

one case of deformity in every thousand, and one case of monstrosity, such as twin and dual-headed fish, in every four thousand. From observations he had made at the South Kensington Aquarium and elsewhere, the lecturer concluded that certain fish, such as the carp and perch, have the power of communicating with one another.

WHILST collecting fish ova from the River Colne for the hatchery at the Delaford Fish Culture Establishment, the water-bailiffs found an "egg-bound" trout, that is, one that had died through being unable to extrude its eggs. It was brought to Mr. W. Oldham Chambers, who on examination found the ova to be thoroughly healthy, although the fish, judging from its decomposed state, must have been dead about three weeks. He at once obtained a milter, and succeeded in impregnating the ova, which appear to be quite healthy and capable of incubation. The spawning season has been greatly retarded by the extreme severity of the weather.

WE have received the first number of the *Cycling Budget*, the editors of which undertake to keep cyclists "thoroughly well posted in every imaginable topic which may be of service to them." There are to be careful analytical descriptions of every new or modified type of machine as it comes into the market. The *Budget* advocates the building of a club-house for cyclists in London. In America, it appears, there are magnificent club-houses for "the votaries of the pastime."

DURING the year ended October 31, 1886, the total quantity of steel and ingot iron made from phosphoric pig was 1,313,631 tons, of which 927,284 tons were ingot iron containing under 17 per cent. of carbon. As compared with the make of the previous twelve months, there was an increase of about 368,314 tons. The total quantity produced represents about 394,000 tons of slag, containing from 30 to 35 per cent. of phosphate of lime. Most of the basic slag made in Germany is finely ground, and used in place of superphosphates.

M. ALFRED MARCHE, who has already been despatched on more than one scientific mission to distant regions on behalf of the French Ministry of Public Instruction, left Marseilles on the 19th ult., on a similar errand, for the Marianne Islands.

M. THOUAR's expedition to solve the question of the navigability of the Pilcomayo, and its suitability as a trade route between Bolivia and the eastern parts of South America, has had to be postponed so far as the upper waters are concerned, owing to the refusal of the Bolivian Government at present to supply its share of the funds for the undertaking. Writing, however, from Suere on Octo'ber 22, M. Thouar reports that the Bolivians have confided to him a mission of exploration in the same regions. He is to cross the Bolivian Chaco and survey it, with a view to discovering a land route for trade, and also to make a scientific investigation of the territory on the right bank of the Paraguay, directing especial attention to its capacity for cultivation and to the methods by which immigration should be encouraged. M. Thouar was to start on this mission about November 18.

THE *Annuaire pour l'An 1887*, issued by the Bureau des Longitudes, Paris, contains much astronomical and other scientific information, arranged in a convenient form. The work is carefully edited, and has been considerably enlarged, by M. Loewy, one of the members of the Bureau.

THE current number of the *Memorie della Società degli Spettroscopisti Italiani* contains a good portrait of the late Alessandro Dorno, with a brief sketch of his career. Dorno was born at Asli on February 13, 1825. He had scarcely taken his degree at the University of Turin in 1848 when he was appointed Professor of Mechanics at the Military Academy there. In 1865 he was made Professor of Astronomy at the University of Turin

and Director of the Observatory. Many papers by him appeared in the Transactions of the Turin Academy of Sciences, and he was a frequent contributor to the various scientific journals. In 1874 he took part in the scientific expedition to India for the observation of the transit of Venus. He died at the Villa di Borgo, San Pietro, near Turin, on August 19, 1886.

WE have received Parts 16-20 of the "Länderkunde des Erdteils Europa," which is being issued at Leipzig and Prague. This admirable work is edited by Dr. A. Kirchhoff, who has secured the co-operation of many eminent geographers. There are numerous illustrations, all of which are carefully executed.

WE print to-day an abstract of an excellent paper on "The Use and Equipment of Engineering Laboratories," by Prof. A. B. W. Kennedy, M. Inst. C. E., read at the ordinary meeting of the Institution of Civil Engineers on Tuesday, December 21, 1886.

WITH regard to the postscript to his letter on "Electricity and Clocks," in our last number (December 30, 1886, p. 198), Mr. Henry Dent Gardner writes to us that it is the weak spring, not the hammer, which should be kept away from a banking.

THE additions to the Zoological Society's Gardens during the past week include two Green Lizards (*Lacerta viridis*), a Slow-worm (*Anguis fragilis*), European, presented by Mr. R. M. J. Teil; a Yellow-footed Rock-Kangaroo (*Fetogale xanthopus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

THE ANDROMEDES, NOVEMBER 27, 1886.—P. F. Denza, writing in *Cosmos* under date December 2, gives the results of the watch maintained on the night of November 27 last at seven observatories distributed over the Italian peninsula. All the reports alike agree in showing that there was no repetition of the shower of 1885, the number of meteors observed being no greater than on an ordinary night, and of these the majority radiated from Perseus and Taurus, only very few from the radiant of the Andromedes. It follows, therefore, from these observations and those of 1873 and 1885, that the meteoric cloud giving rise to the shower is of comparatively small extent, but very dense. This fact tends to confirm the theory of the recent formation of the stream and of its origination in the disintegration of Biela's comet. The interval, thirteen years, between 1872 and 1885, corresponds to two revolutions of the comet; but the earth was in quite a different part of its orbit at the date of the intermediate return, and therefore no shower was witnessed.

THE REDUCTION OF THE POSITIONS OF CLOSE POLAR STARS FROM ONE EPOCH TO ANOTHER.—A paper containing a catalogue of 130 Polar stars for the epoch 1875⁰, resulting from all the available observations made between 1860 and 1885, and reduced to the system of the Catalogue of Publication xiv. of the Astronomische Gesellschaft, has been communicated to the American Academy of Arts and Sciences by Prof. W. A. Rogers and Miss Anna Winlock. The first section of this work, giving an investigation of the methods of reducing the positions of close Polar stars from one epoch to another, has been published in the *Memoirs of the Academy*, vol. xi. part 4, No. 5. And Prof. Rogers chivalrously appends a note to the effect that his connection with the work is limited to the methods of discussion adopted, and to an examination of the numerical results obtained; and that beyond this all the work in the preparation of the paper has been done by Miss Winlock, who is entitled to all the credit therefor. By the laborious process of actual computation, taking the instance of Groombridge 1119—a star situated within 1° of the Pole, it is shown that it is impossible to obtain an exact agreement between the values of the precessional motion computed by Taylor's theorem and the corresponding values computed from the rigorous trigonometrical formulæ, in the case of such a star, when the time exceeds forty years. But it is also shown that the time at which the values derived from the development by Taylor's theorem begin to deviate from those derived from the rigorous formulæ may be extended many years by means of a secondary series, which represents the residuals

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 Cancri	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