handed over to the mercantile bodies that in France correspond to our Chambers of Commerce, who understand local needs and local industries better than any department of State. Most of these institutions are behind the age, and the collections at the Conservatoire des Arts et Métiers, Paris, are not so full as those in other countries, and the building itself is in a half-ruinous condition. If the other establishments are inferior to this, as the Report seems to imply, perhaps it is not so difficult to account for the paucity of students and their lack of interest as the Ministry of Commerce seems to thinkit is.

THE additions to the Zoological Society's Gardens during the past week include two Poë Honey-eaters (*Prosthemadera novæ-zealandiæ*) from New Zealand, presented by Capt. Brabazon J. Barlow, s.s. *Tamui;* a Brazilian Hangnest (*Icterus jamaicai*) from Brazil, presented by Mr. Geo. D. Morce; a White-bellied Sea Eagle (*Haliaetus leucocephalus*) from Newfoundland, presented by Mr. Geo. M. Johnson; three Egyptian Cobras (*Naia haje*), three Cerastes Vipers (*Vipera cerastes*), two Hissing Sand Snakes (*Psammophis sibilans*), a Clifford's Snake (*Zamenis cliffordi*), an Egyptian Eryx (*Eryx jaculus*), a Blunt-nosed Snake (*Dipsas obtusa*) from Egypt, presented by Capt. W. G. Burrows; twenty-one Horrid Rattlesnakes (*Crotalus horridus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

AMERICAN OBSERVATORIES.—The January number of the *Sidereal Messenger* states that the University of California has allotted $19,000 for the current expenses of the Lick Observatory during the present year. The Observatory has received an accession to its staff in Mr. Charles B. Hill, formerly of Chabot Observatory. The equipment of the Observatory has also been furthered by the arrival of the 36-inch photographic corrector and the micrometer for the great telescope. The micrometer is by Fauth and Co.

A new Observatory has been opened in connection with the Syracuse University, New York. This Observatory, erected in memory of Mr. C. D. Holden, a former graduate of the University, was dedicated on November 18, 1887, Prof. Newcomb pronouncing the inaugural address. The new institution possesses a transit instrument by Troughton and Simms, of 3 inches aperture, a chronometer by Dent and Co., a chronograph by Fauth and Co., and an 8-inch equatorial by the Alvan Clarks. Prof. John R. French is the Director.

At the Washburn Observatory, Prof. Brown, the new Director, who was formerly at the Naval Observatory, Washington, is engaged at Prof. Auwers' request in the determination of the fundamental star-places of the Zusatz-sterne in Auwers' system.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1888 FEBRUARY 5-11.

(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 5

Sun rises, 7h. 35m.; souths, 12h. 14m. 13·6s.; sets, 16h. 53m.: right asc. on meridian, 21h. 14·6m.; decl. 16° 0′ S. Sidereal Time at Sunset, 1h. 54m.

Moon (between Last Quarter and New) rises, 1h. 20m.; souths, 6h. 24m.; sets, 11h. 19m.: right asc. on meridian, 15h. 23·5m.; decl. 13° 16′ S.

Planet.	Rises.	Souths.	Sets.	Right asc. and declination on meridian.	
	h. m.	h. m.	h. m.	h. m.	° ′
Mercury..	8 10 ...	13 6 ...	18 2 ...	22 6·3 ...	12 58 S.
Venus.....	5 30 ...	9 32 ...	13 34 ...	18 31·8 ...	21 58 S.
Mars.....	23 17*...	4 41 ...	10 5 ...	13 40·0 ...	7 44 S.
Jupiter....	2 50 ...	7 6 ...	11 22 ...	16 5·6 ...	19 55 S.
Saturn....	15 20 ...	23 15 ...	7 10*...	8 17·5 ...	20 14 N.
Uranus...	22 33*...	4 5 ...	9 37 ...	13 4·2 ...	6 7 S.
Neptune..	11 1 ...	18 40 ...	2 19*...	3 41·6 ...	17 54 N.

