

observed with the theoretical figure is remarkably close; in fact Mr. Adams states that "the mirror may accordingly be regarded as essentially perfect to within the limit defined in this way." A similar set of tests made by Mr. Knox-Shaw on the old thirty-inch Common mirror *in situ* in the telescope. He found that the mirror was uncorrected by about twice as much as was the Ritchey mirror at the time of the first series of tests mentioned above. From tests of the astigmatism he concludes that the position of the telescope has an appreciable effect on the figure of the mirror as has been suspected to be the case.

PLANT-LIFE AT THE SNOW-LINE.¹

MR. JOSIAS BRAUN'S exhaustive account of the vegetation at the snow-line in the south-eastern (Rhætian-Lepontine) Alps forms a valuable contribution to our knowledge of the plant-ecology of the Swiss Alps. The area includes, roughly speaking, the country from the St. Gothard to the Engadine. The text consists of two parts. The first is a consideration of the vegetation in relation to external conditions, with a detailed description of the plant-associations. The zone under consideration is defined as that in which the summer heat just suffices to melt the annual heavy snow-fall on level areas; its altitude ranges from 2960 metres on the Bernina chain to 2650 metres in the St. Gothard group. It lies above the region of close turf, and forms a part of the open rock region. Within it the author distinguishes three secondary zones: (1) the "Pionierasengurtel," the isolated outposts, so to say, of the turf-flora, forming patches in wind-sheltered places or on sunny spots; (2) the "Dicotyledonous zone," characterised mainly by cushion-forming Dicotyledonous plants; and (3) the "Thallophyte-zone" of rock-inhabiting lichens. The principal natural formations in the first zone are the Curvuletum, of which *Carex curvula* is a characteristic component, and the Elynetum, in which *Elyna myosuroides* predominates. Here, too, are found the last traces of the influence of man and his domesticated animals, indicated by luxuriance of *Poa alpina*. The last chapter of the first part deals with the fauna of the area, which comprises ninety-one species, mainly insects and spiders.

The second part comprises a systematic account of the flora. This includes two ferns, *Cystopteris fragilis* and *Asplenium viride*, *Botrychium lunaria*, *Lycopodium selago*, *Juniperus communis* var. *montana*, and 219 angiospermous flowering plants. The latter represent twenty-nine families, those most in evidence being, in order of numerical preponderance, Compositæ, Gramineæ, Caryophyllaceæ, Saxifragaceæ, Cruciferae, Rosaceæ, Leguminosæ, Gentianaceæ, and Primulaceæ, which together contain two-thirds of the whole flora. The proportion of Monocotyledons to Dicotyledons is slightly less than at lower levels, namely, 1:4.3 as compared with 1:3.6. There are nine woody plants: Juniper, three Willows, *Empetrum nigrum*, *Loiseleuria* (*Azalea procumbens*), and three species of *Vaccinium*. The best represented genera are *Saxifraga*, sixteen species; *Gentiana*, ten species; *Carex*, nine species; *Festuca*, *Draba*, and *Cerastium*, each with six species; and *Alchemilla* and *Primula* each with five. A comparison with the Arctic flora of the west coast of Greenland, between N. lat. 69° and 71°, which contains approximately the same number of flowering plants, shows considerable agreement between the two. There is, however, a much greater proportion of marsh plants in the Arctic flora, while in the Alpine the

families Compositæ, Primulaceæ, Gentianaceæ, and Leguminosæ are more richly represented.

The author groups the snow-flora of this district of the Alps under five main headings: (1) an endemic-Alpine element, peculiar to the Alps, comprising twenty-nine species (13 per cent.); (2) a European-Alpine element with ninety-five species (42.4 per cent.); (3) a Eurasiatic element with fourteen species (6.2 per cent.), which occur also in Central Asia, but do not reach the polar circle; (4) an Arctic-Alpine element with seventy-one species (31.7 per cent.); (5) a ubiquitous element, fifteen species (6.7 per cent.), of more widely distributed plants in lower levels.

RECENT WORK ON ENTOMOLOGY.

