who had been trained at Oxford, was appointed assistant in anthropology, and on June 15 Mr. Harlan I. Smith, formerly of the American Museum of Natural History, New York, entered on his duties as archæologist. Mr. Smith is well known as a keen and conscientious archæologist who has done some good work in British Columbia and elsewhere. The Canadian Government deserves hearty commendation for its appreciation of the need of an anthropological survey of Canada, and of the excellent selection of a staff with which to carry it out. May we be permitted to hope that at no distant date the services of a physical anthropologist will be secured?

It is true that a certain amount of work has already been done in Canada; but it has been of a sporadic character, and without any system, except that done by the Jesup North Pacific Expedition; attention should, however, be directed to the series of papers on the Salish tribes published by Mr. Hill-Tout, mainly due to the action of the British Association Committee, and to the fine monograph on "The Great Déné Race," by Father A. G. Morice, in *Anthropos*, vols. i., ii., iv., v. Dr. Sapir is fully aware of this; and while investigations of limited areas and peoples must first engage the attention of the small staff, he has already mapped out the problems which have to be solved, and thus the detailed work will fill gaps in a well-thought-out scheme. The best general account we have of Canadian ethnology is the valuable Archæological Report, 1905, printed by order of the Legislative Assembly, Toronto, 1906.

In a report published in *Science*, December 8, 1911, Dr. Sapir says:—"The ethnological work already undertaken by the division embraces three distinct lines of inquiry. The first of these was undertaken by [himself] among the Nootka, and resulted in the amassing of much material of linguistic and ethnological interest. It is intended to carry forward this work from year to year. The second line of inquiry is the analysis of the culture of the Iroquois, including under this term the Huron-Wyandots, who were never included in the league. This work was undertaken by Mr. Barbeau, who, beginning with the Hurons of Lorette and the few Wyandots still left in western Ontario, took up an intensive study of the most conservative group of Wyandots, those of Oklahoma. The study of the Iroquois proper, particularly from the point of view of social organisation, was entrusted to Dr. A. A. Goldenweiser, of Columbia University, who has amassed much of value at Grand River Reserve. The third point of attack was the culture of the eastern Algonkin tribes. Here a beginning was made by Dr. Cyrus MacMillan, of McGill, among the Micmac, and by Mr. W. H. Mechling among the Malecite. It is hoped to begin systematic work among the Cree, Ojibwa, Plains tribes, and tribes of the Plateau-Mackenzie region as soon as opportunity will permit. So far, the archæological work of the division has been confined to a preliminary reconnaissance, by Mr. Smith, of the field in eastern Canada. Hand-in-hand with research and publication, which must naturally form the main activity of an anthropological survey of Canada, is the building up of an anthropological section of the national museum at Ottawa. At present the museum is relatively rich in West Coast ethnological and Ontario archæological material, to the neglect of other fields. Persistent efforts are now being made to round out the resources of the museum.

"The Canadian Government is to be congratulated on having established a systematic survey of aboriginal Canada. Now or never is the time in which to collect from the natives what is still available for study. In some cases a tribe has already practically given up its aboriginal culture, and what can be obtained is merely that which the older men still remember or care to impart. With the increasing material prosperity and industrial development of Canada, the demoralisation or civilisation of the Indians will be going on at an ever-increasing rate. No short-sighted policy of economy should be allowed to interfere with the thorough and rapid prosecution of the anthropological problems of the Dominion. What is lost now will never be recovered again."

This is a very good example of the way in which the overseas meetings of the British Association justify themselves.

A. C. HADDON.

SOOT.[1]

THE smoke nuisance, like certain other public abuses, is rapidly approaching the acute phase which seems necessary before the patient town dweller changes his tone from an inarticulate murmur to a muttered complaint sufficiently loud to awaken the slumbering authority to a sense of his duty.

The smoke abatement societies serve as his mouthpiece; they have been formed to collect information, hold conferences, organise exhibitions of smoke-preventing appliances, and generally to create discontent with the present whilst encouraging hope for the future.

These societies have recently banded themselves together into a Smoke Abatement League, one of the objects of which is to persuade the Local Government Board to modify the present method of dealing with smoky chimneys. If statistics furnish any guide for public action, the League has fully justified its aims. Within the last few months facts have been forthcoming from different and quite independent sources showing not only the nature of soot and its effects, but the actual amounts discharged into the air and falling to the ground in the course of the year. These quantities are not reckoned in cwts., but in hundreds and thousands of tons.