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

Feb.	h.	
6 ...	1 ...	Jupiter in conjunction with and 4° 2′ south of the Moon.
7 ...	6 ...	Neptune stationary.
8 ...	21 ...	Venus in conjunction with and 1° 24′ south of the Moon

February 11-12.—A partial eclipse of the Sun: not visible in Europe.

Saturn, February 5.—Outer major axis of outer ring = 46″·1; outer minor axis of outer ring = 16″·0; southern surface visible.

Variable Stars.

Star.	R.A. h. m.	Decl. ° ′		h. m.	
U Cephei	0 52·4 ...	81 16 N. ...	Feb. 9,	20 19	*m*
Algol	3 0·9 ...	40 31 N. ...	,, 10,	1 30	*m*
R Canis Majoris...	7 14·5 ...	16 12 S. ...	,, 5,	22 43	*m*
			,, 7,	1 59	*m*
S Hydræ	8 47·7 ...	3 30 N. ...	,, 9,		*M*
T Virginis	12 8·9 ...	5 24 S. ...	,, 7,		*M*
δ Libræ	14 55·0 ...	8 4 S. ...	,, 8,	2 50	*m*
U Coronæ	15 13·6 ...	32 3 N. ...	,, 8,	2 26	*m*
V Coronæ	15 45·5 ...	39 55 N. ...	,, 5,		*m*
U Ophiuchi... ...	17 10·9 ...	1 20 N. ...	,, 9,	1 29	*m*
		and at intervals of		20 8	
X Sagittarii... ...	17 40·5 ..	27 47 S. ...	Feb. 9,	5 0	*M*
Z Sagittarii... ...	18 14·8 ...	18 55 S. ...	,, 6,	0 0	*m*
β Lyræ...	18 46·0 ...	33 14 N. ...	,, 7,	21 0	*m*
			,, 11,	2 0	*M*
U Aquilæ	19 23·3 ...	7 16 S. ...	,, 11,	5 0	*m*
η Aquilæ	19 46·8 ...	0 43 N. ...	,, 11,	21 0	*M*
S Sagittæ	19 50·9 ...	16 20 N. ...	,, 6,	4 0	*m*
			,, 9,	4 0	*M*
Y Cygni	20 47·6 ...	34 14 N. ...	,, 6,	20 9	*m*
			,, 9,	20 3	*m*

M signifies maximum; *m* minimum.

Meteor-Showers.

	R.A. °	Decl. °	
Near Capella	74 ...	43 N.	
,, λ Draconis	165 ...	73 N.	
,, θ Draconis	240 ...	62 N. ...	February 6.

GEOGRAPHICAL NOTES.

AT Monday's meeting of the Royal Geographical Society, Admiral Mayne gave an account of recent explorations in British North Borneo. The paper of most original interest was, however, that of Mr. Maurice Portman, on the exploration and surveys of the Little Andaman. As an official on the Andaman Islands, Mr. Portman made it his business to conciliate the natives of the Little Andaman, who were regarded as quite intractable, and had been severely punished several times for murdering shipwrecked sailors. After a great deal of trouble and much risk, Mr. Portman succeeded in making friends with the natives, with the result that he and those who accompanied him could visit the island with impunity. He has thus been able to collect much welcome information both concerning the island and its highly interesting inhabitants. He completely surveyed the island, and has thus been able to make important corrections on our maps. At the north end the island consists of mangrove swamp and low belts of sandy soil, on which the aborigines have their huts. On the west and south-west the land rises into low hills of a coarse sandstone, running more or less north and south. The timber appears to be much the same as that of the South Andaman, though Mr. Portman saw no padouk and very few bamboos. The rocks are chiefly lime and sandstone, with a good deal of actual coral rock on the east and south coasts. In one place, south of Daogulé Bay, Mr. Portman noticed an outcrop of igneous rock. He found no minerals of importance. This island is about 27 miles long by 15 miles broad, and is encircled by a fringing coral reef. The products of the sea are the same as at the Great Andaman; but the Tubiporine family of coral, particularly *Tubipora musica*, occur in profusion. Dugong and turtle are very plentiful. On the South Sentinel Island, about 12 miles west of the Little Andaman, the turtle appear to have their breeding-station. This island, which is composed entirely of coral rock, is infested by large iguanas, and the *Birgus latro*, or cocoa-nut-stealing crab

