into touch with universities and other of the higher educational establishments. Where a museum does not exist already, as in certain towns and in country districts, a live education authority would set one up, so that the number will be increased. Museums suffer from want of funds because few are supported by more than a ½*d.* rate, some not even by that; they would receive grants in aid directly from the Board of Education.

To this the museums reply that they recognise the argumentative force of a pecuniary bribe; but if their work is worthy of this reward, why should it not be given? For the rest, they dispute the premisses. A museum is *not* fundamentally an educational institution. It exists primarily for the collection and preservation of the works of nature or of man, and its highest aim is the advancement of science or of art. The needs of the researcher must never be sacrificed to those of the elementary student or the public. Even the smallest local museum has a duty in this direction, and it is this spirit which keeps the museum alive. Museums which themselves chart the unknown seas of knowledge can best pilot the learners. Organised education is the vehicle of established knowledge, is necessarily limited in scope, and must move on the rigid lines of a syllabus; but the museum must respond to new influences, must extend knowledge, and assemble material for future research. The existing museum committees are not ideal, but neither are the education committees. The curator knows his men, has been moulding their ideas, and has generally found a chairman with large views. He does not wish to see either himself or his chairman controlled by a body the scope of which embraces but a subsidiary part of his museum's activities. If his means of support are to come solely through educational channels, results will be expected through those channels alone. The others will gradually be blocked, the level of aspiration and accomplishment will be lowered, the living water will stagnate. Museum officials, from experience or observation, distrust bureaucratic government; they want men whom they can approach, not an anonymous Board.

Compromise, however, may be possible. Co-operation is desired, though not subordination. Let the education authority advise upon the public exhibition series, and support financially the educational work of the museum in proportion as it approves. But hands off the unseen activities of the museum! Provincial museums may be linked up with one another and with the national museums above and the minor museums below, but the linking should be through a body representative of their own committees and curators. If the source of money must be the Board of Education, so be it; but let it flow to these committees through a separate museum department of the Board. Museums here, as in the United States, have shown what good educational work they can do on their own initiative. Recognise that initiative, and they will respond with more abundant and more fruitful efforts.

THE COALFIELDS OF SPITSBERGEN.

COAL is not a new discovery in Spitsbergen. It has been known for more than 300 years, and about a century ago small cargoes were even brought to Norway. But mining on a serious scale did not begin until some fifteen years ago, while its rapid extension is due to the high price and comparative scarcity of coal during and after the war. There are now at least four mines in Spitsbergen exporting coal in large quantities during the summer months, and several others which will soon reach the export stage.

Coal of at least three ages occurs—Carboniferous, Jurassic, and Tertiary. It is difficult to give the total content, but it may safely be said that Spitsbergen coalfields do not contain less than 5,000,000,000 tons. Bear Island, in addition, has a content of some 8,000,000 tons. The occurrence of drowned fault valleys in the plateau of almost horizontal strata has made the coalbeds easily accessible in most places, and greatly facilitates loading by reducing land transport to a minimum. Practically all the valuable coalbeds lie around the two great inlets on the west coast—Icefjord and Lowe Sound—except a small outlier of Tertiary coal in King's Bay, near the north-west corner of Spitsbergen. The Tertiary coal has attracted most attention, and for the present at least provides most of the export coal. At Longyear City, the prosperous Norwegian mine in Advent Bay, several seams have been located at 755 ft. above sea-level; a 3½-ft. seam is now being worked, and at 815 ft. a 4½-ft. seam is being opened; another seam occurs at 640 ft. The same coal is being worked in Lowe Sound and in Braganza Bay. In the latter place Swedes are exporting large cargoes from their mine in the 3½-ft. seam at a height of 245 ft. It is also being mined successfully by Russians in Green Harbour.

The Tertiary coal has been proved to be a good steam coal of high calorific value, and fairly free from dirt. An average of the analysis of several samples gives about 79 per cent. carbon, 2 to 6 per cent. water, less than 2 per cent. sulphur, and about 4 per cent. ash. The calorific value averages about 7800. The seams appear to maintain a fairly consistent thickness and uniformity in quality over wide areas. Other seams of Tertiary coal also occur, notably a 7-ft. seam of bituminous coal in Advent Bay at a height of 1900 ft. This seam, which is now being mined, shows a slight tendency to pass to lignite, an unusual feature in Spitsbergen Tertiary coal.

The coal of Carboniferous age occurs in the culm beds near the foot of the Carboniferous system. The deposits are very extensive, but have been investigated only recently, and so have attracted less notice than the Tertiary seams. Moreover, the outcrops of these coal seams are generally obscured by enormous screes and slip masses, so that their examination entails a good deal of serious work, including boring operations; but this is well repaid, as the seams are thick, and extend over wide areas round the northern

and eastern bays of Icefjord. In the Klaas Billen district valuable seams have been opened up at various heights. Varying from a few inches to about 3 ft. in thickness, they total 6 ft. Early analyses of Carboniferous coal were vitiated by the samples being taken from weathered slip masses, in consequence of which they showed a high proportion of ash. Now, however, that the coal has been reached *in situ*, it proves to be of high quality, clean and lustrous, and, unlike the Tertiary coal, fit for coking. Projects are on foot for extensive mining operations in these fields.

