the electric light in the illumination of the saloons on board their steamers.

We are glad to be able to acknowledge the receipt of the Report of the Sheffield meeting of the British Association. This early publication is decidedly a mark of progress.

For the first time in its history the Paris Academy of Sciences has regular archives. More than seven hundred cases are filled up with scientific memoirs and documents from the end of the seventeenth century to the present time. Scientific papers left by Réaumur and Ampère are a part of this unexampled collection.

The bequest of the late Mr. John Miers, F.R.S., to the British Museum, consists of his herbarium of South American plants which he made during his long stay in that country; original drawings and the manuscripts of his published works; and some unpublished manuscripts. Among the more important of his unpublished manuscripts is a list of the native names of the plants. The extent of the herbarium is about 20,000 sheets, on which the specimens are carefully mounted, and as it includes the type specimens figured in Mr. Miers's publications, the acquisition to the Museum is of great value. The cases in which the collection was kept form part of the bequest. It was only last year, when nearly ninety, that Mr. Miers published his "Apocynaceæ of South America," with general remarks on the whole family. The work, which was of 277 quarto pages, was illustrated by 35 plates. The "Contributions to Botany," published in three volumes in 1861, 1869, and 1871, were illustrated by 153 plates, and contained 940 quarto pages of letterpress. All the originals of these are included in the collection sent to the British Museum. There are also a large number of other drawings and sketches of dissections.

On October 10 a large balloon fell on a farm in the town of Milwaukee, U.S. The air-ship was picked up and temporarily stored in a warehouse. On the 11th an inspection of the canvas was made, to ascertain whether it was the *Pathfinder*, a balloon in which Prof. Wyse had ascended some days previously in company of a gentleman, and had not been heard of since. It was proved that this balloon had been liberated on Thursday, October 7, at six in the evening, at Waukosha in Wisconsin, and had been wandering in the atmosphere. Before being discovered in Milwaukee, it had been seen coming from Lake Michigan in an opposite direction to where Waukosha lies. The body of Prof. Wyse has not been recovered, but the gentleman who had ascended with him was found drowned and naked. It was supposed he had prepared to escape by swimming, and precipitated himself into the water.

The Manchester Field Naturalists and Archæologists send us an interesting and varied Report for 1877. It contains an account of the numerous excursions made and the papers read at the Society's meetings.

The several stations of meteorology which have been established in several parts of Paris, according to a vote of the Municipal Council, have been in complete operation for a few months. Startling differences have been occasionally discovered between the readings taken by the several observers at a distance of a very few miles.

The *éloge* on M. Thiers was pronounced by M. Henry Martin before the French Institute on November 13. M. Marmier returned thanks in the name of the Académie Française. The lecturer made allusion to the studies of M. Thiers in astronomy under the guidance of M. Leverrier, and in chemistry, of M. St. Claire Deville. It was stated that many experiments were made by the late President of the French Republic in the last years of Napoleon III.'s rule. These experiments were conducted in the laboratory of the École Normal Supérieure, rue d'Ulm.

The additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus radiatus*) from India, presented by Mr. L. H. Ruegg; a Banded Ichneumon (*Herpestes fasciatus*) from West Africa, presented by Mr. H. L. Cocksedge; a Mace's Sea Eagle (*Haliaëtus leucoryphus*) from India, presented by Capt. Butler; a Pomatorhine Skua (*Stercorius pomatorhinus*), British, presented by Mr. F. L. Smith; a Woodcock (*Scolopax rusticola*), British, presented by Mr. J. Pollard; a King Penguin (*Aptenodytes pennanti*) from the Staten Islands, Cape Horn, a Cinereous Vulture (*Vultur monachus*), Europe, a Downy Owl (*Pulsatrix torquata*) from South America, deposited; a Water Rail (*Rallus aquaticus*), British, an Anaconda (*Eunectes murinus*) from South America, purchased.

OUR ASTRONOMICAL COLUMN

The Biela Comet Meteors.—Assuming, as some astronomers will probably be inclined to do, that Biela's comet has now lost the cometary form in which it presented itself to us from 1772 to 1852, and that its constitutuent particles, or whatever we may term them, are drawn out into a stream or band, beyond the circumstance of a great aggregation having been encountered by the earth on the evening of November 27, 1872, we are ignorant of the position of any other centre or centres of condensation that may exist, and even of the real extent of that which has been observed, along the comet's track; and hence it is desirable that a watch for the Biela meteors should be maintained during the whole of the last week in the present month. We are not assuming as a consequence of the disruption of Biela's comet before it was generally observed in 1846, that such is the actual condition of its constituent parts; Mr. Pogson's observations of a cometary body at Madras in December, 1872, require that such an assumption should be taken at present *cum grano*, but under any circumstances observations about the time when the earth approaches nearest to the orbit of the comet this year, will possess great interest, and we hope there may be an effective organisation of observers. In 1852, when the comet was last observed, its period of revolution, in the instantaneous ellipse at perihelion, was 2,417½ days; the effect of planetary perturbation thence tended to increase the period, so that in January, 1866, the latest time to which the calculations have been carried, the revolution extended to 2,445 days, according to Michez and Clausen. If this were about the period of the meteoric mass which the earth encountered on November 27, 1872, it is very doubtful if we shall be in proximity to it again during the present century; nevertheless, as above remarked, we do not know its extent along the orbit, and other aggregations may exist. A body moving in the orbit of Biela, and approaching the earth at this date, would be at a distance of about 1·4 from the planet Jupiter in September, 1878, and there might be very sensible effect upon the period of revolution.

