Some of these features are characteristic of desert-plants. Many desert-plants have reduced transpiring surfaces and hidden stomates. They often have very long roots, as was particularly observed in the excavations for the Suez canal.[1] The leaves are often small and crowded, the stems woody, much branched and tufted. Bright sunlight retards growth, and green tissues hardly ever present a large absorbing surface when they are habitually exposed to bright light. Accordingly the young shoots and branches do not push out freely, but try to hide one behind another. The tissues of desert-plants may be remarkably dry; they are often, however, remarkably succulent; the plant either learns to do without water for a long time together, or to store it up.

It is not without surprise that we learn how similar are the effects of tropical drought and of Arctic cold. The facts of distribution would in themselves suffice to show that our moorland heaths are well-fitted to endure great cold. Ling extends far within the Arctic circle, though it seldom covers large surfaces there, and it rises to 2000 metres (6600 feet) on the north side of the Alps It extends southward to the shores of the Mediterranean. Our large-flowered heaths have not been traced quite so far north as ling, and they are not found on the Alps, though they inhabit the Pyrenees. Many representatives of the heath family, with like structure of leaves, are found in the extreme north of the American continent. Those features which assimilate our heaths to desert-plants, and which seem to be obvious adaptations to a situation of extreme drought, are equally serviceable to plants which have to face boisterous winds and low temperature. The shrubs of the far north are low, tufted, small-leaved, evergreen, and dry—just like the heaths of our moors. Middendorff[2] shows how the Dahurian larch becomes stunted in proportion to increasing cold. Before it disappears altogether, it is cut down to a prostrate, creeping shrub. One such dwarf larch, though 150 years old, was only a foot or two across. Plants much exposed to biting winds must make the most of any shelter that can be had; their branches push out timidly, and for a very short distance; the leaf-surface is reduced to a minimum; since the warm season is short, evergreen leaves are profitable, for they enable the plants to take advantage of early and late sunshine.

The heaths and many other moorland plants bear the marks of the *Xerophytes*, or drought-plants. Xerophytes grow under a considerable variety of conditions, some of which do not suggest drought at first sight, but their tissues are always ill-supplied with water. It may be that water is not to be had at all, as in the desert; or that water must not be imbibed in any quantity because of low temperature, as in Arctic and Alpine climates; or that the water is mixed with useless and perhaps injurious salts, from which it can only be separated with great difficulty, as in a salt-marsh. Whatever may be the reason for abstinence, xerophytes absorb water slowly, part with it slowly, and endure drought well.

In the case of moorland plants there is an obvious reason why many of them, though not quite all (Sphagnum is one exception) should rather thirst and grow slowly than pass large quantities of water through their tissues. The water contains hardly any potash or lime, and very little that can aid the growth of a plant. But it is probable that this is not the sole reason. Except where special defences are provided, it is dangerous for a plant which may be exposed to wind or low temperature to absorb much water.

(*To be continued.*)

[1] Examples are quoted by Warming, *Lehrb. d. ökol. Pflanzengeographie*, p. 198.

[2] "Sibirische Reise," vol. iv. p. 605.

INDIAN COALS AT THE IMPERIAL INSTITUTE.

THE Imperial Institute has been subjected to much adverse criticism. Its commercial collections, refreshment catering, fellows' club, limelight lectures by eminent men, continental orchestras, library, exhibitions, journal, and commercial intelligence department have all in turn been disparaged. The scientific and technical department has alone escaped attack. There, in well-equipped laboratories, with an enthusiastic staff of experts, valuable research work on new products has been carried on quietly and continuously for some years past. A striking example of the value of the work done is afforded by the exhaustive report just published on the coal supply of India by Prof. Wyndham R. Dunstan. This report embodies the results of the examination of a large number of selected samples from the principal seams. Methodically arranged, well printed, and written in a style that is not too abstruse for the general reader, it is a model of what such a report should be.

The examination was undertaken at the instance of the Government of India. The results are shown in a tabular form, and the chief points in connection with the occurrence, distribution, production and character of Indian coal are summarised. Unlike the English and Welsh coals, the Indian coals are chiefly of Upper Palæozoic and Lower Jurassic age. They are widely distributed, and only a small portion of the known coal area is as yet worked. The increase in coal production in India of late years is very remarkable, and, as the household consumption is inappreciable, practically the whole output is used for steamships, railways, and factories. The output for 1896 was as follows:—

	Tons.
Assam	177,351
Baluchistan	10,572
Bengal	3,037,920
Burma	22,993
Central India	115,386
Central Provinces	141,185
Nizam's dominions	262,681
Madras } Punjab }	79,925
Total	3,848,013

The results of the examination of the various coals have been plotted in curves, and a table of previous analyses of Indian coal is also given. The coals vary greatly in composition and in quality. Most of them are quite suitable for ordinary purposes, whilst some of the samples from Bengal and Central India are of excellent quality, quite equal to that of many English or Welsh coals. Among the many samples described are two from Hyderabad, which are of fair quality. Neither of the samples, however, gave such good results as those recorded by Mr. Tookey in Mr. J. P. Kirkup's monograph on the Singareni coalfield, published in the *Transactions* of the Federated Institution of Mining Engineers in 1894 (vol. vi. pp. 421-448). This valuable memoir appears to have escaped Prof. Dunstan's notice in drawing up his useful list of works of importance in connection with Indian coal. The Bengal coal is that most largely mined, and a great deal of it is a serviceable steam-coal. Many samples cake well, and contain but little sulphur. The coke made from this coal appears, therefore, to be suitable for iron making. In view of the occurrence of rich deposits of iron and manganese ores in India, this is a matter of great importance, for, owing to difficulties connected with fuel supply, the records of iron manufacture in India have been disastrous. Attempts to manufacture steel in Southern India were made in 1818, in 1830, in 1833 and in 1853, but in each case the want of suitable fuel was an unsurmountable difficulty. Charcoal was exclusively used; and in order to supply one blast-furnace it was necessary to clear no less than two acres of moderately heavy forest per day. For every ton of charcoal made, five tons of wood were consumed. The information contained in Prof. Dunstan's report should therefore show that the difficulties in the way of creating an Indian iron industry presented by the fuel supply can easily be overcome. Indeed, the supply of coal is so enormous that this report should be the means of directing attention to the possibilities of many other branches of industrial enterprise.

BENNETT H. BROUGH.

THE INTERNATIONAL AERONAUTICAL CONFERENCE.[1]

THE second meeting of the International Aeronautical Committee (which was appointed by the Paris Meteorological Conference of 1896) was held at Strassburg, Germany, March 31 to April 4, inclusive. Besides the President, Prof. Hergesell of Strassburg, and the Secretary, M. de Fonvielle of Paris, there were present the following members of the committee: Messrs. Cailletet and Besançon of Paris, Assmann and Berson of Berlin, Erk of Munich, Rykatcheff and Kowanko of

[1] By A. Lawrence Rotch. (Reprinted from the U.S. *Monthly Weather Review* for April.)