

OUR ASTRONOMICAL COLUMN

THE COMET.—By favour of Dr. W. L. Elkin of the Royal Observatory, Cape of Good Hope, we are able to subjoin observations of the great comet made at that establishment before the perihelion passage, which it is stated will admit of improvement when the places of the comparison-stars have been more accurately determined :

	Cape M.T.	R.A.	Decl.
	h. m. s.	° ' "	° ' "
May 31 ...	6 19 24 ...	75 46 25 ...	-29 42 19
June 3 ...	5 53 47 ...	76 12 30 ...	26 25 57
4 ...	5 59 57 ...	76 21 55 ...	25 4 53
9 ...	5 31 18 ...	77 16 24 ...	-15 44 53

From the positions on May 31, June 4 and 9, Dr. Elkin has calculated the following elements of the comet's orbit, by the side of which we place for comparison others deduced by Mr. Hind, from post-perihelion observations up to July 1 :—

	ELKIN	HIND
	June 16'29839 G.M.T.	June 16'41519 G.M.T.
Longitude, perihelion..	204 55 13	205 9 4
„ node ...	270 54 27	270 58 0
Inclination ...	63 27 4	63 29 9
Log. perihelion dist....	9.866656	9.865516
	Direct.	Direct.

The longitudes are reckoned from the mean equinox of 1881.0. Mr. Hind's orbit gives the following expressions for the comet's heliocentric co-ordinates x, y, z to be used with the x, y, z of the *Nautical Almanac* in the calculation of geocentric right ascensions and declinations; they apply to apparent equinox 1881.5.

$$x = r[9.65000] \sin. (\vartheta + 356 22.5)$$

$$y = r[9.99187] \sin. (\vartheta + 243 20.7)$$

$$z = r[9.96142] \sin. (\vartheta + 328 24.3).$$

Here, ϑ is the true anomaly, r the radius vector, and the quantities within square brackets are logarithms.

We may take this opportunity of correcting a singular misstatement with which Admiral Mouchez, the director of the Observatory at Paris, is credited in the *Comptes rendus* of the Academy of Sciences. He is there made to say that the period of revolution of the comet of 1807, which had elements resembling those of the present comet, was found by Bessel to have been reduced to 174 years after he had taken account of "new perturbations." Any one who refers to Bessel's treatise will see that this is an error. Bessel fixed the period of revolution at 1713½ years, on September 22, 1807, and in continuing the computation of the perturbations by the planet Jupiter to March, 1815, when they had become very small, he found that the revolution had been diminished thereby, about 170 years; he considered that the period he had assigned for September 22, 1807, was not liable to a greater error than 100 years. In the *Comptes rendus* the effect of perturbation on the period appears to have been quoted, instead of the revolution itself, as perturbed to March, 1815. In the communication to which we refer, the identity of the comet of 1881 with that of 1807, is pretty distinctly assumed, but the weight of evidence is certainly in the other direction.

THE VARIABLE STAR U CEPHEI.—Prof. Julius Schmidt has published an ephemeris of the last variable star discovered by Ceraski in Cepheus, extending to the end of the present year. From his later observations he has found that the gradual increase of period which he had formerly suspected is not confirmed, and he now fixes the period at 2d. 11h. 49m. 33.35s. On August 18 commences a series of minima, which may be observed at intervals of something less than five days to the end of December: the following are the Greenwich mean times to the end of October :—

	h. m.	h. m.	h. m.
Aug. 18, 14 44.9 ...	Sept. 12, 13 0.8 ...	Oct. 7, 11 16.6	
23, 14 24.0 ...	17, 12 39.9 ...	12, 10 55.8	
28, 14 3.2 ...	22, 12 19.1 ...	17, 10 35.0	
Sept. 2, 13 42.4 ...	27, 11 58.3 ...	22, 10 14.2	
7, 13 21.6 ...	Oct. 2, 11 37.5 ...	27, 9 53.4	

The letter T, at first used to designate this star, will be properly applied to another variable also discovered by Ceraski, the place of which for 1855.0 is in R.A. 21h. 7m. 33s., Decl. + 67° 54' 4", which seems to have a period of about 400 days, and was at a maximum on December 30, 1880.