A New Nebula.—Dr. Tempel states that on September 19 he found a new nebula which, from his description, appears to be nearly as bright as an average second-class of Sir W. Herschel, and is therefore deserving of attention on the score of possible variability, since in these days we hardly expect to meet with many unknown second-class nebulæ visible in European latitudes. Dr. Tempel mentions that there is a central glimmer as from very minute stars: it is about one minute in diameter, and its position for the beginning of the present year is in R.A. 22h. 41m. 25s., N.P.D. 102° 27′·1: it is very little fainter than the nebula II. 744. He adds that he has often sought for the nebula No. 49 of Auwers, which should be near the new one, but has only found in its assigned position a star of 12m., which has a very faint companion. Auwers 49 is the object observed as a star 11·5m. on October 8, 1855, in one of the Markree zones, and called "nebulous;" position for 1850 in R.A. 22h. 52m. 35s., N.P.D. 101° 19′·9. The late Mr. Edward Cooper had so unfavourable an opinion of the climate in his locality for astronomical purposes (perhaps from long experience of the skies of Italy), that probably he would not have been surprised at the discovery of any number of "nebulous" objects at Markree; but the four volumes of positions of small stars for which astronomers are indebted to him, sufficiently illustrate the good work that may be effected by well-directed energy and skilful arrangement, even in such a climate as we remember to have heard him describe that of Sligo. Pons expressed his fear that

the second comet of 1826 would be "drowned in Eridanus," as the sky had been overcast ever since it entered this constellation; on which Mr. Cooper ("Cometic Orbits," p. 152) is tempted to remark that, had Pons "written from the interior of Ireland, there would have been little to fear, for he might have made quite sure of it!"

THE SATELLITES OF MARS.—Both satellites of Mars have been observed with the Washington refractor; the measures of *Deimos* commenced on October 13, clouds interfering on the 10th, when it was first seen, and those of *Phobos* on the 12th. The correction required to the periodic time of *Deimos*, as determined by Prof. Asaph Hall from the observations of 1877, is so small that it will only be certainly ascertained from an exact discussion of the measures at this opposition; the periodic time of *Phobos* requires to be diminished 1·074s., or the corrected period is 7h. 39m. 13·996s.

Phobos and *Deimos* are also under observation with the Ealing reflector.

PHYSICAL NOTES

THE *Scientific American* describes a self-resonant tuning-fork, the invention of the indefatigable Edison. It consists of a tube of thick bell-metal closed at one end, and sawed down longitudinally nearly to the closed end, thus making two "prongs" united to a common base. To tune the prongs into unison with the column of air between them, the tube is put into a lathe and turned thinner and thinner until unison is reached. But how such forks are made of any precise pitch, or how the inclosed air-column contrives to vibrate in spite of the long lateral cuts, our contemporary does not vouchsafe to inform us. There are not many organ-pipes that would resound to their proper note with a saw-cut incised down them front and back.

FOR observation of atmospheric electricity M. Mascart (*Journ. de Phys.*, October) uses a Thomson electrometer connected with a vessel having continuous outflow of water. The deflections of the needle are transmitted every two and a half minutes to a pencil which records them on a sheet of paper. The series of traces forms a curve, not continuous, indeed, but nearly so. This apparatus was put in action at the College of France in the end of February this year, and the curves obtained during the following five months present several interesting features. The potential of the air is shown to be generally positive, with more or less rapid variations. In bad weather the curves become more irregular; rain nearly always produces very great negative deflections. The change of sign appears before the rain comes, and sometimes rain is followed by very high positive indications. There are also some very rare cases of positive rains, and of great negative deflections without apparent rain in the neighbourhood. (This predominance of negative electricity in rain clouds M. Mascart regards as an important point in the question of the origin of atmospheric electricity.) Neglecting accidental variations, one is struck by the fact that the electricity is much more uniform at night and more variable by day. The potential is also considerably higher at night than in the day. The maximum seems to occur about 9 or 10 P.M.; the curve descends slowly towards 6 A.M., then more rapidly; reaches a minimum about 3 P.M., and then rises again in a nearly uniform manner. The indications by the curves are confirmed by numerical tables of monthly averages of eight daily observations at three hours' interval. The results thus obtained are in contradiction with ideas commonly adopted. M. Mascart remarks that the continuous maximum of positive electricity observed at night may be of an exceptional character, owing to the anomalous season; He also suggests the possibility of previous observations having been vitiated through defective insulation.