(which certainly does not live on cocoa nuts there, as there are none). In rough weather landing is almost impossible on the coast of the Little Andaman, and even in fine weather there are heavy ground-swells and tide-rips. On the north coast large isolated reefs and ledges exist, which make navigation dangerous. With regard to the aborgines of the island, Mr. Portman is of opinion that the whole of the Little Andaman Island is peopled by one race, calling themselves Öngés. These people are subdivided into tribes, who adhere more or less to their own villages, and who quarrel and fight with each other considerably. They appear healthy; their principal diseases being chest complaints, colds, fever, and itch. In physique they compare favourably with the inhabitants of the Great Andaman. Their manners and customs differ somewhat from those of the Great Andaman people, the principal differences being the following:—Instead of small lean-to's, they build large circular huts, some measuring as much as 35 feet in height, and 60 feet in diameter. In these huts the various families sleep on charpoys of wood and cane matting, raised from 6 to 18 inches off the ground, and about 2 feet 6 inches square. Their habits are more cleanly, particularly as regards their huts, and the manner of preparing their food, which is invariably cooked. They cook, dry, and store in baskets, a small fish like a sprat, and this, with the boiled seed of the mangrove, seems to be their principal food, which they supplement with what they can. Their canoes, utensils, ornaments, and bows, are different from those of other Andamanese, and the women wear a tassel of yellow fibre in place of the leaf. They do not smear their bodies over with red ochre, or tattoo themselves, nor do the women keep their heads clean shaved. They are by no means expert in the use of a canoe in rough water, and do not harpoon turtle or dugong, though very fond of the former. They have no religion of any kind, and Mr. Portman learnt nothing of their traditions or superstitions, from which they seem even more free than their neighbours.

MR. C. M. WOODFORD has recently returned from a two years' visit to the Solomon Islands, with extensive collections of mammals, birds, reptiles, Lepidoptera, &c. Nearly six months were spent on Guadalcanar, an island the interior of which has never been previously explored. Ascents were made of several rivers, the furthest point reached being about fifteen miles from the coast; but the hostility of the bushmen prevented the ascent of Mount Lammas.

OUR ELECTRICAL COLUMN.

MR. WILLARD CASE, of Auburn, N.Y., U.S.A., whose extremely interesting paper on a thermic voltaic cell was read before the Royal Society on May 6, 1886, is systematically pursuing his studies to obtain electric energy direct from carbon without passing through the intermediate stage of heat. A paper read on January 10, 1888, in New York, narrates his latest experiments. Jablochkoff tried to do it by immersing plates of carbon and iron in fused nitre. Mr. Case has been using chlorate of potassium and chlorine peroxide (perchloric acid), and with the latter has obtained an E.M.F. with certain forms of carbon varying from 0·3 to 1·24 volt.

IN 1869, Dr. Gore proposed a thermo-magnetic generator of electricity (Proc. R.S. 1868–69, p. 261), in which an increasing or decreasing magnetic field was produced by heating and cooling an iron wire placed as a core to a coil of wire. Mr. Edison has recently endeavoured to make this principle practical, but M. Menges, of the Hague, has been more successful. The difficulties to overcome are waste of heat, energy, and consumption of time, in heating and cooling. The results obtained at present are, however, poor, though encouraging.

