"The Museums Association, at its annual conference in Hull, 1913, declares itself in cordial sympathy with the proposal to make provision in the grounds of the Crystal Palace for a British Folk-Museum on the open-air plan, and expresses the hope that the Right Hon. the Lord Mayor of London will use every endeavour to carry the proposal into effect."

The conference concluded its business by electing Mr. Charles Madeley, director of the Warrington Museum, to be president for the 1914 meeting, which is to be held at Swansea.

THE ELECTRIC FURNACE SPECTRUM OF IRON.

IN NATURE for April 24 (p. 200) we gave a brief account of the researches carried on by Mr. A. S. King, of the Mount Wilson Solar Observatory, upon the variations of the spectrum of titanium in the electric furnace. Mr. King has now concluded an investigation of the variation with temperature of the electric furnace spectrum of iron, an account of which is published in No. 66 of the Contributions from the Mount Wilson Solar Observatory.

This communication, like others of his on a similar subject, is of great interest, because it shows that the spectrum of a substance is not the same for any temperature. By knowing what spectrum is given at a known temperature it is possible to determine the temperature of stars or portions of the sun, and so utilise these laboratory researches for stellar and solar spectroscopy.

While a great amount of work has already been done in the case of iron, one of the earliest being the differentiation of temperatures by the short- and long-line method of Lockyer, Mr. King has all the advantages of the latest form of furnace and method of determining accurately the varying temperatures for the lower stages of temperature.

One of the great problems in these investigations is to determine whether the changes described are due to temperature or to electrical or chemical conditions which are present in different degrees in the sources of heat.

In a brief summary like this it is not possible to state all the conclusions which the research has led Mr. King to deduce, but the more important may be briefly summarised. In the first place, he has been able to divide into six classes the relative intensities of the iron lines in the visible spectrum for three furnace temperatures and the arc, basing them on the temperature at which a line appears in the furnace, and its rate of growth as the temperature increases. In passing from the furnace to the arc the changes in relative intensity may generally be accounted for by a difference in conditions equivalent to a large temperature difference. The ultra-violet was found a rich region for lines, and it was noted that increase of temperature corresponded to an extension of the line spectrum towards shorter wave-length. The increase in intensity of lines from the outer vapours into the core of an iron arc was found usually to resemble the rate of growth shown by the same lines with rising furnace temperature, and this the author suggests renders it unlikely that chemical reactions in the outer vapours affect the relative intensity of arc lines in any large degree.

So far as the visible region is concerned the enhanced iron lines are above the furnace stage, no lines being observed in the furnace spectrum. The furnace spectra at low and medium temperatures were found, except perhaps in the ultra-violet, to be very similar to those of the several flames.

The author concludes that while there is no definite proof that temperature radiation in a strict sense takes place, the position of temperature as the exciting and regulating agent in furnace phenomena seems to be clear.

ANTARCTIC LICHENS.[1]

LICHENS form a quite exceptional group of plants with many peculiar features, the chief among which is the fact that they are compound organisms, a lichen consisting of a fungus individual and numerous alga individuals—the fungus with its branched and interlacing threads has grown around the alga cells and enclosed them in a nest. The result is that the lichen can grow in places which would be quite unsuitable for the independent existence of either the fungus or the alga of which it is composed. Algæ grow in water or in moist places, while most fungi are extremely sensitive to cold and drought, but lichens can thrive in the bleakest positions and in the most severe climates, as on bare mountain rocks and in the farthest circumpolar regions reached by explorers—provided that the land surface is not covered by perpetual snow. In alpine and arctic regions, lichens do important pioneer work, helping to break up the hardest rock surfaces and prepare soil on which other plants can grow; while on steeply inclined and bare rock, lichens, along with minute algæ, are in general the first colonists.

These pioneer lichens are of the flat crustaceous and foliose types, the former attached closely to the substratum by their entire underside, the latter clinging more loosely, and being therefore detachable without chipping off bits of the rock itself in order to obtain specimens. On less steeply inclined parts, where the vegetation is older, the shrubby or fruticulose lichens are added; these are fixed at the base only, and show much greater variety of form than is found among the encrusting and leafy types.

In his report on the lichens of the Swedish Antarctic expedition, 1901–3, under Dr. O. Nordenskjöld, which has recently been published, Dr. O. V. Darbishire adds to his descriptions of the new species an interesting summary and discussion of the distribution of lichens in the arctic and antarctic regions generally. Unfortunately the good ship *Antarctic* was crushed by ice in January, 1903, and a large portion of the plants collected during her cruise along the coast of Graham Land had to be abandoned when she sank a month later; but though doubtless a considerable amount of material was lost in this disaster, a rich harvest was brought back by the botanical members of the Swedish expedition. This includes no fewer than 145 species of lichens, of which thirty-three are new.

An analysis of the results of antarctic expeditions up to and including Charcot's (1905) shows that at present 106 lichen species are known from the land which lies strictly within the antarctic limits, and that of these thirty-two also occur in subantarctic America, twenty-five in New Zealand, and sixteen in South Georgia, showing a very close affinity between the antarctic lichen flora, on one hand, and the American and New Zealand floras, on the other—the difference to the disadvantage of the latter being accounted for by the greater nearness of the subantarctic American region to the extreme limit of the southern drifting pack-ice. The lichens of subantarctic America and New Zealand are also very nearly allied, for out of 133 lichens in the former flora, 113 are found in New

[1] "The Lichens of the Swedish Antarctic Exp dition." By Otto Vernon Darbishire. Wissensch. Ergebn. der schwedischen Südpolar-Expedition. 1901-1903. Band iv., Lief. 11. Pp. 1—73+3 plates. (London Dulau and Co., Ltd., 1912.) Price 8s. (Subscription price 6s.)