THE American representatives of the minute homopterous insects commonly known as jumping plant-lice (Psyllidæ) form the subject of an elaborate memoir by Mr. D. L. Crawford, published as Bulletin No. 85 (168 pp.) of the U.S. National Museum. These widely-spread insects frequent trees and shrubs, where, from their active habits, they are difficult to capture without the aid of a net. When disturbed, they throw themselves into the air by means of their powerful hind-legs, and when once launched, are able to propel themselves some considerable distance by rapidly vibrating the wings, although they are not endowed with the power of prolonged flight.

Mr. Crawford found the current classification of the group—largely based on wing-venation—to be altogether untrustworthy, closely related species being in many instances placed in different genera. A more satisfactory basis for classification is afforded by the structure of the head; and from this and other features the author proposes a new taxonomic scheme, with the description of many new species.

Cicalas and other Homoptera collected during the second expedition of the Duke Adolf Friedrich of Mecklenburg are described by Dr. L. Melichar in Lief. 5 of Band i. of *Ergebnisse der Zweiten Deutschen Zentral-Afrika-Expedition, 1910-11*. The collection included 184 specimens, referable to 65 species, of which 18 appeared to be new, some of these likewise representing three new genera types.

In the first article of Lief. 4 of the publication just quoted, Prof. Y. Sjöstedt records the white ants observed and obtained during the expedition. Special interest attaches to photographs of the interior of a nest of *Termites natalensis*, showing, not only a "fungus-garden," but also the royal cells, of which one contains the monstrous, overgrown queen, and a second, in close proximity, the diminutive king.

In connection with the above may be noticed the description, by Mr. S. Hozawa, in *Annot. Zool. Japon*, vol. viii., parts 3 and 4, of a new species of termite-eating beetle from Formosa. It belongs to the tenebrionid genus, *Zielas*, previously known only by a single species from Annam, of which the habits have not been observed, although, from its affinity to termitophilous genera, it has been assumed to feed on white ants. The elongated eyes, degenerate hind-wings, and sluggish movements of the Formosan species are doubtless connected with its mode of life.

Three issues of the Journal of the College of Agriculture, Tohoku Imperial University, Sapporo, Japan, are to hand, two of which (vol. v., parts 6 and 7) are devoted to various groups of Japanese insects, with descriptions of a number of new species and genera, while the third (vol. vi., part 1) contains further observations on reduplication in silkworms.

Pine timber in a district in Montana, between the Swan and Clearwater rivers, is seriously menaced by

¹ Nouveaux Mémoires de la Société Helvétique des Sciences Naturelles, vol. xviii. Pp. vii+347+map+4 plates.

the larvæ of the sequoia pitch-moth (*Vespa mima sequoiae*). According to a leaflet by Mr. J. Brunner, issued as Bulletin No. 111 of the U.S. Department of Agriculture, it specially attacks the so-called lodge-pole pine, in which it propagates; other trees in the vicinity of those attacked are endangered by the forest-fires fed by the timber killed by the larvæ. Destruction of the larvæ themselves seems the only efficient preventive of the infestation.

Experiments recently undertaken in the United States, as recorded by Mr. B. R. Cond, in vol. ii., No. 3, of the *Journal of Agricultural Research*, have shown that the larvæ of the boll-weevil (*Anthonomus grandis*) can and do feed on plants other than cotton, as, for example, on *Hibiscus syriacus*.

The Board of Agriculture has issued a leaflet (No. 286) on the two species of narcissus-flies, *Merodon equestris* and *Eumerus strigatus*, the grubs of which attack the bulbs of daffodils and other narcissi. The first and larger species, which was, at one time, supposed to have been introduced from the continent into this country, where it has been recognised since 1869, but in the opinion of at least one economic entomologist is probably indigenous, although it only became abundant with the development of daffodil-culture. The second and smaller species is a recent introduction, but, from its destructive nature, is likely to become as serious a pest as the first. The life-history of each species is described, with suggestions for remedial measures.

The July and August numbers of the *Entomologist's Monthly Magazine* contain two instalments of an account, by Mr. J. J. Walker, R.N., of the spread of the American butterfly *Danaida plexippus* to the islands of the south Pacific and Australia. Following one of its food-plants—a milk-weed of the genus *Asclepias*—it appears to have reached Hawaii between 1845 and 1850, whence a gravid female (or possibly a pair) was probably carried to Ponape, in the Caroline group. From this solitary individual (or pair) have probably sprung the swarms now spread over the South Sea islands, in many of which this species is the commonest of all butterflies.

