

(Canada Geol. Survey, Mem. 118, 1920). R. Lockhart Jack, in "The Salt and Gypsum Resources of South Australia" (Geol. Surv. S. Australia, Bull. 8, 1921) interestingly connects the salt of the lagoons of the Yorke Peninsula, between Spencer Gulf and the Gulf of St. Vincent, with "cyclic" salt imported aerielly during long ages from the sea. The supply thus given to the soil is drawn on by the lakes, with, of course, some addition from salt-dust now falling on their surfaces, and depends on conditions of dryness, whereby the local water-table does not rise dangerously high. The meteorological features of the region are well put forward. The deposits of gypsum are similarly attributed to cyclic matter, which has been redissolved and carried by the saline ground-waters (p. 90) into lake depressions. On the margins of these it evaporates and becomes blown up into dunes. There are also some occurrences of gypsum in a more normal and less interesting manner in Cainozoic rocks.

The graphite deposits of the world outside the United States are reviewed, with maps, in a valuable paper by A. H. Redfield ("Foreign Graphite in 1919," U.S. Geol. Surv., Min. Resources, 1919, part ii., No. 12, 1921). This pamphlet should stand beside our text-books of mineralogy, which constantly require the refreshing influence of general surveys of this nature. Though the commercial aspect is naturally paramount, the names of localities and the references to literature will be of service to the student.

The work of R. E. Liesegang has added considerably to the interest of zoned and banded deposits. P. A. Wagner (Trans. Geol. Soc. S. Africa, vol. xxiii., p. 118, 1921) describes the "Nature and Origin of the Crocodile River Iron Deposits" in the Rustenburg district of the Transvaal. He compares them with those of the Lake Superior region, and holds that the hæmatite and hydroxide masses are concentrations by downward percolation from beds of siderite and ferruginous chert. In some cases alteration in place has led to the formation in chert of magnetite, hæmatite, or brown hydroxide, alike pseudomorphous after rhombohedral siderite.

Olaf Høltedahl (*Amer. Journ. Sci.*, vol. cci., p. 195, 1921) reviews old and recent work on the zoned concretions of calcite in the magnesian limestone of Durham, pointing out the reasons that have led English geologists to regard them as mineral structures arising through secondary alteration. Their resemblance to some of the pre-Cambrian structures claimed by Walcott as algal (*Camasia*, *Newlandia*, *Greysonia*, etc.) inspires the author with caution in dealing with these older specimens.

Mineralogists cannot afford to overlook the paper

by F. W. Clarke and W. C. Wheeler on "The Inorganic Constituents of Marine Invertebrates" (U.S. Geol. Surv., Prof. Paper 102, 1917) with its important series of analyses of the hard parts of a wide range of living creatures. The proportion of magnesium carbonate to calcium carbonate bears, of course, on the much-discussed origin of dolomite, and it is shown that organisms capable of depositing calcite may accumulate magnesium by isomorphous substitution, while this cannot take place when the hard parts are formed of aragonite. The utilisation of magnesium is very distinctly favoured by warm conditions, specimens from Arctic or Antarctic waters, or from very deep waters, showing relatively small proportions. Crinoids, for instance, from 47° N. lat. and a depth of 1000 metres may yield 9 per cent. of magnesium carbonate, while 12 per cent. commonly occurs at similar depths near the equator. A biological problem of much interest is here opened. No such authoritative and detailed analyses have hitherto been available. As was already known, alcyonaria generally are rich in magnesium carbonate. An equatorial specimen of *Phyllogorgia quercifolia* is here shown to contain 15.73 per cent. The influence of these facts on determinations of specific gravity in fossil forms should, of course, be noted.

The rhyolites of Lipari, including the familiar obsidian of the Rocche Rosse, have received complete and critical examination and analysis from H. S. Washington (*Amer. Journ. Sci.*, fourth series, vol. 1, p. 446, 1920). It is shown that in the glassy varieties ferrous oxide predominates largely over ferric oxide, while this condition is reversed in crystalline types. It is suggested that the glassy state retains more nearly the constitution of the igneous magma, while oxidation occurs as the gases are permitted to escape.

