

Islands, north of the Sandwich Islands, through the southern point of California, through Mexico and Cuba, and just north of Madeira. In fact, through its whole course it lies just south of the isoclinic line of  $60^\circ$  inclination and between this and that of  $50^\circ$ ; a fact forcibly illustrating Prof. Fritz's remark that the isochasmic curves lie nearly parallel to those of equal magnetic inclination. For this curve we have for the value of  $M$  in Madeira, Cadiz, Naples, Smyrna, Teneriffe, and Cuba 0.1, for the Azores 0.15, for Barnaul 0.7, and Nertschinsk 0.6.

It is well known that both in ancient and modern times polar lights have been seen occasionally south of this line, as for instance in the year 502 at Edessa, in 1097, 1098, and 1117 in Syria, in 1621 at Aleppo, and in 1872 over most of North Africa and India.

North of this line their frequency rapidly increases, and we have  $M = 1$  beginning at Bordeaux, through Switzerland and north of Cracow, south of Moscow and Tobolsk, and north of Lake Baikal, through Udsch and the southern point of Kamtschatka, through northern California and the north of Florida. For the values of  $M$  for this zone we have for Perpignan, Marseilles, Bordeaux, La Rochelle, and Viviers, a mean of 1.1, for Moscow 1, for Tobolsk 0.9, Barnaul 0.7, and Sacramento 0.8. Singularly enough, probably from climatic or other local causes, the value of  $M$  for New Orleans is only 0.14.

The zone for  $M = 30$  passes through the north coast of Ireland, through Scotland near Edinburgh, through the White Sea and the Gulf of Obi, where it attains a latitude of  $70^\circ$ , and then tends a little southward through Werchni, Kolymsk, and the Bay of Anadyr, near Sitcha, Cumberland House, Quebec, and the north coast of Nova Scotia, to the north coast of Ireland.

North of this the frequency of aurora rapidly increases. The zone of  $M = 100$  passes through the Hebrides, Shetland, near Drontheim and Wardon, through Nova Zembla, across Behring's Straits, just south of the Arctic Circle, south of Lake Athabasca, through Hudson's Bay, and just north of Newfoundland.

Only a little further north we reach a zone of maximum frequency, beyond which the intensity of auroral display again declines, contrary to the old idea that its intensity increased up to the poles. This zone passes just north of Faroe and of the North Cape, through the northern part of Spitzbergen, and just north of the Siberian coast, near Point Barrow, Great Bear Lake, and Nain on the coast of Labrador. Iceland, Spitzbergen, and Greenland lie considerably to the north of this zone, and aurora are not there so frequent, nor especially so brilliant as at Faroe, the north coast of Norway, and Labrador. Of this Prof. Fritz adduces much evidence, and in addition draws attention to the important fact, that while south of this zone of maximum frequency the arches are generally north of the observer, from the north of it they appear to the south, and upon it, indifferently, north, south, or overhead.

It will be noticed that the system of curves tends strongly southward in North America, while in the Atlantic and Pacific Oceans the curves pass rapidly northward and reach their highest latitudes in Central Asia. This is borne out by the fact that the great aurora of Aug. 28 and Sept. 1, 1859, were not noted in the meteorological registers either of Nertschinsk, Barnaul, or Jekaterinburg, nor were they seen at Tigris in Yozgat ( $39^\circ$  N.), Mosul ( $36^\circ$  N.), or Kharput ( $33^\circ$  N.); whilst in the Atlantic Ocean they were visible at least to  $12^\circ$  N., in Africa to St. George del Mina ( $28^\circ$  N.), and in America during the maximum they were frequently observed in the Antilles ( $20^\circ$  N.)

The geographical extent of great displays of polar lights is very significant. That of Sept. 1, 1859, was visible in the Sandwich Islands ( $20^\circ$  N.), Sacramento ( $20^\circ$  N.), San Salvador ( $13^\circ$  N.), in the whole Atlantic Ocean to  $12^\circ$  N., in Western Africa to  $14^\circ$  N., and in the whole of Europe. At the same time the southern lights

were seen in Australia, South America to  $33^\circ$  S., and in the Indian Ocean to  $39^\circ$  S.

For the southern hemisphere there are as yet too few observations to calculate the distribution as has been done for the north. For Hobarton ( $43^\circ$  S.)  $M = 6$ , and for Melbourne 15. In low latitudes they have been seen at Cosco ( $12^\circ$  S.) in 1744, at Rio Janeiro ( $23^\circ$  S.), 1783, at Bloemfontein ( $29^\circ$  S.), and Vaal-Fluss ( $28^\circ$  S.); in Africa and at Réunion and Mauritius in 1870 and 1872.