PHYSICAL NOTES

IN the *Journal* of the Franklin Institute Prof. S. W. Robinson has recently described some experiments upon the effect produced upon sound-waves by repeated oblique reflections at membranes forming the boundary of two gaseous media. These experiments, as far as they go, would appear to show that after repeated reflection at oblique surfaces set in vertical planes a sound-wave acquires new properties by virtue of which it is reflected at another such oblique surface with an intensity which is a maximum if this surface be also in a vertical plane, and a minimum if the surface be equally inclined to the direction of propagation of the wave, but turned through a right angle about that direction as an axis. If this be indeed established as an experimental result it is equivalent to a proof that sound-waves can be polarised by reflection. The apparatus consisted of a series of L-shaped tubes of tin plate, one inch in diameter and three inches long, the parts joined at an obtuse angle, but having the outer angle cut away and covered by a thin membrane. This membrane was fixed so that a sound-wave coming in either direction should be incident on it at the angle of supposed maximum polarisation, the angle being calculated by Brewster's Law so that its tangent should represent the ratio between the velocities of wave-propagation in the two media, namely, coal-gas within, air without (14 : 11). The series of tubes was so set that at first the membranes were all parallel, and then a "pulse" was sent along the tube in the following manner :—The initial and final openings were closed by membranes stretched across the tubes orthogonally. Against each a small ball of ivory or glass was hung by a thread. The ball at one end was raised to a given height and dropped on to the membrane, and the impulse given to the ball at the other end was noted. Then the second half of the system was turned round so that the membranes of this portion were at right angles to their former position, and the ball was again dropped. The impulses received on the second ball were in general feebler when the second system, or "analyser," stood at right-angles to the first system, or "polariser," the diminution varying in different experiments from 16 to 38 per cent. No diminution was observable when the interior of the tube was filled with air instead of coal-gas. It remains to be seen whether the results are capable of being reproduced under other circumstances, or whether they are due to some mechanical peculiarity of Prof. Robinson's apparatus. Whether this be so or not we must absolutely reject the very unwarranted conclusion at which Prof. Robinson arrives, namely, that the vibrations of light as well as of sound are longitudinal until they are polarised, and that they become transversal only in the act of polarisation.

M. MERCADIER has examined the resistance of selenium at different temperatures, using for this purpose a photophonic receiver of selenium spread between the edges of platinum sheets, the resistance being measured in the dark by the ordinary bridge-method. The receiver, which had been well annealed, had at 15° C. a resistance of 54,000 ohms. This amount decreased as the temperature rose with great regularity to 36° C., when its resistance was less than 1500 ohms. From this point the diminution of resistance was less rapid; but at about 125° C. it had fallen to less than 500 ohms, rising slightly to 163° C., from which it again fell as the temperature was raised to 208°. These results accord with the earlier experiments of Werner Siemens.

M. LIPPMANN finds (*Four. de Phys.*, May) that galvanic polarisation, which modifies so much the capillary properties of a metallic surface, causes no perceptible variation of its optical properties. He directed a beam of polarised light towards a platinum or silver mirror in acidulated water, or copper sulphate solution, and it was received, after reflection, in a Jamin quartz compensator, followed by an analyser-Nicol. The dark fringe in the compensator was not displaced when the mirror was included in the circuit of a Daniell or Bunsen element, and the current passed. Again, Newton's rings, formed by a glass plate on the platinum surface, and observed under various incidences, showed no displacement when the polarising current passed. (M. Lippmann adds some observations as to the mode of production of gas-bubbles by electrolysis.)

A FEW years ago M. Montigny called attention to the fact that the scintillation of stars is considerably increased during aurora borealis. Further data on this subject are afforded in a recent issue of the Belgian Academy's *Bulletin*, No. 3. *Inter alia*, he has observed that the phenomenon is more pronounced in winter than in summer, and that stars in the northern region

show the increased scintillation most. The author's general conclusion is that the effect is not one due to direct influence of the electro-magnetic light of aurora on the scintillation itself, but to disturbances (probably a cooling) which coincide with the appearance of aurora in the upper regions of the air, traversed by the star-rays.

