

case the Congress of Electricians comes to any conclusion relating to this most important object, he is ready to send a circular to the several Governments on the opening of an international conference on the matter. This official correspondence will be published in full in the next number of *L'Électricité*.

WE take the following from the *Colonies and India*:—"To say that a train had been stopped by caterpillars would sound like a Yankee yarn, yet such a thing (according to the *Rangitikei Advocate*) actually took place on the local railway a few days ago. In the neighbourhood of Turakina, New Zealand, an army of caterpillars, hundreds of thousands strong, was marching across the line, bound for a new field of oats, when the train came along. Thousands of the creeping vermin were crushed by the wheels of the engine, and suddenly the train came to a dead stop. On examination it was found that the wheels of the engine had become so greasy that they kept on revolving without advancing—they could not grip the rails. The guard and the engine-driver procured sand and strewed it on the rails, and the train made a fresh start, but it was found that during the stoppage caterpillars in thousands had crawled all over the engine, and over all the carriages inside and out."

A SHOCK of earthquake is reported from Möttling (Carniola) on April 26, at 4.55 p.m., direction from north to south. At Tüffers (Styria) a smart shock was felt on May 6, at 7.41 p.m., duration three seconds, direction north-east to south-west.

ON Tuesday last week, the Princess Christian of Schleswig-Holstein presented the prizes and certificates adjudged to candidates in a competitive examination on "Domestic Sanitation," following a course of lectures delivered on the subject by Dr. B. W. Richardson. With regard to the course of lectures he had given at the request of the Ladies' Sanitary Association, Dr. Richardson stated that nearly 300 pupils attended, of whom seventy-five competed for the prizes offered by Mr. Edwin Chadwick and others. Of the papers sent in, he could say that all the writers showed a sound knowledge of four subjects, viz. the relative values of the substances used as foods, the circulation of the blood, the process of breathing, with the conditions which produce a pure and healthy dwelling, and the management of a sick room. Dr. Richardson announced that, by desire of the Ladies' Sanitary Association, he should deliver another course of lectures, beginning in October next, on the nervous system. This would raise questions concerning education and other interesting and, at present, debatable matters.

IN the *Revue Scientifique* for May 14 is the conclusion of a long paper on the Physiological Immunities enjoyed by the Jewish race, in which the nature of these immunities is examined and the probable reasons for them given.

THE additions to the Zoological Society's Gardens during the past week include an Indian Fruit Bat (*Pteropus medius*) from India, presented by Mr. Edwin H. Maskell; a Wood Brocket (*Gariacus nemorivagus*) from South America, presented by Capt. Mackenzie, s.s. *Severn*; an Egyptian Gazelle (*Gavella dorcas*) from Egypt, presented by Mrs. J. J. Jones; a Common Hare (*Lepus europæus*), British, presented by Mr. Wormald, F.Z.S.; two Hawfinches (*Coccothraustes vulgaris*), British, presented by Dr. Bree; three Viperine Snakes (*Tropidonotus viperinus*) from North Africa, presented by Mr. J. C. Church; a Common Adder (*Vipera berus*), British, presented by Mr. G. H. King; a Three-striped Paradoxure (*Paradoxurus trivirgatus*) from India, a Javan Adjutant (*Leptoptilus javanicus*) from Java, received in exchange; six Rose-coloured Pastors (*Pastor roseus*) from India, two Mandarin Ducks (*Aix galericulata*) from China, purchased; a Blue and Yellow Macaw (*Ara ararauna*) from South America, deposited; a Geoffroy's Dove (*Peristera geoffroyi*), three Red-crested Whistling Ducks (*Fuligula rufina*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

VARIABLE STARS.—Mira Ceti, which was at its minimum on March 20, according to Prof. Schönfeld's formula in his second catalogue of variables, will attain a maximum by the same on July 8, and may therefore be observed as it approaches that phase. The next maximum takes place on April 1, 1882, and will not be observable.