Dr. Fritz remarks that his zone of greatest frequency nearly coincides with that given by Muncke (in "Gehler's Wörterbuch"), and that the whole curve-system has great similarity to the zone-system of Loomis in *Silliman's Journal*, vol. xxx. The curves cut the magnetic meridians in most places at right angles, and are very similar to the isoclinic curves constructed by Hansteen in 1780, while they noticeably deviate in places from those of Sabine of 1840, and approximate, at least in the best determined portions in East America, the Atlantic Ocean, and Europe, with the isobaric curves of Schouw. It may here be remarked that the curves of increasing frequency in the Atlantic Ocean tend towards the point of lowest barometric pressure.

It is also noticeable that throughout the greater part of the northern hemisphere the curves tend to follow the form of the continents, and the limits of perpetual ice which depend upon it; and Prof. Fritz points out that in mean latitudes the magnetic meridians and the direction of visibility of the aurora are coincident, and are mostly (viz., from the Atlantic Ocean to the Asiatic Icy Sea) normal to the limit of ice. The greatest deviations from this rule exist in places where the ice-limit is most irregular, as, for instance, in Hudson's Bay and the Gulf of Labrador. It may here be noted that at Fort Franklin, Fort Normann, and Wardochus the northern lights begin in spring to be seen most frequently in the south at the same time as the ice-limit deviates furthest in the same direction. At Bossekop, according to the report of the Scientific Commission, the northern appearances are to the southern ones as 3.6 to 1 during the four last months of the year, but only as 2 to 1 in spring. Wrangel, from his observations on the coast of the Arctic Ocean, concludes that the freezing of the sea is favourable to aurora; but remarks that in the east of Asia the appearance is more frequent as the coast is approached, and is most so during the increasing cold of November, while it becomes rarer in January, when the coast ice extends further to the northward. M'Clintock notices that aurora was most frequently visible when water was in sight; and Hayes, that it was more frequently seen in the direction of some piece of open water than of the magnetic north. These observations would rather support a belief common in Scotland that the frequency of the aurora varies with increase and decrease of the Greenland ice, and render it probable, at least, that ice-formation is one of the most prominent local influences by which auroral distribution is affected. It seems not unlikely that the neighbourhood of the Alps may influence the frequent displays in North Italy. These and other points, however, require more systematic observation, and it is especially desirable that some notice should be taken of the relative intensity of different displays.

H. R. P.

EDWIN LANKESTER, M.D., F.R.S.

IT is with great regret that we have to announce the death, from diabetes, on Friday last (October 30), at Margate, of Dr. Lankester, the Coroner for Central Middlesex.

Dr. Lankester was born April 23, 1814, at Melton, near Woodbridge, in Suffolk, at which latter town he received his early education and commenced his medical studies. In 1834 he entered University College, London, as a



medical student, and took the membership of the College of Surgeons, as well as the licentiatehip of the Apothecaries' Society, in 1837. In the year 1839 he graduated at Heidelberg, and was appointed lecturer on *Materia Medica* at St. George's School of Medicine four years later. In 1845 he was elected to the Fellowship of the Royal Society, and five years afterwards became Professor of Natural History in New College, London. In 1851 he received the degree of LL.D. from Amherst, U.S.; in 1853 was made lecturer on Anatomy and Physiology at the Grosvenor-place School of Medicine; in 1858, Superintendent of the Food Collection, and in 1862 Examiner in Botany to the Science and Art Department of the South Kensington Museum. In 1859 he was President of the Microscopical Society, and in 1862 he was, after a severe contest, elected Coroner for Central Middlesex, which post he retained until his death.

For about twenty-five years Dr. Lankester was secretary of Section D of the British Association, of which he was one of the originators, being a most intimate friend of Edward Forbes, with whom, in his younger days, as a bachelor, he lodged in London. In conjunction with Mr. Busk, he for eighteen years edited the *Quarterly Journal of Microscopic Science*, after which he did so with his son, Mr. E. Ray Lankester, Fellow of Exeter College, Oxford.

Dr. Lankester's contributions to scientific and medical literature are very considerable. He edited the Natural History portion of the "English Encyclopædia," and contributed the article "Rotifera" to Todd's "Encyclopædia of Anatomy and Physiology." In 1849 he published a translation of Schleiden's "Principles of Scientific Botany," and, in 1859, of Kirchenmeister's "Animal Parasites." In conjunction with Dr. Letheby he contributed the article on Sanitary Science to the "Encyclopædia Britannica." Among his most popular works is the well-known "Half-hours with the Microscope." His contributions to this journal have been several, and, like all that he wrote, are marked by their admirable style and tone, as well as by the liberal spirit of modern scientific thought, which gives them an almost youthful freshness; we have, not less than others, to deplore the loss that has been sustained by ourselves in his premature decease.

