memoirs he received the gold medal of the Royal Astronomical Society at the hands of Prof. J. C. Adams in 1852. His researches on the proper motion of Sirius also attracted much attention, and many other papers on various astronomical and mathematical subjects were contributed by him to the Altona journal. His later work at Altona and Kiel chiefly bore upon the determination of differences of longitude; the last, "Altona-Göttingen," is to be detailed in a memoir to be published in a few weeks.

MINOR PLANETS.—Circular No. 136 of the *Berliner Astronomisches Jahrbuch* notifies the re-observation of *Hilda*, the most distant of the group of small planets yet known to us, and one which, with *Ismene* No. 190, must at times experience considerable perturbations from the action of Jupiter. It has been found at Pola as an object of 13·5 m., many degrees from the position assigned in the ephemeris last published, but there seems reason to suspect error of calculation. Thus if the elements of Dr. Kühnert in the *Berliner Jahrbuch* for 1880 are employed, though there is a later orbit, the error of the computed place is much less than that shown by the ephemeris in the Berlin Circular, No. 135. The difference of positions appears to indicate that the true period of revolution is even longer than has yet been calculated.

In the same Circular, No. 136, are new elements of *Philomela*, attributing to that planet an almost circular orbit, the angle of excentricity being only 0° 18′ 36″·8, so that $e = 0·005414$, which is less than in the case of *Venus*.

Medusa, to which has been assigned the shortest period of any of the minor planet group, has apparently passed the last opposition without being re-observed, but in addition to much uncertainty as to position, it was likely to fall in a region of the sky which is crowded with small stars, and therefore a search would be attended with much trouble and difficulty.

Vesta should now be well discernible without the telescope, being in opposition and perihelion this year nearly at the same time, as we have before remarked, magnitude 5·9. The planet is in perihelion on May 28.

COMET 1880, II.—The following ephemeris is calculated from elements depending upon observations to May 8:—

12h. G.M.T.	R.A. h. m. s.	Decl. ° ′	Log. distance from the Earth.	Log. distance from the Sun.
June 1	6 29 32	+51 38·8	0·4108	0·2683
3	30 41	50 52·4		
5	31 49	50 7·0	0·4168	0·2660
7	32 57	49 22·7		
9	34 5	48 39·4	0·4221	0·2640
11	35 13	47 57·0		
13	36 20	47 15·6	0·4267	0·2623
15	37 27	46 35·0		
17	38 33	45 55·2	0·4307	0·2609
19	39 38	45 16·1		
21	6 40 43	+44 37·7	0·4340	0·2599

PHYSICAL NOTES

PROF. LEMSTRÖM, of Helingsfors, has recently described to the Physical Society of St. Petersburg a singular experiment which, unless otherwise explained by some of the circumstances of the experiment not yet published, must be regarded as a fundamental fact in the physical theory of electricity. He finds that a ring of insulating material when rotated about its axis of symmetry with a high velocity acts like a galvanic circuit, and produces a magnetic "field" in the space within it. Prof. Lemström is a disciple of Edlund, and regards this experiment as confirmatory of Edlund's theoretical views on the nature of electricity. According to Lemström, the ether in the insulator, being dragged along by the ring, produces vortical motion of the ether in the central space, which vortical motion he conceives to be the essential condition of a magnetic field. Arguing from these premises, Lemström proceeds to build up an ingenious theory of terrestrial magnetism. The converse operation of rotating an iron bar within a hollow insulating body or insulating medium ought also to produce magnetism in the bar. The earth being a magnetic body rotating in an insulating medium, ought to be magnetised by rotation about its axis, the axis being the axis also of magnetisation, unless the irregular internal disposition of the magnetic constituents produced an irregular distribution of the magnetism, or unless the distribution were affected by the induced magnetism due to movements of electricity in the atmosphere, as in the *aurora*, or by the magnetism which would, on Lemström's theory, be generated by the revolution of the earth round the sun, and by the motion of the solar system through space.

M. DUMAS, who has been examining the property of certain metals in occluding gases, has found that aluminium may occlude as much as one and a half times its bulk of hydrogen gas, and also shows traces of carbonic acid. The gases were given up when the metal was heated to redness under exhaustion. Magnesium behaves similarly. Were these metals distilled *in vacuo* they could probably be obtained pure. It is possible that these observations may throw some light on the anomalous behaviour of aluminium when used as an electrode in the voltameter.

THE cone of rays entering the eye from a peripheric point is never again united to one point, but it must present somewhere a minimum of cross section. The geometrical place of this minimum of cross section Herr Matthiessen (*Arch. f. Ophthalm.* (4) 25, 1879) designates the "theoretic retina." He finds that it is a spherical surface, the middle point of which coincides with the middle point of the corneal ellipsoid. To a distance of 75° from the fovea centralis the theoretical retina corresponds very exactly to the actual (according to the determinations of Arlt and Helmholtz). At greater distances the retina is formed hypermetropically, and so is within the "theoretic retina."