χ Cygni, by the recent observations of Prof. Julius Schmidt, may also be expected to reach its maximum about July 10, perhaps a few days later: the last maximum occurred on May 30, 1880, when the star was 6m.; it has occasionally attained 4m. at maximum. The perturbations in this case appear to be considerable.

The position of the variable usually designated *Nova* 1848 may be identified by means of Prof. Schmidt's observations of neighbouring stars. In *Astron. Nach.*, No. 1708, he gives the following places for 1855 0:—

Mag.	R.A.			Decl.		
	h.	m.	s.	°	'	"
11	...	16 50 53.3	...	- 12 43 57		
13	...	51 18 1	...	12 42 0		
13.12	...	51 22.5	...	12 40 3		<i>Nova</i> 1848
11	...	51 44.8	...	12 47 8		
11	...	51 51.9	...	12 31 57		
10.11	...	16 53 9.2	...	- 12 47 2		

Further, the variable follows the star, Lalande's star 30,853 a ninth magnitude, 14'.8s., and is north of it 18' 21".

Prof. Winnecke's star of the twelfth magnitude, in close proximity to the place of Kepler's *Nova* 1604, deduced from observations of Fabricius, and apparently in the position of a star marked 10m. by Chacornac, but not since observed of that brightness, well deserves watching, and it would be interesting to possess a carefully-formed map of all stars visible in the vicinity of Kepler's celebrated star, with the aid of one of our most powerful telescopes—similar to that prepared by D'Arrest with the Copenhagen refractor for the vicinity of Tycho's *Nova* 1572 in Cassiopea. Prof. Winnecke's star precedes the 9m., No. 16872 in Oeltzen's Argelander 33.2s., and is 2' north of it.

THE SATELLITES OF SATURN.—Observations of these satellites are still followed up at the Observatory of Toulouse, and M. Baillaud has communicated a series made about the last opposition of the planet to the Paris Academy of Sciences. Amongst them are a number of observations of *Mimas*, consisting mainly of elongations, but with several attempts to fix the moments when the satellite was on the tangent to the extremity of the ring. M. Baillaud does not appear to regard the latter observation with favour, on account of the difficulty attending it, but proposes to gain further experience of the degree of precision of which it admits. The later observations of *Mimas* are as follows:—

1880			1880			h. m. s.		
Nov. 1	...	W. ... 6 59 40	Nov. 25	...	N.E. ... 10 23 50			
13	...	W. ... 12 58 17	Dec. 18	...	W. ... 10 1 7			
23	...	E. ... 10 33 13	19	...	W. ... 8 42 33			

The times are mean times at Toulouse, 3m. 29.9s. west of the Observatory of Paris. The observation of November 25 relates to the passage of the satellite by the tangent to the extremity of the ring.

Dr. M. W. Meyer of Geneva publishes elements of *Enceladus*, *Tethys*, *Dione* and *Rhea*, obtained on a new method, from observations made with the 10-inch Geneva refractor. By the way he terms the second of these satellites *Thetis*, not the only time that Sir John Herschel's proposed designation has been mistaken of late. *Thetis*, as is well known, is appropriated for one of the minor planets discovered by Dr. R. Luther.

SWIFT'S COMET (1881 a).—M. Bigourdan has calculated the following elements of this comet, from the Dun Echt observation on May 2 and observations made at Paris on May 5 and 7:—

Perihelion passage 1881, May 21.0613, Paris M.T.

Longitude of perihelion	...	...	...	297 54 43	} M. Eq.
" " ascending node	...	...	...	119 24 5	} 1881.0
Inclination	...	...	...	81 40 56	
Log. distance in perihelion	...	...	...	9.75568	
				Motion—direct.	

Though observations will not be longer practicable in these latitudes the comet may perhaps be observed in the southern

hemisphere, it being understood that telegrams have been sent to the Cape and to Australia (by Lord Crawford) with this object. According to the above orbit, on July 9 the comet will have one-fifth of the intensity of light on the night of discovery. There is no close resemblance of elements to those of any comet previously calculated.