W. R. Browne provides a new study of differentiation in an igneous mass, through the sinking of crystals and later extrusions, in his description of "The Igneous Rocks of Encounter Bay, South Australia" (Trans. Roy. Soc. S. Australia, vol. xlv., p. 1, 1920). In the same volume, p. 300, W. Howchin reviews coarse fragmental structures of various kinds in rocks, citing Australian examples, and he usefully directs attention to the influence of desiccation in breaking up a sediment in an early stage of its history. The drying mud of lakes is an example. Attention may be directed to the moderate price (10s. 6d.) of this volume and of some other illustrated publications from our federated Commonwealths, in the hope that the enterprise displayed may react on issues in the homeland.

G. A. J. C.

Plant Pests and their Control.

By DR. WILLIAM B. BRIERLEY.

THE "Report on the Occurrence of Insect and Fungus Pests on Plants in England and Wales for the Year 1919,"¹ which has just been issued by the Intelligence Department—Plant Pests Branch of the Ministry of Agriculture and Fisheries, marks a very definite step in the recognition in this country of the danger to our food crops from diseases caused by insects, fungi, bacteria, etc. This disease-survey work was originated by a sub-committee of the Technical Committee of the late Food Production Department, which was formed to advise the department

¹ Ministry of Agriculture and Fisheries. Intelligence Department: Plant Pests Branch. (Miscellaneous Publications, No. 33.) "Report on the Occurrence of Insect and Fungus Pests on Plants in England and Wales for the Year 1919." Pp. 68. (London: H.M. Stationery Office, 1921.) 1s. 6d. net.

on questions relating to plant disease and insect pests. A few honorary correspondents scattered throughout the country forwarded monthly statements relating to diseases and pests in their own particular areas, and at the close of the year these were summarised by the sub-committee, and a "Report on the Occurrence of Insect and Fungus Pests during 1917" was published. This was the first time that any successful attempt had been made to gather together and systematise data relating to the incidence and spread of plant disease in this country. With the experience gained the work was continued in a more efficient manner, and a report for 1918 issued. There has now appeared the present, and somewhat belated, report for 1919, and a comparison of these three publications

shows a marked progress in width and inclusiveness of vision. A mass of valuable data has been accumulated, and the Ministry, by becoming acquainted with those areas where disease is most serious, is in a better position to advise and to urge measures of control. Further, the Ministry must lead the way, and by the recognition of those diseases most responsible for heavy losses, it will be enabled to suggest, or institute, policies which will lead to the prevention of the present appalling waste of foodstuffs.

The report for 1919 is divided into three sections, the first being a tabulated and summarised list of the correspondents' reports on insect pests received during the year. The second section is a complete and up-to-date hand-list of the authenticated fungus diseases in the country, and if expanded and elaborated would form a very useful reference book for plant-pathologists, filling a niche at present singularly empty. The third section is a summary of meteorological data with which the incidence and spread of disease might be correlated. The report is a notable achievement, and a fine example of the solid scientific work which, quietly and unassumingly, is being carried out by this branch of the Ministry of Agriculture. Much credit is due to Messrs. Fryer and Cotton, who, in the face of not a little discouragement and lack of aid, have carried this work through to such a pitch of efficiency and permanent value.

There are naturally many features at which one could cavil, but these are due primarily to the exigencies of the incomplete and voluntary system on which the field reporting necessarily is based, and upon the innate difficulties in the reporting itself. Thus whilst it is important to learn that a particular disease is present in certain localities on specific dates, the really important thing in this connection is to find out what, if any, relation exists between the several outbreaks, and what relation the outbreaks bear to

climatic conditions and dispersive factors. The acquiring of such knowledge, however, is a considerable piece of research, needing the whole-time services of a large *personnel* of highly trained investigators, and these the country does not possess, nor will it until plant disease is regarded a little more seriously by the university and the farming mind. Again, to learn that "Mosaic Disease is present in tomatoes grown in the open," is interesting, but one would like to know exactly what percentage of the plants are killed or sterilised by this disease, or of those in bearing what percentage of a normal yield is obtained, and what is the financial loss incurred by the trade? The present lack of standardised criteria in loss estimation is very unsatisfactory. However, these are questions easy to ask, and almost, if not quite, impossible to answer, and only slightly detract from the value of this report as a foundation for epidemiological study in plant disease.