The most important item in Prof. G. H. Carpenter's report on injurious insects in Ireland during 1913 (*Economic Proc.*, R. Dublin Soc., vol. ii., No. 9), relates to the damage caused by the frit-fly (*Oscinis frit*) to corn crops. This little black fly is a recent introduction to Ireland, and in May and June of last year its maggots were very destructive to a field of oats in Tyrone. Its early life-history is detailed in an article by Mr. T. R. Hewitt in vol. xiv., No. 23, of the *Scientific Proceedings of the Royal Dublin Society*; and this account is incorporated in Prof. Carpenter's report.

R. L.

THE AUSTRALIAN MEETING OF THE BRITISH ASSOCIATION.

SECTION E.

GEOGRAPHY.

OPENING ADDRESS BY SIR CHARLES P. LUCAS,
K.C.B., K.C.M.G., PRESIDENT OF THE SECTION.

Man as a Geographical Agency.

In an inaugural address to the Royal Scottish Geographical Society on geography and statecraft Lord Milner said: "If I have no right to call myself a geographer, I am at least a firm believer in the value of geographical studies." I wish to echo these words. I have no expert geographical knowledge, and am wholly unversed in science, but I am emboldened to

try to say a few words because of my profound belief in the value of geographical studies. I believe in their value partly on general grounds, and largely because a study of the British Empire leads an Englishman, whether born in England or in Australia, to the inevitable conclusion that statecraft in the past would have been better, if there had been more accurate knowledge of geography. This statement might be illustrated by various anecdotes, some true, not a few apocryphal; but anecdotes do not lend themselves to the advancement of science. I am encouraged, too, to speak because the field of geography is more open to the man in the street than are the sciences more strictly so-called. It is a *graphy*, not a *logy*. Geology is the science of the earth. Geography is a description of the face of the earth and of what is on or under it, a series of pictures with appropriate letterpress and with more or less appropriate morals to adorn the tale. The man in the street may talk affably and even intelligently about the face of the earth.

Taking the earth as it is, geographical discovery has well-nigh reached its limit. The truth, in the words of Addison's hymn, is now "spread from Pole to Pole," and recent exploration at the South Pole, with its tale of heroism, will have specially appealed to the citizens of this Southern land. Coasts are in most cases accurately known. The age of Cook and Flinders is past. Interiors are more or less known. In Africa there is no more room for Livingstones, Spekes, Burtons, and Stanleys. In Australia Sir John Forrest is an honoured survival of the exploring age—the age of McDouall Stuart and other heroes of Australian discovery. The old map-makers, in Swift's well-known lines, "o'er uninhabitable downs placed elephants for want of towns." Towns have now taken the place of elephants and of kangaroos. Much, no doubt, still remains to be done. The known will be made far better known; maps will be rectified; many great inland tracts in Australia and elsewhere will be, as they are now being, scientifically surveyed; corners of the earth only penetrated now will be swept and garnished. But as we stand to-day, broadly speaking, there are few more lands and seas to conquer. Discovery pure and simple is passing away.

But meanwhile there is one side of geography which is coming more and more to the front, bringing it more than ever within the scope of the British Association for the Advancement of Science. "Man is the ultimate term in the geographical problem," said Dr. Scott Keltie some years since at the meeting at Toronto. "Geography is a description of the earth as it is, in relation to man," said Sir Clements Markham, long president of the Royal Geographical Society. Geography, I venture to think, is becoming more and more a description of the earth as it is and as it will be under the working hand of man. It is becoming intensive rather than extensive. Geographers have to record, and will more and more have to record, how far man has changed and is changing the face of the earth, to try to predict how far he will change it in the coming centuries. The face of the earth has been unveiled by man. Will the earth save her face in the years before us, and, if she saves her face, will it be taken at face value? How far, for instance, will lines of latitude and longitude continue to have any practical meaning?

Man includes the ordinary man, the settler, the agriculturist; man includes, too, the extraordinary—the man of science, the inventor, the engineer. "Man," says a writer on the subject, "is truly a geographical agency," and I ask you to take account of this agency for a few minutes. I do so more especially because one of the chief features of the present day is the rise