AN acoustical apparatus for lecture purposes, devised by Dr. Maschke (*Wied. Ann.* No. 5), consists of a longish graduated piece of wood on adjustable supports, and having a longitudinal groove in its upper surface, in which a glass tube is placed. At the end of the wooden piece is a screw arrangement supporting a thin steel rod which enters the tube, and has at its end a (vertical) ring with collodion membrane, against which hangs a little ball of shellac by a cocoon-fibre from the upper border. The tube may be made a closed one by means of a felt-covered piston. When the tube is sounded by means of a suitable tuning-fork, the shellac ball shows pendulum-motions, if not at a nodal point. The effects may be projected on a screen.

THE passivity of iron has been studied under new conditions by M. Bibart (*Four. de Phys.*, May), and he considers it is not produced by a layer of insoluble sub-nitrate, as some physicists have thought, since the previous action of nitric acid is not necessary. Still less is it due to a formation of bioxide of nitrogen. It is produced by any cause which tends to oxidise iron, and destroyed by any cause which tends to deoxidise it. It is due then either to a layer of oxide or a layer of oxygen. The oxides formed on the surface may preserve it by their very presence, furnishing a sort of unattackable varnish, or they may preserve it like platinum, liberating, on the denuded parts, a protective layer of oxygen. The passivity of iron from contact of platinum seems to be produced at first by a simple layer of oxygen condensed on the platinum surface (a simple shock destroys it). But by degrees a layer of oxide is formed, and the iron then loses its passivity much less readily than before.

GEOGRAPHICAL NOTES

DR. SCHWEINFURTH, who left Suez for Socotra on February 23, returned on June 19. From the *Egyptian Gazette* we learn that his voyage to the island in a native vessel lasted one month (with calls). He was a month on the island. The rich flora yielded many new species. The mountains are well wooded, and covered with a more luxuriant vegetation than Mount Etna. The climate is exceptionally temperate, and the natives are inoffensive, greater security being experienced everywhere than in any part of uncivilised Africa. On the approach of the south-west monsoon Dr. Schweinfurth had to leave, and in a miserable native vessel he tried to reach the Arabian coast opposite Socotra. It was found impossible to get to the east of Aden, and in H.M.S. *Dragon*, which was met, the explorer was conveyed to that place. Dr. Schweinfurth has brought with him a rich botanical collection, including some living plants which he will try to acclimatise in his garden at Cairo.

THE Polar relief ship *Rodgers*, Lieut. Berry, sailed from San Francisco on June 16 in search of the *Jeanette*. She will first cruise to St. Berry, then proceed to Petropaulovsky, then cross to St. Michael's in Alaska to coal, thence to St. Lawrence Bay and along the coast of Northern Siberia, making inquiries of the natives; then from Cape Serge to Kamon, where letters will be left with some natives; then north to Herald Island, hunting well over for cairns. It is intended next to go along the southern shore of Wrangel Land, and seek a harbour to winter in. The north-east and west coasts will be examined in sledge parties. Lieut. Berry means to return, if possible, by the second year.

INSTRUCTIONS have now been issued by Brigadier-General Hazen, of the U.S. Signal Office, to the commanding officers of the two expeditionary forces about to be sent out to establish permanent stations of observation in Polar regions. Lieut. Greely commands one of these forces, which goes to the neighbourhood of the coal-seam discovered near Lady Franklin Bay in 1875. The steamer will directly return (with a transcript of observations during the voyage), and the party landed will proceed to erect dwelling-houses and observatories, after which a sledge party will proceed to the high land near Cape Joseph Henry. It is intended that the permanent station shall be visited in 1882 and 1883 by a steam-sealer or other vessel with stores, &c., but directions in case of failure are supplied. Lieut. Ray commands the other expedition, which will sail from San Francisco for Point Barrow, Ala-ka Territory, and establish

there a permanent station to be occupied till the summer of 1884 and visited annually. A great variety of observations will be made by both parties, and the instructions drawn out by the recent Hamburg Conference (with added notes from the U.S. Chief Signal Office) are furnished.