THE influence of magnetisation on the tenacity of iron has been lately studied by Signor Piazzoli (of the Catanian Academy of Sciences). Iron wires were hung between two hooks and ruptured by pouring water into a vessel suspended from them. They were about 350 mm. long, and were inclosed in a spiral with four windings one over another, which were either all traversed by a current in one direction, or two by a current in one direction, and two by an equal opposite current, so that in both cases the wires were equally strongly heated by the spiral, but in one case they were magnetised, in the other not. The weights required to break wires annealed in charcoal (weight of one metre, G = 0·299) were, during magnetisation, P = 1260–1306; without magnetisation, P′ = 1213–1270. In the case of wires annealed in carbonic oxide (where G = 0·46 g.), P = 1732·4 – 1742·7; P′ = 1703·62 – 1719·87. In the case of wires annealed in hydrogen P = 1289·5 – 1310·1; P′ = 1263 – 1299·7. In each separate series, accordingly, the difference P – P′ was frequently less than the difference between the highest and lowest weights required for rupture of apparently identical wires; still, the mean values in each of the (14) series, were from about 1 to 3 per cent. greater for the magnetised than for the unmagnetised wires, showing that the tenacity of iron increases on magnetisation. This, it is remarked, need not be attributed to a change of cohesion of the iron, but may be due to ordinary magnetic attraction of the successive parts of the wires. In eleven out of fourteen cases the relative elongation of the magnetised wires at rupture was greater than that of the unmagnetised, in three cases less.

IN a recent note to the Vienna Academy, Prof. Ludwig gives the results of the first of a series of observations on the decomposition of organic compounds by zinc powder. This relates to alcohols, and it is stated that in distillation of these over zinc powder heated to 300 – 350° C., the higher ones—from ethylic alcohol upwards—are split up into the corresponding olefine and hydrogen. Under the same conditions methylic alcohol is decomposed simply (if the small quantities of marsh gas be neglected) into carbonic oxide and hydrogen. The similar decomposition of ethylic alcohol into marsh-gas, carbonic oxide and hydrogen, only occurs at a considerably higher temperature—with dark red glow. On the ground of these decompositions, which indicate that the combination of the carbon and the oxygen must be a very strong one, it is supposed that the decomposition of the higher alcohols is no simple reduction to the saturated hydrocarbons, from which, then, by separation of hydrogen, the olefines might arise, but that in the first phase of the process the alcohol is split up into the olefine and water, and that the hydrogen concentrated in the gases is due to a reduction of the generated steam by the zinc powder.

PROF. RIGHI has recently described to the Bologna Academy an arrangement of Holtz's electric machine, in which the whole machine except the handle and the electrodes is inclosed, along with a small friction machine for excitation, in a glass case tightly

closed by means of strips of fur, and dried interiorly with chloride or calcium, so that in all weathers the machine acts well.

HERR ZEHFUSS has lately given (*Wied. Ann.*, 4) some personal experiences of the phenomenon of "after images of motion" (about which Plateau and Oppel have before written). These after images may be had, *e.g.*, in a train, if one look at a point on the horizon for a little, then turn to look at (say) a horizontal fibre in the wood of the carriage, or close one's eyes. Motions then seem to be still perceived; in the latter case, *e.g.*, a stream of sparks seems to be moving to the right (or if the point originally looked at have been between the observer and the horizon, there is a stream of sparks above going to the right and one below to the left). Herr Zehfuss offers a physiological explanation, in preference to the partly psychical ones proposed by Plateau and Oppel. Each individual nerve rod, he supposes, has special blood-vessels, which, when the original image of a moved object goes to the right, directs the course of the blood to that side, just as in ordinary light the decomposed blood is promptly replaced by fresh. By this preponderant direction of blood to the right a heaping up occurs in each retinal element on the right, which gives rise to return currents as soon as the outer cause has ceased to act. As the blood flows back there arise, in consequence of the specific excitability of the rods, those spark-streams, which are projected as elementary motions to the right.

IN a recent number of *Wiedemann's Annalen* (3) Herr Schönn describes a method of making visible ultra-violet prismatically decomposed light in such a way that exact measurements can be made. One feature of it is the use of a disk of fine calking paper saturated with sulphate of quinine, and contained in a small cell which is brought close before the Ramsden ocular, which can be directed at once on the disk and on a luminous line (its axis is not inclined like that of Soret's, but coincides with the axis of the telescope). The author gives measurements of the ultra-violet spectrum of cadmium, zinc, and thallium.—In the same number Herr Glan describes a "spectro-telescope," with which objects can be seen in any homogeneous colour at will. The instrument has various applications, especially in astrophysics.

IN a paper on the thermic theory of the galvanic current (*Wied. Ann.*, No. 4) Herr Hoorweg lays down the following propositions:—Wherever two conductors come into contact, motion of heat results in development of electricity; therefore a constant electric difference arises between the two substances. 2. If in a closed circuit, the total sum of the differences of potential be different from zero, there arises in this circuit a continuous electric current. 3. This current exists at the cost of the heat at one part of the point of contact, and has heat-production in the other for a result. 4. All voltaic currents are thermo-currents. 5. The chemical action in the battery and the decomposition apparatuses is a result of the galvanic current.