Jurassic coal is widely spread, but less accessible than the other kinds. It was the first coal to be mined, but turned out to be of relatively poor quality, and is now no longer worked.

Mining is continued throughout the year, although the export season at present extends only from June to September. The miners winter in comfortable timber houses, and are well supplied with fresh food, brought from the European mainland in the autumn. There is wireless communication throughout the winter. The restriction of export to four months in the year necessitates good storage facilities for the winter coal and rapid loading in summer both from the dump and direct from the mine, but these problems are being satisfactorily solved. The total coal export of Spitsbergen, which in 1913 was 35,000 tons, rose last year to 65,000 tons, and this year must have reached about 100,000 tons. These figures are, of course, comparatively small, but they will be much increased as several new mines get into working order. The shortage of labour, material, and tonnage still affected the output this season, but it may be said that the prejudice against mining in the Arctic has now been overcome, and Spitsbergen will soon take its due place as one of the important coal-producing countries of Europe. R. N. R. B.

NOTES.

THE Ministry of Munitions has published as a confidential document a highly interesting report of the Commission appointed to visit the iron and steel works of the occupied areas of Germany, also of Lorraine, Luxemburg, and certain portions of Belgium and France. The object of the Commission was to ascertain what developments in iron and steel manufacture have taken place during the war, the present condition of the plants, the future prospects of these areas, and to what extent fuel economy has been advanced therein. As regards the last-named item, Messrs. Cosmo Johns and Lawrence Ennis communicated to the recent autumn meeting of the Iron and Steel Institute a report on the present status of fuel economy in the German iron and steel industry of the occupied territory. This report is now public property, and contains very much interesting material; it may be taken as an indication of the importance of the valuable information which the Commission itself has collected. It is to be hoped that the Ministry of Munitions will see its way to publish the entire report as an ordinary Government publication purchasable in the usual way, so that it may be known by all engaged in the iron and steel industries in this country, as there is no reason why our industries should not be allowed the benefit of the careful studies of this Commission. Such an important document should be made available as widely as possible to all those interested in the subject-matter.

THE future of the Royal Botanic Society at Regent's Park has for long been a matter of anxiety, and the recent appointment by Lord Ernle, when President of the Board of Agriculture and Fisheries, of a strong Committee to inquire and report as to what steps should be taken to render the work of the society as useful as possible, from the scientific and educational points of view, was a most welcome step. The Committee, under the chairmanship of Sir David Prain, Director of Kew Gardens, has taken evidence from representative botanists and others, and its report is now available. Apart from the establishment of the gardens at Regent's Park, the primary object of the society, which was incorporated in 1839, was "the promotion of botany and its application to medicine, arts, and manufactures." It is interesting and satisfactory, therefore, to note that the Committee is of the opinion that the usefulness of the work of the society would be enhanced by the organisation and development of botanical work essentially economic in its bearing. The chief suggestions made by the Committee are:—(1) The establishment of a school of economic botany at which a knowledge of economic plants and their products could be obtained; (2) an institute which might be made a centre for research, especially in plant physiology; and (3) a centre for teaching practical horticulture. The first is the most notable and valuable recommendation. The establishment of such a school would supply an undoubted want in this country, where organised instruction in economic botany, especially as regards tropical crop plants, is almost impossible to obtain. The Committee is to be congratulated on so accurately judging the need of the situation. It is greatly to be hoped that the financial means necessary for the successful carrying out of the Committee's recommendations will be forthcoming.

A MEETING of the Executive Committee of the United States National Research Council was held at the National Research Council Building, Washington, on April 15 last, and according to an abstract, 21 pages in length, of the minutes, which appears in the July issue of the Proceedings of the National Academy of Sciences, the Council has already made great progress in initiating and co-ordinating research in pure and applied science in the States. It has organised divisions for physical science, chemical science, geology and geography, biology and agriculture, engineering, industrial, educational, and State relations. Each division is presided over by a man of note, and on it there are many representatives of scientific and other societies. The Council will have ample funds at its disposal, the Rockefeller Foundation alone having undertaken to provide 100,000*l.* during the next five years for the promotion of fundamental researches in physics and chemistry primarily in educational institutions. The chairman of the Council receives 2000*l.*, and chairmen of divisions 1500*l.*, per annum, with travelling expenses. The Council is to be congratulated on the speed with which it has accomplished so much.

DR. THEODORE W. RICHARDS, professor of chemistry at Harvard University, has (*Science* announces) been elected president of the American Academy of Arts and Sciences.