M. TERESCHIN, following Quincke's examples and directions, has found with water, methyl and ethylic alcohol, bisulphide of carbon, ether, oil of turpentine, and rape oil, a considerable transport of mass in capillary tubes in the direction of the positive current (*Beiblätter* No. 10, 1887); and Prof. Horace Lamb, in the *Phil. Mag.* for January, prints the admirable paper on the subject which was read before Section A of the British Association at Manchester last September, in which he criticizes the work of Wiedemann and Helmholtz, and explains the phenomenon on the assumption of Quincke, that there is a contact potential difference between the fluid and its solid boundaries, and his own conclusion that there is a sliding coefficient for a fluid in contact with a solid. This transport of mass, due to currents, and the electromotive forces produced by the passage of liquids through capillary tubes, and porous diaphragms are facts undeveloped and unapplied at present.

CONSIDERABLE attention is being devoted to the heating and fusing of wires by currents. Short lengths of fine wire are used in nearly all electric light equipments as safety valves or cut outs; but the law determining the behaviour of these fuses was little known. Mr. Preece has written two papers for the Royal Society. Profs. Ayrton and Perry introduced the subject in a recent paper read at the Society of Electrical Engineers, and Mr. Cockburn has brought the whole subject before that Society, where it has been well threshed out. For fine wires, viz. those under ·010 in., the fusing current varies with the diameter; but for wires over ·010 in., is given by the equation—

$$C = ad^{3/2}.$$

The constant a has been determined for all metals. The behaviour of tin, which is very commonly used, is peculiar. When it approaches the temperature of fusion, its surface oxidizes and coats the wire with a thin skin, which acquires a higher temperature and allows a greater current to flow before fusing. Mr. Cockburn breaks through this skin with a weight—a pellet of lead; while Mr. Preece prevents the skin forming by covering the wire with shell-lac, which acts as a flux and prevents oxidation.

MAJOR KING, U.S.A., has recently made a mammoth electro-magnet out of two Rodman guns, weighing about 60 tons. It was excited by a powerful dynamo, and the armature resisted a pull of nearly 10 tons. The field was felt and watches were stopped at very great distances.

VON BERNARDO'S system of welding by directing an arc itself along the crack, fissure, or edge of the metal to be welded is attracting great attention on the Continent. Prof. Rühlmann, of Chemnitz, has read a very interesting paper before the Electrotechnical Society of Berlin. A carbon rod is the positive and the metal to be fused the negative pole of the arc. The arc acts like a blow-pipe flame. It is eminently adapted to repair cracks and leaks in boilers, heaters, and condensers, to repair tools and generally to cover the ground of soldering and welding.

A NOVEL mode of forming electrolytically deposited copper tubes is attracting considerable attention. The copper is slowly deposited in a thin coating on an iron mandril kept constantly rotating in the bath. As the copper forms it is pressed by an agate burnisher, which compresses the molecular structure into a hard and solid mass of great tensile strength. Such copper has reached a breaking strain of 40 tons on the square inch. The process is due to Mr. W. Elmore.

A CURIOUS experiment is mentioned by the *Electrician* (January 27). A disk of soft iron has a spindle put through it so that it can be spun like a top. When at rest or moving slowly the disk is attracted by the poles of a magnet; but when it turns with sufficient velocity it is repelled by the magnet. The reaction of the induced currents in the mass of the metal is greater than the magnetic attraction.

H. F. WEBER has cast doubts on the dull red rays being the first luminous rays to appear. He says that the carbon filaments, platinum, gold, and iron give a "gray glow," which is evident at temperatures much below that of dull red, viz. 525° C. Gold gives this gray effect at 417°, iron at 377°, and platinum at 390°.

THE PROPOSED TEACHING UNIVERSITY FOR LONDON.

THE following is the text of the petition which has been drawn up by the Association for Promoting a Teaching University for London:—

To the Queen's Most Excellent Majesty in Council.

The Humble Petition of the Association for Promoting a Teaching University for London

Showeth—

1. That the Association for Promoting a Teaching University for London was formed in 1884, and has enrolled up to the present time about 250 members, each of whom was specially invited to join on the ground of eminence, or of experience in matters affecting University teaching in London, or of being