DR. GERARD ROHLFS delivered an interesting lecture at the meeting of the Berlin Gesellschaft für Erdkunde regarding his last journey in Abyssinia. He was received in a friendly manner by the inhabitants, and he is quite charmed with the hospitality of the Abyssinians. At Debratabor he was received kindly by Negus (Emperor) Johannes, and this was of great importance for his subsequent tour. Rohlf's travelled in a northerly direction to the ancient Portuguese capital Gondar, the residence of the late King Theodore. By means of a pass given to him by the ecclesiastical chief of the city he was able to inspect all the ancient historical buildings of the city. He continued his journey to the north, and after crossing the Takkaze River he reached Artum (Axum?), the ancient former royal residence, with its monuments dating from the period of Ptolemy. In April Rohlf's reached the Nassaur mountain chain, the boundary of Abyssinia, whence he proceeded to Cairo by boat.

THE expedition sent out by the French Secretary for Public Instruction to investigate the east coast of Finmarken has arrived at Vadsö after a journey of twenty-one days. The expedition, which is under the command of M. Georges Pouchet, has for its special object to study the natural history of the Varanger Fjord, which is situated at the boundary of the Atlantic and Arctic Oceans. The keeper of the Christiania Royal Zoological Collections joined the expedition at Hammerfest.

THE Emperor of Germany has honoured Dr. Oscar Lenz, the well-known African traveller, with the Order of the Crown.

MR. SANDFORD FLEMING, C.M.G., Engineer-in-Chief of the Canadian Pacific Railroad, is to attend the International Geographical Congress at Venice in the interests of the question of standard time, coupled with which is that of a prime meridian. The former of these subjects is attracting much attention on the other side of the Atlantic, and a paper on it was lately read by Mr. Fleming before the American Society of Civil Engineers at a convention in Montreal, which brought out an interesting discussion, and a committee, consisting of leading railway officials in Canada and the United States, was appointed to examine and report at a future meeting. Dr. Barnard, the President of Columbia College, New York, is to represent the American Meteorological Society on the same subject at a meeting of the Association for the Reform and Codification of the Law of Nations, which is to be held at Cologne in August.

COL. PERRIER, a well-known French topographer, has lately been for some time engaged in survey work in the Regency of Tunis, and has prepared a map of the Kroumir country, which will shortly be published by the Dépôt de la Guerre.

MESSRS. S. CLARKE AND J. H. RILEY, of the China Inland Mission, whose station is at Chungking, formerly Mr. Colborne Baber's head-quarters, have each lately made important journeys in the Szechuen province. Mr. French, accompanied in one of his journeys by Mr. Broumton, has visited nearly every city in Eastern Yünnan, and has lately started again for the same region. In the course of their journey from Burmah Messrs. Soltan and Stevenson also made extensive journeys in the western part of the Yünnan province.

THE steamer *Nordenskjöld* is to start this week for the Gulf of Obi to the assistance of the *Oscar Dickson* and the *Nordland*. The crews of these vessels were all safe on April 23, when five men from the former left for Tobolsk, which they have lately reached.

A LETTER from Mussuca, on the Lower Congo, states that a Jesuit missionary expedition has been set on foot to penetrate into the far interior. Père Argourd has been sent from the French mission station at Landana to organise a party of about thirty to proceed to Stanley Pool. He tried to procure carriers at Boma, Mussuca, and Noki, but not succeeding there, he went some thirteen miles inland to King Kangan Pecca, with a view to secure his aid. This was readily obtained by a truly missionary present of two gallons of rum, and Père Argourd returned with eight men and the promise that seventeen more should be sent shortly. The men however ran away the next day, and, yielding to circumstances, Père Argourd has resolved to proceed to Stanley Pool by M. de Brazza's route up the Ogowe.