

fest a smaller blaze (0.0100 volt or less), and a less active germination. Still older seeds, incapable of germination under even the most favourable conditions, manifest still smaller blaze (0.0010 volt or less), and finally none at all, or the small counter-effect due to polarisation (0.0005 volt more or less).

The series of communications, of which the present communication is the 12th, is as follows :—

1. "On the Retinal Currents of the Frog's Eye, Excited by Light and Excited Electrically," 'Roy. Soc. Proc.,' vol. 66, p. 327, March 29, 1900; 'Phil. Trans.,' p. 123, 1900.
2. "Action Électromotrice de la Substance Végétale consécutive à l'Excitation Lumineuse," 'Comptes Rendus de la Société de Biologie,' p. 342, March 31, 1900.
3. "The Electrical Effects of Light upon Green Leaves," 'Roy. Soc. Proc.,' vol. 67, p. 129, June 14, 1900.
4. "Four Observations concerning the Electrical Effects of Light upon Green Leaves," 'Physiol. Soc. Proc.,' June 30, 1900.
5. "Le Dernier Signe de Vie," 'Comptes Rendus de l'Académie des Sciences,' September 3, 1900.
6. "On the Excitability of Nerve: its last Sign of Life," 'Proceedings of the Neurological Society,' October 25, 1900; 'Brain,' p. 542.
7. "The Eyeball as an Electrical Organ," 'Physiol. Soc. Proc.,' November 10, 1900.
8. "On the 'Blaze Currents' of the Frog's Eyeball," 'Roy. Soc. Proc.,' vol. 67, p. 439, December 6, 1900; 'Phil. Trans.,' 1901.
9. "The Frog's Skin as an Electrical Organ," 'Physiol. Soc. Proc.,' December 8, 1900.
10. "Action Électromotrice des Feuilles Vertes sous l'Influence des Lumières Rouge, Bleue et Verte," 'Comptes Rendus de la Société de Biologie,' December 22, 1900.
11. "Le Premier Signe de Vie," 'Comptes Rendus de l'Académie des Sciences,' December 24, 1900.

"On a New Manometer, and on the Law of the Pressure of Gases between 1.5 and 0.01 Millimetres of Mercury." By LORD RAYLEIGH, F.R.S. Received January 15,—Read February 21, 1901.

(Abstract.)

The new manometer, charged with mercury, is capable of measuring small pressures to an accuracy of 1/2000 mm. of mercury. This may be compared with the ordinary manometer, read with the aid of a cathetometer, which is capable, according to Amagat, of an accuracy of 1/100 mm. at most.

With this instrument the behaviour of nitrogen, hydrogen, and

oxygen gases between the pressures mentioned has been investigated. The results confirm the applicability of Boyle's law. In the case of oxygen nothing has been seen of the anomalies encountered by Bohr, especially in the neighbourhood of a pressure of 0.7 mm.

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"An Investigation of the Spectra of Flames resulting from Operations in the Open-hearth and 'Basic' Bessemer Processes." By W. N. HARTLEY, F.R.S., Royal College of Science, Dublin, and HUGH RAMAGE, A.R.C.Sc.I., St. John's College, Cambridge. Received November 15, 1900,—Read February 21, 1901.

(Abstract.)

Three papers on "Flame Spectra," by one of the authors, were published in the 'Philosophical Transactions' for 1894. Parts I and II, "Flame Spectra at High Temperatures," and Part III, "The Spectroscopic Phenomena and Thermochemistry of the Bessemer Process." The results in the last of these papers had reference to the phenomena observed in the flames of the "acid" Bessemer process; the present paper deals mainly with an investigation of the Thomas-Gilchrist or "basic" process.

The Cleveland district of Yorkshire was chosen as the principal centre; owing to the interest taken in the work by Mr. Arthur Cooper, Past President of the Iron and Steel Institute, and in consequence of the courtesy and attention shown us, the North Eastern Steel Company's works at Middlesbrough were selected.

It was found necessary at the outset to have three observers at work simultaneously, and the authors were voluntarily and ably assisted by Mr. E. V. Clark, A.R.S.M. Photographs of the plant and the flames, at different periods of the blow, were secured by means of a small Anschütz camera and Goertz lens; eye observations were made with a small direct-vision spectroscope; photographs of spectra were taken with the spectrograph described in 'Philosophical Transactions,' A, vol. 185, p. 1047, and the times of the exposures, &c., were observed and recorded in a note-book. This work was not accomplished without some difficulty, which was occasioned by the large quantity of lime dust blown into the air.

The spectroscopic results were quite different from those previously obtained, as the continuous spectrum was much stronger. Many lines and bands new to the Bessemer flame spectra have been observed in addition to the spectra of the common alkali metals, iron, and manganese. Thus rubidium, caesium, calcium, copper, silver, and gallium have been identified. The crude iron, the ores, limestone,