THE influence of changes of temperature and pressure on double refraction has been recently investigated by Herr Pfaff, of the Erlangen Society of Physics and Medicine, and with (briefly) the following results:—In crystals of the rhombohedric system, when the temperature is raised, double refraction diminishes in quartz, but increases in vesuvianite, beryl, and apatite; it is not changed in Iceland spar (perpendicular to the principal axis), carbonates of iron and of magnesia, tourmaline, mellite, ferrocyanide of potassium, zircon, and cassiterite. In the orthorhombic system it increases in the case of arragonite (perpendicular to the median line), celestine (parallel to P); it diminishes in topaz, celestine, and heavy spar (perpendicular to the median line). In the clinorhombic system it diminishes in adularia (parallel to the median line) and mica; it increases in gypsum (parallel to the primary cleavage), remains constant in anhydrite, topaz, arragonite (inclined to the median line), witherite, carbonate of lead, adularia parallel to M), and the anorthic crystals, albite, oligoclase, labrador, anorthite, axinite, cyanite, and sulphate of copper. Pressure on the whole surface produces the same effect as a lowering of temperature in carbonate of magnesia, Iceland spar, celestine, gypsum, and heavy spar; the others do not present any modification, even those which, like topaz and vesuvianite, are very sensitive to variations of temperature.

PROF. REITLINGER and Dr. Urbanitzky have recently presented to the Vienna Academy the first portion of a memoir "On the Phenomena of Geissler Tubes under External Action," giving in more developed form, an investigation, of which they had already published some results. Various interesting experiments are described, *e.g.*, with reference to the attractions and repulsions of the light columns in Geissler tubes, and a possible joint action of the electrostatic and dynamic states in these, the authors hung a strip of tinfoil (15 ctm. long) from a platinum electrode at the top of a tube, 20 ctm. long, connected with a mercury pump (the second electrode being a straight platinum wire). Before rarefaction commenced the strip flew to the side, immediately the Ruhmkorff was set in action. But on rarefying, this phenomenon became less pronounced, till at 7 mm. the strip hung freely down in the middle. When in this state, it was attracted by a shellac rod rubbed with cloth, and repelled by a glass rod rubbed with amalgam (if the strip was connected with the positive pole, conversely in the other case); but these actions diminished as the rarefaction proceeded, becoming hardly perceptible at 4 mm. with the strip positive, and even at 6 mm. in the other case. A good conductor brought near caused attraction at all degrees of rarefaction in one case; but this, too, disappeared in the other. An experiment showing how the action of static electricity on a conductor is arrested when the latter is made a carrier of dynamic electricity, was made by bringing a rubbed glass or vulcanite rod near the strip, which thereupon went from the vertical to an inclined position. On sending through it the induction current (in either direction) the strip recurred at once to the vertical and remained there.

M. NIAUDET has lately constructed for Prof. Stefan, of Vienna, a Gramme magneto-electric machine, in which the permanent steel magnets are of circular form, instead of the usual elongated horse-shoe shape. The soft iron cheeks which embrace the rotating armature are also of a peculiar form. The new machine is much more compact than those hitherto constructed, and gives very satisfactory results.

A VERY singular theory of electricity and magnetism has recently been put forward by M. Bjerknes, who endeavours to explain the various phenomena upon mechanical principles. If a number of spherical bodies are plunged in an incompressible liquid, in the midst of which they execute isochronous vibrations, they are found to exercise certain forces upon one another. These forces may be either attractive or repulsive, according to the nature of the motions executed. Thus the actions exercised by an electrified particle may be illustrated by a pulsating sphere, that is to say, one which periodically increases in volume. A sphere vibrating to and fro similarly represents a magnetic particle. Unfortunately, however, the theory, to be applicable to electric and magnetic phenomena, would require the forces to act just in opposite directions to that which is found to be the case; for with M. Bjerknes' spheres the like poles attract, while the dissimilar poles repel. Experimentally, the attractions and repulsions thus theoretically deduced have been observed by means of an ingenious apparatus constructed for the inventor in Sweden. The pulsating bodies are a species of elastic capsule suspended from knife-edges by a hollow tube, by means of which the air is forced into and out of the capsule in rapid alternations. The vibrating bodies are little spheres set in motion by delicate levers. The mechanism is in each case driven by a pulley turned by hand. The liquid in which they are immersed is water, and the resultant attractions and repulsions are very clearly demonstrated.

M. GERNEZ has been studying the little-known phenomena of evaporation and distillation under the influence of electrification, discovered by the Abbé Nollet in 1746. The results of M. Gernez's observations have been communicated by him to the Physical Society of Paris, and are of considerable interest. Two concentric tubes communicating with one another above only are filled with a liquid to a common level. Sparks from a Holtz