But the preparation of such a report as this has a far greater value than its local interest. Plant diseases are no respecters of diplomats or political boundaries. The disastrous spread into this country of American gooseberry mildew, or wart disease of potatoes; of citrus canker and chestnut bark disease into America; the wiping out of the coffee industry in Ceylon by the introduction of the coffee leaf disease into that island—the remembrance of these among many examples that could be quoted, should convince everyone of the critical importance of an accurate and systematic survey of plant diseases in order that undesirable aliens may be excluded, or if found to be present, crushed whilst still limited in distribution.

The control of plant disease in our crops is one of the most vital factors in agriculture to-day, and in the lean years to come, when every ounce of food will be an asset, the knowledge gathered together in such reports as this will be a very material aid in the struggle to provide the nation's sustenance.

Studies of Shore Fishes.¹

NOT the least of the Danish marine expeditions in the *Thor*, under the skilful hands of Dr. Johs. Schmidt, was that devoted to the careful search of the Mediterranean and the sifting of the work of Grassi and Calandruccio in regard to the spawning of the eel and the murenoids.

In the course of this work many young shore-fishes were encountered, and M. Louis Fage has given an excellent report thereon. Some of them are common to British waters as well as to the Mediterranean, whilst others, such as *Macrorhamphosus*, *Anthias*, *Callanthias*, and *Uranoscopus*, are more characteristic of the southern waters. Though the shores of the Mediterranean are rich, they fall far short of the plenitude and variety of the shore-fishes of Japan. Of the twenty families encountered, thirteen have pelagic eggs and seven demersal. The striking changes between the adult outline and that of the young are well shown in such species as *Macrorhamphosus scolopax*, the gurnards, *Serranus cabrilla*, and *Anthias sacer*. The illustrations appear to have been made from preserved specimens, and in a characteristic form like the grey gurnard in its early stage the pectorals fall short of the actual proportions (cf. Prof. Prince's figure from life, *Trans. Roy. Soc. Edin.*, vol. xxxv., pl. xvii., Fig. 5).

Perhaps the most interesting part of M. Fage's memoir is the introduction, in which he discusses the

problems connected with the reproduction of the Teleosteans. Amongst other features, he believes with Giard that the embryology is condensed as we advance to the north, yet that the pelagic embryos are specially adapted to the colder waters. Thus, taking the genera *Sebastes* and *Scorpaena*, the latter having two sub-genera, *Helicolenus* and *Scorpaena*, it is found that *Sebastes marinus* is rare south of the Faroes, and is viviparous. The widely distributed *Helicolenus dactylopterus*, Delar., reproduces in winter in northern waters, and the larvæ agree with those of other *Scorpaenidæ*. On the other hand, *Scorpaena porcus* and *S. scropha* in the southern waters are developed in summer, and their early pelagic stages have enormous pectorals for sustaining them. The larval stages of some of the fishes from southern waters are prolonged, e.g. *Arnoglossus laterna*, Will., as shown by Dr. H. M. Kyle, undergoes metamorphosis in northern water when 16 mm. long, but in the Bay of Biscay when 26-30 mm. in length.

M. Fage attributes the wide distribution of the young forms of certain shore-frequenting species to the cyclonic currents of the Mediterranean; but he has to except the young of the genus *Caillionymus*. A wider view of the subject, however, creates doubt as to the general applicability of such an explanation. In connection with the adaptations of the larvæ he forms two groups (after Dollo), viz. the *nectique* and the *plantique*. The slow forms, especially the benthals, develop organs for maintaining equilibrium in the plankton, such as long ventral or pectoral fins

¹ Report of the Danish Oceanographical Expeditions in the Mediterranean, 1908-10. "Shore Fishes." By Louis Fage, of the Natural History Museum, Paris. Pp. 154. (Copenhagen: And. Fred. Høst and Son, 1918.)