

pulled off by the action of electricity. The cathode of a vacuum-tube was covered with chalk. It exhibits phosphorescence of orange-yellow colour, while in a short time the tube-wall becomes covered by a very delicate layer of chalk, without losing its clearness and transparency, and phosphoresces like chalk. Puluj believes that the yellow-coloured phosphorescence observed on metallic cathodes is caused by the phosphorescence of the oxides covering the metal.

GEOGRAPHICAL NOTES

AT its annual meeting the Russian Geographical Society elected as vice-president M. Semenov, and Baron Osten-Secken as his "aid." The great Constantine medals were awarded to M. Moushketoff, for his geological researches in Central Asia, and to M. Yanson, for his remarkable work on "Comparative Statistics of Russia," the two first volumes of which have already appeared; the Lütke gold medal was awarded to Baron Kaulbars for his papers on the Lowlands of the Amu-daria; the two great gold medals instituted last year for ethnographical and statistical researches were awarded to Dr. Pyasetzky for his work, "Travels to China during the Years 1875-77," and to M. Roussoff for his statistical description of the Nyejin district. Small gold medals were awarded to M. Nordkvist, who took part in Nordenskjöld's expedition; to M. Potanin for his travels in Mongolia; to M. Tyaghin, for meteorological observations on Novaya Zemlya, and to M. Mainoff for anthropological explorations among the Mordovians. Silver medals were awarded to Mme. Treskina and to MM. Andrianoff, Unterberger, Polonsky, Orloff, Skassi, Karatin, Zinovieff, Krasovsky, and Mikhalenko.

WE learn from the last number of the *Izvestia* of the Russian Geographical Society that the Society sends this spring M. Polyakoff with an assistant for the exploration of Sakhalin Island. M. Polyakoff will start from Odessa, on board of a Russian ship, and proceed to Sakhalin, where he will stay during a year; thence he will go to the Manchurian shore of the Pacific for further explorations.

THE explorer Begaert has arrived at Lisbon. He was sent by the King of the Belgians to make scientific researches on the route of Mr. Stanley at Vivi and other parts of Zaire.

WE are glad to learn that the U.S. Congress have decided to appropriate 175,000 dollars to send out an expedition in a whaling vessel in search of the missing steamer *Jeannette*, which was sent out in 1879 by Mr. Gordon-Bennett to carry on Arctic exploration by way of Behring Strait. The initiative in this matter is due to Chief-Justice Daly, President of the American Geographical Society.

IN addition to two papers descriptive of the visits of Mr. Leigh Smith to Franz-Josef Land and Mr. Delmar Morgan to Kuldja, the new number of the Geographical Society's *Proceedings* gives Mr. F. C. Selous' notes on some of his many journeys in South Central Africa, those dealt with here being to the north of the Zambesi between the 27th and 29th meridians, and in the neighbourhood of the River Chobe which empties into the great river above the Victoria Falls. We gave last week the text of the interesting note on Col. Prejevalsky, in addition to which we may refer to the record of some altitudes recently determined in Matabele Land, and a note of Dr. Otto Finsch's explorations in Polynesia. The maps this month are of the South Coast of Franz-Josef Land and the Central Zambesi region.

WE observe that M. Henri Duveyrier's interesting observations on the question of the sources of the Niger appear in the last (December) number of the French Geographical Society's *Bulletin*, but we regret to find that they are published without a map.

IN last week's issue of *Les Missions Catholiques* Mgr. Lavigerie, Archbishop of Algiers, commences an account of the missions of Equatorial Africa, with the direction of which he has been charged. There is also a letter from Père Antonin de Reschio in Brazil, in which will be found some notes on curious traditions among the Indians.