AN interesting series of experiments has been recently made by Dr. König on the vibrations of a normal tuning-fork (*Wied. Ann.*, No. 3). He finds that, practically, at least to 50° to 60° of heat, the influence of heat on a tuning-fork may be regarded as constant. Thick tuning-forks are more affected by heat than thin ones of the same pitch, indicating (it is remarked) that change of elasticity, and not change of the length of the arms, is the primary cause of the change of pitch. The influence of heat on tuning forks of different pitch, and of not very different thickness, is proportional to their number of vibrations. Generally the period of vibration of a tuning-fork is increased or diminished $\frac{1}{8913}$ by a difference of temperature of 1° centigrade. The general change in pitch of the normal fork $Ut_3 = 512$ vibrations per second at 20°, through the temperature difference of 1° C. is 0·0572 vibrations per second. Dr. König has constructed a fork which, at any temperature, will exactly give 512 vibrations.

SOME quotations by Herr Oehler (*Wied. Ann.*, No. 3) from Jacob Hermann's work, "Phoronomia sive de Viribus," &c., published in 1716, have a curious significance in relation to the history of the mechanical theory of heat. In the twenty-fourth chapter, "De motu intestino fluidorum," the following paragraph occurs:—"Hoc nomine non intelligitur hoc loco internus molecularum motus fluidi cujuscunque in suo statu naturali consistentis, sed is particularum motus, qui in fluidis a causis externis et accidentalibus excitari solet, quo calor præsertim est referendus, qui dubio procul ex concitatiore particularum motu in corpore calido a causis externis producitur. Utut vero ejusmodi motus intestinus admodum perturbatus sit, nihilo tamen minus regula physice satis accurata pro ejus mensura media tradi potest. In another place Hermann offers a demonstration of the theorem that "Calor, cæteris paribus, est in composita ratione ex densitate corporis calidi, et duplicata ratione agitationis particularum ejusdem."

GEOGRAPHICAL NOTES

LIEUT. A. LOUIS PALANDER, of the Swedish Royal Navy, was last week elected a Corresponding Member of the French Geographical Society, in acknowledgment of his brilliant services to geography as commander of the *Vega* during the late Arctic Expedition. We understand that the Swedish Royal Academy of Sciences have just caused a handsome bronze medal to be struck in commemoration of the successful accomplishment of this enterprise. This medal shows on one side the heads of Prof. Nordenskjöld and Lieut. Palander, and on the other a well-executed representation of the *Vega* surrounded by ice.

AT the Anniversary Meeting of the Geographical Society, on Monday next, the Earl of Northbrook will take the chair for the last time, and will deliver an address on recent geographical progress. The formal presentation of the Royal Medals will also take place at this meeting, though neither of the recipients (Lieut. Palander and Mr. Ernest Giles) can be present. The Duke of Edinburgh, Honorary President of the Society, will preside at the Anniversary Dinner in the evening, which will be held, as usual, at Willis's Rooms.

LORD ABERDARE, it is understood, will succeed the Earl of Northbrook as President of the Geographical Society.

A BEGINNING is about to be made to carry out Lieut. Weyprecht's proposal for a circle of observing stations around the North Polar region. The Danish Government has resolved to establish a station at Upernivik, in West Greenland; the Russian Government has granted a subsidy for an observatory at the mouth of the Lena, and another on the new Siberian Islands; Count Wilczek is to defray the expenses of a station on Novaya Zemlya under the direction of Lieut. Weyprecht; the U.S. Signal Service, under General Myer, has received permission to plant an observatory at Point Barrow, in Alaska; and it is expected that Canada will have a similar establishment on some point of her Arctic coast. At the Hamburg Conference it was announced that Holland would furnish the funds for a station in Spitzbergen; and it is expected that Norway will have an observing post on the extremity of the Province of Finmark. This is a good beginning, and we hope that some sort of agreement will be established to have all the observations made after a uniform method, otherwise their value will be greatly decreased.

BARON EGGERS, of St. Thomas, West Indies, sends is a prospectus of a plan for the scientific exploration of the West Indies, especially as regards their natural history, his main purpose evidently being to make complete collections of plants, insects, and shells. Such collections he offers at certain rates to all who express their wish to become subscribers, the subscription to be paid on delivery of the collections. Details may be obtained from Baron Eggers or from his agent in Europe, Dr. Eug. Warming, Copenhagen.

M. PAUL SOLEILLET, who was compelled to return to Senegal in his attempt to reach Timbuctoo, is now in Paris, and expresses his determination to embark again in July, to make another attempt.

A SOCIETY of Geography for the north of France has been established at Douai.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The election to the Professorship of Mineralogy, vacant by the death of Dr. W. H. Miller, F.R.S., will be held in the Senate House on June 12.

In the fourteenth Annual Report of the Museums and Lecture-Room Syndicate, Lord Rayleigh, the recently-appointed Professor of Experimental Physics, says:—"On visiting the Cavendish Laboratory in December last, after my appointment to the Professorship of Experimental Physics, I was at once struck with the