Messrs. Cohen and Ruston have shown that the quantity per square mile which falls in Leeds increases from 25 tons on the outskirts to 539 tons in the industrial centre of the town. In London, Messrs. Des Vœux and Owens have found the quantity to vary from 58 tons at Sutton, in Surrey, to 426 tons in Old Street, E.C., and Mr. Fyfe, of Glasgow, in a paper read at the Manchester Smoke Abatement Conference, has found that whereas 72 tons falls at the seaside village of Bo'ness, the amount in Glasgow reaches about 820 tons per square mile. The three large towns together show a total deposit of nearly 50,000 tons of soot a year, or about 18 lb. per head of the population ($6\frac{1}{4}$ millions). At the same rate the yearly sootfall for the whole of the United Kingdom would reach about 300,000 tons; but this number is probably too high, as it includes country districts where naturally the quantity per head is much smaller. The method for estimating the deposit which has been used in Leeds was to collect rain water at eleven different stations (ten in the town and one in the country) by means of a large funnel placed in the neck of a Winchester quart bottle, and to analyse the contents monthly during a whole year. These estimations included the soot (in which the content of carbon, tar, and ash was determined) and the soluble constituents, viz. free and albuminoid ammonia and nitrates, free and combined sulphuric acid, sulphurous acid and chlorine. In Glasgow the deposit was estimated by means of eighty-three dust boxes, sixteen being distributed about Glasgow and the remainder placed in other districts. They were left for two months (December, 1910, and January, 1911), and the contents were then weighed and analysed for carbon, tar, and ash. Messrs. des Vœux and Owens have used a similar method to that adopted in Leeds, but on a much larger scale, substituting for the funnel a large hopper connected with a capacious bottle. The contents were treated as in Leeds, both insoluble and soluble constituents being estimated. The experiments were also continued throughout the year. There does not seem to be any great advantage gained by the substitution of the larger and more costly apparatus for the funnel and Winchester quart bottle if the analyses are carried out with sufficient care.

In addition to the monthly sootfall, the Leeds experiments have included the estimation of the total soot discharged from domestic and factory chimneys, and the still more important permanent deposit of tar, which is the prime agent in the discoloration of buildings and foliage, and (on account of its acid character) in the destruction of masonry, mortar, fabrics, and vegetation. The quantity of soot produced in Leeds annually from factory and domestic chimneys is roughly 35,000 tons, which is distributed as follows:—

[1] "Soot: its Character and Composition." By Cohen and Ruston. (Journ. Soc. Chem. Ind., December 15, 1911.)
"Air Pollution in Glasgow and Other Towns in Scotland." By Peter Fyfe. Paper read at the Manchester Smoke Abatement Conference, November, 1911.
"The Sootfall of London." (*The Lancet*, January 6, 1912.)

	Tons.
Blown away	31,480
Temporary deposit in the town	3,472
Permanent deposit in the town	48
	35,000

The method of determining the permanent deposit was by means of glass plates a foot square, which were exposed at different stations for three months at a time. The surface was then rinsed with water to remove any loose material, and the deposit removed and analysed. As this tarry material is much the most deleterious ingredient of the soot, the method of comparing the translucency of these plates after exposure with certain standards may be recommended as a rough test of atmospheric pollution by smoke.

Cohen and Ruston have calculated that in a domestic fireplace about 6 per cent. of the fuel escapes as soot, whereas in a boiler or other furnace the loss may be reckoned at $\frac{1}{2}$ to $\frac{3}{4}$ per cent. Taking the estimated coal consumption from both sources, we get for the whole country a loss in the form of soot of :—

	Tons
6 per cent. on the estimated domestic consumption of 32 million tons ...	1,920,000
0·5 per cent. on the estimated factory consumption of 100 million tons ...	500,000
	2,420,000

From the ratio of soot emitted to soot deposited in Leeds, the above 2,420,000 tons will yield a deposit of nearly 300,000 tons in the neighbourhood where the coal is consumed; for it must be remembered that the whole quantity will sooner or later reach the earth.

Comment is unnecessary. On the ground of the discomfort, dirt, waste, and pecuniary loss which smoke entails, the evil is one which should receive serious consideration, and it is to be hoped that the forthcoming conference and exhibition which is being promoted by the London Coal Smoke Abatement Society will be successful in directing more attention on the part of the authorities to the disastrous effects of smoky chimneys.

J. B. C.

BELGIAN BOTANICAL INVESTIGATIONS.[1]

THE supplementary part of the seventh volume is entirely occupied with a sketch of the geographical botany of Belgium by Dr. J. Massart, providing a continuation of the more specialised account of the vegetation of the littoral and alluvial districts by the same author published in the original volume, and previously noted in NATURE. The sketch does not contain any such detailed observations as are recorded in the botanical surveys carried out in Great Britain by W. G. Smith, C. E. Moss, and others, but incorporates the results of various Belgian researches, notably the modification of leaves in dry and moist localities furnished by Miss M. Ernould, the periodic phenomena of vegetation carefully studied by the meteorologist, Dr. E. Vanderlinden, in connection with climatic variations, as well as several geological and agricultural investigations. Geology occupies a more prominent position than is usual in an œcological botanical memoir, and practically supplies the basis of treatment in the most important chapter. The classification of associations is artificial. Uncultivated and cultivated areas are placed in antithesis. As might be expected in a country where mountain ranges are wanting and intense cultivation is general, there are few natural associations; apart from the dunes, the most important are the types of vegetation growing on cliffs and rocks.