MARQUIS ANTINORI and the other members of the Italian expedition to Shoa are expected shortly at Zeila. It is also stated that Signor Libman, an Italian traveller, has gone to Assab in order to make an attempt to open commercial relations with the interior and to survey some of the little-known regions in the neighbourhood. Signor Giuletti, who accompanied the Italian

official representative to Assab in January, is charged by the Italian Geographical Society to undertake a journey through the country of the Danakil and Adel tribes, and to study the best means for opening a trade-route between Assab and Abyssinia. His mission has considerable geographical importance, as the region to be traversed is unknown, and he will have an opportunity of solving the problem of the River Gualima, which probably he found to empty into some lake in the interior, as the Hanash does, if indeed it be not part of the latter river-system.

CAPT. NEVES FERREIRA, Governor of Benguela, and other Portuguese officers, have placed their services at the disposal of the Lisbon Geographical Society for a scientific expedition across Africa, to start from the West Coast.

THE *Sydney Morning Herald* of January 17 publishes a telegram from their Queensland correspondent as follows, dated January 14:—"Skuthorpe arrived two days ago from his exploring trip out west. He reports having travelled 200 miles inside the South Australian boundary, and in the Herbert River discovered relics of Leichhardt, consisting of his diary and Classen's diary; also a telescope with presentation engraving, compasses, and other things. These, he alleges, are in two packs which he has brought with him. The diary of Classen is to the effect that he left Leichhardt at the Saltwater Creek while he searched for water, and that on his returning he found the party dead, and then joined the blacks, with whom he lived until three years ago. Skuthorpe will not allow any one to inspect the alleged relics, and here it is considered doubtful whether they are genuine."

INTELLIGENCE has been received at the Foreign Office from Her Majesty's Consul at Mozambique, which confirms the report of the deaths of Capt. Phipson-Wybrants and Messrs. Carr and Mears, of the Wybrants' expedition. Mr. Mayes is stated to be at Umzeilas, and Mr. Owen to have left with the remainder for Inhambane, whither Her Majesty's ship *Ruby* will proceed forthwith.

ON THE VISCOSITY OF GASES AT HIGH EXHAUSTIONS<sup>1</sup>

II.

*INFLUENCE of Aqueous Vapour on the Viscosity of Air.*—In the foregoing experiments many discrepancies were traced to the presence of moisture in the gas. The influence of aqueous vapour does not appear to be great when present in moderate amount in gas of normal density, but at high exhaustions it introduces errors which interfere with the uniformity of the results. A series of experiments were accordingly undertaken to trace the special action of aqueous vapour when mixed with air.

Up to a pressure of about 350 millims. the presence of aqueous vapour has little or no influence on the viscosity of air. The two curves are in fact superimposed. At this point, however, divergence commences, and the curve rapidly bends over, the viscosity falling from 0.0903 to 0.0500 between 50 and 7 millims. pressure. Here it joins the hydrogen curve, and between 7 millims. and 1 millim. they appear to be identical.

These results are partly to be explained by the peculiar action of water vapour in the apparatus. At the normal pressure the amount of aqueous vapour present in the air, supposing it to be saturated, is only about thirteen parts in a million, and the identity of the log dec. with that of dry air shows that this small quantity of water has no appreciable action on the viscosity. When the pump is set to work the air is gradually removed, whilst the aqueous vapour is kept supplied from the reservoir of liquid. As the exhaustion approaches the tension of aqueous vapour, evaporation goes on at a greater rate, and the vapour displaces the air with increasing rapidity; until, after the pressure of 12.7 millims. is passed, the aqueous vapour acts as a gas, and, being constantly supplied from the reservoir of water (as long as it lasts), washes out all the air from the apparatus, the log dec. rapidly sinking to that of pure water gas.

This explanation requires that the viscosity of pure aqueous vapour should be the same as that of hydrogen, at all events between 7 millims. and 1 millim. pressure. The facts can, however, be explained in another way. During the action of the Sprengel pump sufficient electricity is sometimes generated to render the fall tubes luminous in the dark. It is conceivable

<sup>1</sup> Abstract of a paper read before the Royal Society, February 17, 1881. by William Crookes, F.R.S. Continued from p. 423.