THE "ASTRONOMISCHE NACHRICHTEN."—It is announced that after the termination of the current volume, by authority of the Prussian Government a new arrangement for the management of this journal will take effect. It will be edited by Prof. A. Krueger, the director of the Observatory at Kiel, in co-operation with the president of the "Astronomische Gesellschaft," of which association it will become a recognised organ.

### BIOLOGICAL NOTES

LIMULUS POLYPHEMUS.—A paper on the anatomy, histology, and embryology of *Limulus polyphemus*, by A. S. Packard, jun., M.D. (*Anniversary Mem. Boston Soc. Nat. Hist.* 1880), may be regarded as a continuation of the author's former series on the development and affinities of the king-crab. He discusses fully the question of the affinities of that puzzling animal, and combating the position of those zoologists who connect *Limulus* with the Arachnida, he sums up the facts which point to the crustacean nature of *Limulus* as follows:—(1) The nature of the branchiæ, those of *Limulus* being developed in numerous plates overlapping each other on the second abdominal limbs (those of the Eutryperida being, according to H. Woodward, attached side by side like the teeth of a rake), while the mode of respiration is truly crustacean; (2) the resemblance of the cephalothorax of *Limulus* to that of *Apus*; (3) the general resemblance of the gnathopods to the feet of Nauplius or larva of the cirrhipedia and copepoda; (4) the digestive tract is homologous throughout with that of Crustacea, particularly the Decapoda, there being no urinary tubes as in Tracheata; (5) the heart is on the crustacean type as much as on the tracheate type, and the internal reproductive organs (ovaries and testes) open externally, at the base of and in the limbs, much as in Crustacea. The paper is illustrated by seven plates showing the circulation of *Limulus*, sections of the adult and of embryos, and details of the structure of the eyes with comparison of these with those of Trilobites, with which group the author, as in his first memoir, allies the Merostomata.

THE NUMMULITIC ECHINIDS OF EGYPT.—A monograph of the Echinids contained in the Nummulitic strata of Egypt, by M. P. de Loriol, is published in the *Mem. Soc. Phys. et d'Hist. Nat. de Genève* (tom. xxvii. 1880, 1<sup>ere</sup> p.). The specimens described by M. de Loriol were obtained mostly near Cairo and Thebes. The fauna of the Nummulitic strata of Egypt has been found by him as far as yet explored to contain forty-two species of Echinids, or about the same number as that of the Nummulitic strata of India; that of the Canton of Schwytz has only thirty-four, the Eocene fauna of the Antilles only eighteen; but the Eocene fauna of the Pyrenees has as many as ninety-three. In the present memoir, which is illustrated by ten plates, twenty new species are described. The author does not concur in Prof. Jeffrey Bell's reasons for the formation of his new genus *Paleolampas*, considering that there are not sufficient grounds for separating it from *Echinolampas*. Only four of the forty-two species composing the Egyptian Nummulitic fauna are regular Echinids, all the rest are irregular. Of the whole number all but eight are peculiar to Egypt. Of the eight exceptions four occur in the lower part of the Nummulitic formation at San Giovanni Harione, in the Vicentin, three in that of the Pyrenees, whilst the remaining one, *Hemispatanzus depressus*, has been found in the Crimea in the same beds as *Echinolampas subcylindricus*, which also occurs at San Giovanni Harione.

SPONGES OF LAKE BAIKAL.—In a recent note to the St. Petersburg Academy, Dr. Dybowski says sponges occur in Lake Baikal wherever the bottom is rocky or large blocks of stone or wood are lying about. Close to the border of the lake, at a depth of 2 to 6 metres, they have a sod or cushion-like form, clinging to the stones, blocks, and (more largely) to decaying wood. In a depth of 6 to 25 metres they become tree- or shrub-like, with a height rarely exceeding 60 ctm.; while from 25 to 100 m. depth the sod or cushion-like form recurs; and only that is met with. The colour of the sponges is generally more or less dark grass-green, sometimes olive-green or brown. But

those got from depths of 60 to 100 m., or found under stones, are nearly quite white.