To those who, like the present writer, were acquainted with him, and had the privilege of passing many pleasant hours in his company, Dr. Lankester was always genial and kindly, inspiring others with that hopefulness which was so marked a feature of his own character. He made many sincere friends, amongst whom was Henfrey the botanist, who named the genus of plants (which is grown in many nursery gardens) *Lankesteria*, after him. It was his kindly spirit which directed his attention to questions of social organisation, and he always referred to the articles by himself, in the *Daily News*—when a young man—on Medical Reform, as having been of assistance in the passing of Mr. Wakley's bill. His remains were interred in the churchyard of Hampstead Church on Tuesday last.

#### NOTES

NEWS concerning three of the Transit Expeditions is to hand. Advices from Capetown of Oct. 6 state that the German screw corvette *Gazelle*, bound to Kerguelen on the Transit Expedition, arrived in Table Bay and left on Oct. 4. The *Gazelle* will visit the Crozette Islands, and proceed from thence to Kerguelen. If circumstances are favourable she will search for a warm current, supposed to exist between 60 and 80 east, and endeavour to reach Wilkes Land. She will then visit the north and west coast of Australia, the coast of Guinea, and several island groups of the Pacific. Lord Lindsay had arrived out and left for Mauritius in his yacht, there to watch the transit of Venus. A Cairo correspondent of the *Daily News*, writing under

date Oct. 20, sends a long account of the preparations made by the Egyptian party. General Stanton, the Consul-General, has taken the greatest interest in the expedition, and put himself to considerable trouble to make everything smooth for the party and enable them to make all the necessary arrangements. All the instruments have arrived safely, and Capt. Browne, the chief of the party, has determined to erect his observatories on the top of the Moquattam Hills, a distance of about three miles in a direct line from Shephard's hotel. They are about 600 feet in height and overlook the whole country. Capt. Browne, who has been carefully observing the atmosphere, finds it free of moisture, at least about sunrise; which is most important, as the maximum altitude that will be observed will be only 15°. It is at present the intention to form a camp on the top of the hill, the tents having been furnished by the Egyptian Government. Mr. Dixon, a civil engineer in Cairo, has been of great assistance in the matter of transit. Capt. Abney was expected to leave for Thebes on the 26th. Admiral Ommaney had arrived at Alexandria, but to what party he would be attached was not known.

THE generally well-informed London correspondent of the *Scotsman* states that another Arctic Expedition will be despatched in the ensuing year under the auspices of the Government and the Royal Geographical Society. He believes that it is so far considered an accepted fact that the expedition will leave these shores in the spring of 1875, inasmuch as it has the approval of the Premier.

SOME time since we pointed out the extreme inconvenience of the form and manner in which our learned societies publish their "Transactions." Anyone who is not a Fellow, for example, of the Royal Society, and who may wish to possess a memoir, say on some physiological subject published in the "Philosophical Transactions," is probably debarred from doing so by finding that he must purchase with the memoir which he wants a number of others belonging to the most diverse subjects, pure mathematics being almost invariably one. We advocated, as the common-sense remedy for this state of things, the sale of separate copies of each memoir. We were not aware at the time that this was actually done by the Linnean Society. After the completion of the twenty-sixth volume of its "Transactions," it was decided by the Council that twenty-five separate copies of each memoir should be kept for sale. Probably because the arrangement is not generally known, the sale of the part of the "Transactions" is still as good, if not actually better than that of the memoirs which they contain. The price is, however, proportionally higher, which may have something to do with this. Thus the part of the "Transactions" containing Prof. Owen's memoir on the King Crab is sold to Fellows for 9s., to the public for 12s. The corresponding prices of the memoir itself (of which no separate copies have been sold) are 7s. 6d. and 10s. But the part also contains another paper, the prices of which are 4s. 6d. and 6s. In one case all the available spare copies were purchased by the author.

We are glad to be able to announce that a considerable portion of the galleries of the late International Exhibition at South Kensington, taken by the India Office, will be devoted to the display of Natural History collections of that department of the Government. The fact of the collections having been kept in an unavailable form for so many years past has always been a great grievance to working naturalists, and has called forth many remonstrances, from ourselves among others.

MR. RICHARD LYDEKKER, B.A., of Trinity College, Cambridge, second in the First Class of Natural Sciences Tripos in 1871, has been appointed to the Palæontological Department of the Geological Survey of India in the room of the late Dr. Stoliczka. Mr. Lydekker left some months since for India,