ABSTRACTS AND REVIEWS

INFLUENCE OF ELECTRICITY ON THE GROWTH OF PLANTS.¹

In this interesting paper, read before the British Association for the Advancement of Science, the author presents in detail as the causes leading to the investigations the following: 1. The adaptation of needle-like leaves of fir-trees and beards of cereals to act in the capacity of transmitters of electricity from the air to the earth. 2. The periodicity of particular and otherwise unexplainable variations of the year-rings of fir-trees from different latitudes, which is in full agreement with the periods of the sun-spots and the auroras, being more pronounced as the latitude increases. 3. The periodicity of the harvest results in Finland, which agrees with the periodical variations in the sun-spots, and in the number of polar lights. The conclusion being that the active factor is atmospheric electricity, the following experiments were made. After a short history of previous work in this line, there follows an exhibit of the results obtained from experiments made in southern Finland and Bourgoyne. The method employed consisted essentially in carrying on, at the same time, like cultivations in two fields, conditions being as nearly equal as possible, save that a wire net connected to the positive pole of a machine of the Holtz or Wimshurst type was spread over the one, and the electricity forced to flow from points of the net into the air. The conclusions, seemingly well taken, from a great number of results are: 1. The electricity given to the air through points in connection with the one pole of an electric machine, the other being conducted to the earth, exercises under all circumstances a great effect on growing vegetables. 2. The effect will be greatly favorable to the development of the vegetables only when the supply of water is, within certain limits, barely sufficient. 3. This will be the case, for the most part, of vegetables under ordinary circumstances, assuming that the electricity is given during three or four hours in the morning, and three or four hours in the afternoon, avoiding the hours of highest sun, when the sky is clear. 4. When the supply of water is abundant, the electricity can be given during the whole twenty-four hours with a favorable result. 5. The surest way to produce a favorable effect seems to be *to limit the giving of the electricity to a moderate time*, so that the vegetative process is not forced too fast. The paper is concluded by a discussion of some of the *probable* causes of the effect of the electricity, together with a promise of further and more perfected investigations covering a greater territory. J. A. FLEMING.

SEMMOLA: *Atmospheric Potential*. The author discusses the influence of earth-air electric currents and of those traversing the rarefied strata of the atmosphere, causing a decrease of potential with the altitude.

Nuova Cimento, March; abstracted briefly in Lond. Elec. June 23d, and Elect. W. & Eng., July 22d.

SOUTH POLAR LIGHTS.²

In Dr. Bollers's first memoir on the southern auroras, which was published in the earlier part of the third volume of Gerland's Beiträge, he treated of the chronological and geographical distribution of the aurora australis, although the want of abundant material led to some unsatisfactory results. Since that

¹ LEMSTRÖM, SELIM, Professor of Physics at University of Helsingfors: "*Experiments on the Influence of Electricity on Growing Vegetables or Plants*." Repr. from "Electrical Review," Nov. 24 and 25, Dec. 2 and 16, '98.

² BOLLER, W. *Das Sudlicht*. Zweite Abhandlung. Gerland's Beiträge zur Geophysik, Band III, Leipsic, 1898, pp. 550-609.

time the author has most diligently continued the search for data, examining not only the printed books in continental and British libraries, but numerous collections of manuscripts and a large number of daily and weekly periodicals. Although the results of this search have brought to light a far larger material than could have been supposed to exist, and although his publications will doubtless stimulate future observers to more careful auroral records, yet, in general, this increase of material is not likely to change the conclusion expressed by him in his first memoir to the effect that before the year 1840 the aurora australis was actually as frequently and as fully developed as the aurora borealis, but was not observed or recorded, owing to the general lack of interest in the subject by those living in the southern hemisphere. He finds that it is a phenomenon as regular in the southern hemisphere as in the northern. The data recently discovered by him do not change the general character of the annual and other periodicities given in his previous memoir. The sun-spot period is marked with great clearness. The total number of dates of auroras catalogued by Boller is 791. The annual maxima occur in March and October, the minima in November and June.

The sun-spot period is shown by the following annual sums, in which we begin with 1840, because the records previous to the establishment of the magnetic observatories at Hobart Town, St. Helena, Cape Town, Mauritius, Auckland, etc., are too fragmentary:

1840	18	1850	0	1860	42	1870	58	1880	6	1890	7
1841	22	1851	5	1861	16	1871	62	1881	11	1891	6
1842	22	1852	1	1862	7	1872	40	1882	39	1892	45
1843	7	1853	0	1863	11	1873	7	1883	28	1893	22
1844	2	1854	1	1864	5	1874	37	1884	2	1894	21
1845	13	1855	0	1865	3	1875	13	1885	9	1895	3
1846	1	1856	3	1866	2	1876	3	1886	13	1896	1
1847	11	1857	6	1867	0	1877	3	1887	8	—	—
1848	9	1858	22	1868	0	1878	2	1888	13	—	—
1849	0	1859	36	1869	4	1879	2	1889	7	—	—

By far the greater number of these were observed in Australia, New Zealand, and Tasmania. None were recorded in Cape Town, Natal, or South America. This distribution agrees with the conclusion that the zone of maximum frequency is no more symmetrical about the geographical South Pole than it is about the North Pole. Its location was determined in Boller's previous memoir. Assuming that the auroral streamers emanate from this zone, Boller revises his previous computation of the altitude of the auroral light and obtains 80 kilometers for auroras observed at Melbourne and 130 kilometers for those observed on the southern border of the Australian continent. The complete copy of auroral records appended to Boller's article seems to make it unnecessary for the student to refer to the original sources, and greatly lightens the labors of future investigators. We thus owe Dr. Boller a debt of gratitude for his exhaustive search for auroral records.

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CLEVELAND ABBE.

RECENT PAPERS ON ATMOSPHERIC ELECTRICITY.

At the meeting of the Vienna Academy of Sciences of March 9th, Professor Exner presented three papers upon atmospheric electricity. For the following abstracts we are indebted to the *Naturwissenschaftliche Rundschau*, July 8th:

I. HANS BENSCHDORF: *Measurements of Falls of Potential in Siberia.*

The author reports concerning the measurements of atmospheric electricity in Siberia carried out by him under the auspices of the Vienna Academy.