MICROSCOPICAL EXAMINATION OF FARINA.—In examining any given kind of farina with the microscope to find whether a less nutritive farina has been mixed with it, it has been common to confine attention to the starch granules (which one may easily be mistaken about): Dr. Cattaneo holds (*Re. Ist. Lomb. Rend.* vol. xiv. fasc. v.) that greater importance should be attached to the character of the bran-particles, some of which are never wanting even in the most carefully-bolted flour. These (as he shows) differ in a marked way according to species.

THE HYPOPHYSIS IN ASCIDIANS.—While the hypophysis, or pituitary gland, found in the cranial cavity of adult vertebrates seems to be a rudimentary body without function, it is, in its earlier development, furnished, like all active glands, with an excretory passage into the alimentary canal. On the instance of M. van Beneden, M. Julin has lately studied an enigmatical organ in ascidians, a glandular apparatus under the brain (discovered by Hankow), which, it was thought, might be homologous with the pituitary gland of vertebrates. M. Julin examined the gland, the so-called anterior tubercle or vibratile organ, and various connected organs, in four species of ascidians at Leewik, on the Norwegian coast, and his researches (lately described to the Belgian Academy) appear to confirm M. van Beneden's conjecture. M. Julin is unable to regard the vibratile organ as an olfactory organ (the ordinary view); it receives no nerve-branch, and no olfactory cells can be found in its vibratile cylindrical epithelium. It is (he considers) merely the enlarged mouth of the excretory canal of the gland below the brain, leading into the buccal region, while the gland itself represents, in permanent state and functional activity, the embryonic hypophysis which becomes rudimentary in vertebrates. The rôle of the gland remains in obscurity. (Anatomical details will be found in the Academy's *Bulletin*, No. 2.)

### PHYSICAL NOTES

AN extremely ingenious explanation of the peculiar green phosphorescence observed by Crookes in his researches on high vacua has recently been given by Mr. J. J. Thomson of Cambridge. This phosphorescence appears on the inner surfaces of the exhausted glass tubes whenever they are exposed to the so-called molecular bombardment of particles projected from the negative electrode. Mr. Thomson points out firstly that, as predicted by Clerk-Maxwell and verified by Rowland, a moving electrified particle acts as a current of electricity and possesses an (electro-magnetic) vector-potential. Now where such an electrified particle strikes a glass surface and rebounds, its change of velocity is accompanied by a change of vector-potential, and the glass against which it impinges and rebounds will be subjected to a rapid change in electromotive force. But by Clerk-Maxwell's electro-magnetic theory of light this is precisely what happens when a ray of light falls upon it. And therefore it phosphoresces as it would under the impact of an actual ray of light. It would be interesting to inquire whether all phosphorescent and fluorescent phenomena are capable of an analogous explanation in accordance with Clerk-Maxwell's theory.

MR. E. H. COOK proposes (*Phil. Mag.*) the term *sonorescence* as suitable to apply to the phenomena discovered by Graham Bell and investigated by Mercadier, Tyndall, and others, of the direct conversion of intermittent radiations into sound. The new name is obviously suggested by analogy with fluorescence and calorescence, but does not seem quite a happy one. Stokes gave the name of *fluorescence* to the phenomenon of the change of non-luminous ultra-violet rays into luminous ones. Akin gave the name of *calorescence* to the phenomenon of the change of non-luminous heat-rays into luminous ones (as in the lime-light), but the term has been superseded by Tyndall's term *calorescence*, which is etymologically unfortunate, seeing that the Latin verb is *calesco*, not *caloresco*. By strict analogy the term *sonorescence* should mean the conversion of sound into luminous rays, not the reverse change, to which Mr. Cook applies it.

THE researches of Edlund, Joubert, and others have left no doubt that the voltaic arc possesses an electromotive force of its own acting in a direction opposite to that of the current which sustains the arc. The principal work of maintaining the arc appears indeed to be spent in overcoming this opposing force, and is not occasioned by the resistance of the arc itself, which is small. M. Alfred Niaudet has lately announced the observation