A notice of Dr. Massart's able contribution would be quite incomplete without an expression of cordial admiration of the excellent photographs and maps that are collected in the "Annexe." Of the photographs, more than half are stereoscopic, and to ensure that they shall be fully appreciated a simple but effective stereoscope is provided. It will be observed that the author has paid particular attention to the photography of cryptogamic plants; fungi are the most suitable for the purpose, but the lichens (Figs. 434 and 636), the mosses (Figs. 332 and 414), and the algæ (Fig. 222), also the mycorrhiza of beech (Fig. 320), are particularly well defined. Discrimination between the photographs of flowering plants would be idle where nearly all are successful and convey their special meaning.

The eighth volume contains three extensive papers, a study by Dr. V. Gallemaerts of the phanerogams growing on willows, an investigation by Mrs. J. Schouteden-Wery as to the factors which regulate the distribution of algæ off the south-western region of the Belgian shore, and the observations of Dr. Vanderlinden mentioned above; in the last the observations, concerned chiefly with the comparative dates of flowering, extend over a period of fourteen years.

[1] "Recueil de l'Institut Botanique Léo Errera (Université de Bruxelles)." Publié par Jean Massart. Tome Supplémentaire vii.bis, pp. xii+332. Annexe au tome supplémentaire vii.bis, pp. iv+466 photographs+9 maps +2 diagrams+pp. v-xiii. Tome viii., pp. ix+383, avec Stéréoscope. (Bruxelles: Henri Lamerton, 1910 and 1911.)

BIOLOGICAL STUDIES IN JAVA.[1]

THE memoir referred to below contains a series of articles embodying the results of six months' study and observation in Java in the winter of 1909–10. The subjects dealt with are:—(1) climbing organs within the genus Randia; (2) Javan Myrmecodia; (3) the "silver-field" of *Haplochilus panchax*; (4) the microbiological processes in the humus of certain humus-collecting Epiphytes; (5) the bacteria nodules on the leaf-margins of *Ardisia crispa*.

Not the least interesting is the account of the author's investigation of the biological phenomena of *Myrmecodia tuberosa*, of *Hydnophytum montanum*, and, incidentally, of *Polypodium sinuosum*. Miehe briefly reviews the work of his predecessors, Beccari, Treub, and others, on the same subject, and adds a bibliography relating specially to the interrelations of ants and plants. The tuberous-stemmed rubiaceous genera Myrmecodia and Hydnophytum are among the most remarkable vegetable productions of the Malay Archipelago, alike in habit of growth and the economies of nutrition. These plants are epiphytes, usually gregarious, and commonly associated with the equally singular *Polypodium sinuosum*. They form irregularly shaped fleshy stems or tubers, ultimately 6 to 9 inches or more in diameter, with chambers and intersecting or blind galleries, in nature perhaps eventually always inhabited by a certain kind of ant and a fungus. A few short branches bearing a tuft of crowded leaves are given off from the tuberous stem, and the flowers are small and inconspicuous.

How far the association of these three organisms is an instance of beneficial symbiosis is still uncertain. Beccari, one of the earliest investigators and illustrators of this class of plants, came to the conclusion that the shape and development of the stems was entirely dependent on the action of the ants. But Treub proved by experiments with seedlings and older plants that the development of the thickened stems and the formation of galleries was absolutely independent of the ants. Hence some other use had to be sought for the passages and chambers open to exterior influences. Treub and subsequent investigators claim to have proved that these interior surfaces, which are of two kinds, play an important part in the economy of the plant, furnishing, in effect, the channels of absorption and transpiration. The absence of stomata from the exterior parts of the stem and tuber is advanced in support of this theory.

Miehe instituted further experiments to determine the nature of the vital functions of these two different surfaces of the galleries and chambers. In certain parts of the system the surface of the walls was smooth and of a "leather-yellow," in others black and warted. The result of numerous experiments was the same, namely, that the warty surface rapidly absorbs water, whereas the smooth surface does not possess this property. The fungus which inhabits the tubers has not been determined, but it is probably allied to Cladosporium and Cladotrichum.

[1] "Javanische Studien." By Hugo Miehe. Pp. 299–431. (Des xxxii. Bandes der Abhandlungen der Mathematisch-Physischen Klasse der Königlichen Sächsischen Gesellschaft der Wissenschaften, No. iv.) (Leipzig: B. G. Teubner, 1911.) Price 6 marks.