," del Prof. T. Taramelli. "Relazione alla R. Sottocommissione Geodinamica sulla Distribuzione delle Aree Sismiche nell' Italia Superiore e Media," del Prof. T. Taramelli. "Il Terremoto nel Vallo Cosentino del 3 Dicembre, 1887," Studio del Dott. Giovanni Agamennone.—All these papers are published in the *Annali dell' Ufficio di Meteorologia e di Geodinamica*, vol. viii. Parte 4, Anno 1886. (Rome, 1888.)

"Alcuni Risultati di uno Studio sul Terremoto Ligure del 23 Febbraio, 1887," Nota di T. Taramelli e G. Mercalli, *Rendiconti d. R. Accad. dei Lincei*, vol. iv. fasc. 1. (Roma, 1888.)