as the discoverer of facts which have often thrown unexpected light on the problems of our science, and have always, at least, been of the highest importance, and stated with admirable truth and modesty."

THE *Annales de Chimie et de Physique* reproduces in its August number a paper relating to the theory of dissipation of energy, read by Macquorn Rankine at the British Association meeting in 1852.

A SERIES of scientific ascents were made on Sunday afternoon from the Place Saint Jacques, in Paris, under the auspices of the Académie d'Aérostation Météorologique. At a height of eight hundred feet photographs of the entire horizon were taken by means of a panoramic apparatus invented by M. Triboulet. In a brief explanation of this, given by one of the members of the Academy, it was pointed out that the experiment was as important from a military as from a scientific point of view, since it would enable an army to ascertain exactly the number and position of their enemies. At another ascent telephonic conversation with persons on the ground was carried on at the height of five hundred feet. The experiments were under the auspices of the Municipal Council of Paris.

THE aurora borealis which was seen in so many parts of England on October 2, was also visible in France from a very large number of places.

M. DUVAUX, the French Minister of Public Instruction, has opened the first superior school for females established in France. It is situated in the city of Rouen, and the regular course of study will begin this year. Many similar establishments are in course of construction in several parts of the country.

THE additions to the Zoological Society's Gardens during the past week include a Sykes's Monkey (*Cercopithecus albigularis* ♀) from East Africa, presented by Capt. F. W. Schwedler; a Binturong (*Arctictis binturong*) from Malacca; a Common Fox (*Canis vulpes* ♀), British, presented by Mrs. Studholme Brownrigg; two Goshawks (*Astur palumbarius*) from Germany, presented by Dr. Rudolph Blasius, C.M.Z.S.; a Common Raven (*Corvux corax*), two Lesser Black-backed Gulls (*Larus fuscus*) from Scotland, presented by Mr. F. G. Bury; two Greater Sulphur-crested Cockatoos (*Cacatua galerita*) from Australia, presented by Mr. C. Kerry Nicholls, F.Z.S.; a Puff Adder (*Vipera arietans*) from South Africa, presented by Lieut. R. Crawshay; an Ornamented Lorikeet (*Trichoglossus ornatus*) from Moluccas, a Crested Curassow (*Crax alector*) from Guiana, two Illiger's Macaws (*Ara maracana*) from Brazil, purchased; two Brazilian Hangnests (*Icterus jamaicai*) from Brazil, deposited; an Australian Fruit Bat (*Pteropus poliocephalus*), born in the Gardens.

CHEMICAL NOTES

AN exceedingly ingenious patent for the manufacture of hydrogen and oxygen has been taken out by M. N. A. Hélouis, of Paris. Wood charcoal is obtained by heating wood in closed vessels: the gas which is evolved is used for heating the retorts in which hydrogen and oxygen are produced, the tar is used for carburetting hydrogen, the pyroligneous acid is employed to decompose sodium sulphite (produced in another stage of the process), whereby sulphurous acid and sodium acetate are obtained. By passing steam over hot wood charcoal, a mixture of hydrogen, carbon monoxide, and dioxide is obtained; the mixed gases are passed into retorts containing heated gypsum, which is reduced by carbon monoxide to calcium sulphide; the escaping carbon monoxide is absorbed by soda solution, giving sodium bicarbonate. Oxygen is obtained by decomposing gypsum (600 parts) by silica (340 parts river sand); the mixture of sulphur dioxide and oxygen which is produced, is passed into caustic soda solution, whereby sodium bisulphite is formed; the residual sulphur dioxide is absorbed by milk of lime. The calcium sulphite produced by the final washing of the mixed gases is decomposed by sodium bicarbonate, giving calcium carbonate and sodium bisulphite; the latter is decomposed, as already described, by pyroligneous acid, and the sulphurous acid produced is oxidised to sulphuric acid in a cylinder containing platinised pumice-stone, by air containing 75 per cent. of oxygen. The calcium sulphide which remains in the oxygen retorts is decomposed by carbon dioxide and steam; the sulphuretted hydrogen produced, after being freed from moisture by passing through a condensing apparatus, is burned with air rich in oxygen, and the sulphurous acid formed is conducted into the leaden chambers of the sulphuric acid manufactory. Air containing 75 per cent. oxygen is obtained by pumping air into a cylinder containing a mixture of 80 parts water and 20 parts glycerine; when the pressure has reached 10 atmospheres, communication is made between the first cylinder and another from which air has been removed; air rich in nitrogen remains in the first cylinder. By repeating this operation, a mixture of 75 per cent. oxygen and 25 per cent. nitrogen can be obtained. Another method of obtaining nearly pure oxygen from air consists in passing the latter into an iron cylinder containing a bag of silk covered with caoutchouc; the dialysed air is then driven by a steam jet into a condenser, and thence passes into a second similar cylinder; this process is repeated several times; a mixture of 98 per cent. oxygen and 3 per cent. nitrogen may thus be obtained, but for most metallurgical or lighting purposes a mixture containing 60 per cent. oxygen is sufficient. Nitrogen escapes from each iron cylinder by a side tube which dips under water. The silk bags used for dialysing air are prepared by washing ordinary caoutchouc with a mixture of carbon disulphide and alcohol (whereby substances are removed which would readily stop the pores of the caoutchouc-covered silk) making into a paste with benzene, and placing a layer of this between two layers of silk.

IN the *Scientific Proceedings* of the Ohio Mechanics' Institute (i. 35) a process is described for melting iridium by heating in a Hessian crucible with phosphorus, and subsequent renewal of the phosphorus by repeated fusion with lime. The metal, in very thin sheets, can be cut by a copper wheel making 2000 revolutions per minute, and having its surface covered with emery, or corundum, and oil. Metallic iridium is nearly as hard as ruby; no steel tools make any impression on it; attempts have been made, with fair success, to use it in place of carbon as the negative pole in the electric arc light.

IT is stated in the *Chemical Review* that recent analyses of the water from the *Holy Well* at Mecca, which is so eagerly drunk by pilgrims, show this water to be sewage, about ten times stronger than average London sewage.

ARTIFICIAL ivory of a pure white colour, and very durable has recently been manufactured by the inventor of celluloid: it is prepared by dissolving shellac in ammonia, mixing the solution with oxide of zinc, driving off ammonia by heating, powdering, and strongly compressing in moulds.

ON THE ALTERATIONS IN THE DIMENSIONS OF THE MAGNETIC METALS BY THE ACT OF MAGNETISATION[1]

DR. JOULE long since discovered that when a bar of iron was magnetised by an electric current, an *elongation* of the bar took place. In subsequent experiments, published in 1847, Joule found that the elongation amounted to about 1-200,000th of the length of the bar for the maximum magnetisation, and that the total elongation was nearly proportional to the square of the actual magnetisation. By placing the bar in a vessel of water stopped with a capillary tube, it was found that the volume of the iron did not augment, and hence Joule concluded that the sectional area diminished in proportion to the elongation. Under longitudinal tension, magnetisation caused a *shortening* of the rod when the tension exceeded 600 lbs. for a rod a quarter of an inch square. Soft steel behaved like iron; but hard steel, under all circumstances, Joule found to shorten slightly when the magnetising current passed

In 1873 Prof. Mayer repeated Joule's experiments with new and delicate apparatus; the elongation of the iron he found to amount to 1-277,000th of its length for the maximum magnetisation. Mayer also found that soft as well as hard steel contracted under magnetisation.

[1] Paper read at the Southampton Meeting of the British Association by Prof. W. F. Barrett, F.R.S.E., Professor of Physics in the Royal College of Science, Dublin.