

scapes that illustrate this memoir are of wide interest and considerable beauty.

C. H. Clapp has described the south-east of Vancouver Island in Memoir 36 (1913). The interest of the metamorphosed volcanic and sedimentary rocks in this region lies in the fact that they are largely of Lower Mesozoic age, and have been invaded and altered, and in part replaced, by granitic batholithes in Upper Jurassic and possibly Lower Cretaceous times. The gneisses thus produced finally offered a denuded surface on which Upper Cretaceous conglomerates have been laid down. The drowned valleys of the Vancouver region are shown to have become elevated by some 250 ft. since a maximum of submergence in early Glacial or Interglacial times (pp. 109 and 127). The topographical and geological maps required for use with this memoir are folded in a pocket at the end, in accordance with the present very useful custom of the survey.

The beautiful country of fjords and islands that results from the subsidence of the Cordilleran coast is dealt with by J. A. Bancroft in Memoir 23 (1913), on "The Coast between the Strait of Georgia and Queen Charlotte Sound, B.C." The Upper Mesozoic intrusions again play a large part, and the relations of the batholithes to the roofs above them, and the production of "roof-pendants," like those studied by C. Darwin in South Africa, can be well seen in the deep sections provided by the fjords (p. 105). An orbicular "hornblende gabbro," which might well be called a diorite, occurs in Midsummer Island (p. 94), and is regarded as a product of spherulitic crystallisation during the consolidation of the invading magma.

The remarkable discoveries of silver-cobalt ores at a railway-cutting in Ontario only thirteen years ago led to the rise of the great mining centre of Cobalt. The mineral veins are associated with sills of dolerite (diabase), and the tracing out of the igneous sheets has greatly widened the mining area. W. H. Collins describes the "Gowganda Mining Division," west of Lake Timiskaming, in Memoir 33 (1913). As at Cobalt, the principal ores are native silver, smaltine, nickeline, and copper pyrites. The silver has been deposited as a fine network through the other minerals after their formation. Other memoirs of economic importance are Nos. 47 (1914) and 65 and 66 (1915), on the "Clay and Shale Deposits of the Western Provinces." In these references are required from the plates to the pages of the text. Plate iv. in Memoir 65, showing suspended clay in jars, is without any obvious explanation.

Prof. R. C. Wallace, of the University of Manitoba, issues a pamphlet through the editorial department of the Winnipeg Industrial Bureau on "The Geological Formations and Mineral Resources of Manitoba," accompanied by a geological sketch-map.

Among the separate sheets issued by the Geological Survey of Canada we may note Map 53A, described in Memoir 20, covering south-eastern Nova Scotia, on the scale of 1 : 250,000. The foundation-sheet and the colouring may serve as types of the beautiful work produced by the Government departments of the Dominion.

J. B. Tyrrell (Trans. Royal Soc. Canada, vol. ix., 1915, p. 89) interestingly connects all the gold-bearing veins in the pre-Cambrian rocks of central Canada with the Algomian epoch of igneous intrusion. The albite-diorites which then invaded the pre-Animikian series seem to have been especially associated with "chrysogenesis." It should be noted that the Algomian batholithes of gneiss and granite are not themselves rich in gold. The term Huronian is relegated in this paper to rocks above the great unconformity recognised by Logan and Lawson alike. Hence the Algomian epoch is pre-Huronian; but its rocks are

intrusive in the Timiskaming Series, and the gold veins may occur, therefore, in the older "Laurentian" gneisses and in the Keewatin Series invaded by these masses. Mr. Tyrrell points out that the presence of gold veins in central Canada will now serve to mark the rocks in which they are found as "pre-Huronian," that is, older than the great unconformity.

G. A. J. C.

CHEMISTS AND MANUFACTURERS.¹

AMONG the many lessons which we are learning as the result of the war, not the least important is the fact that experimental science in general, and chemistry in particular, is not merely an interesting intellectual occupation, but one of the foundation-stones on which national progress rests, and that its continued neglect could only lead to disaster, and end in our complete defeat by more progressive and far-seeing nations.

The ignorance of the value of scientific knowledge shown by our people is very great, and, unfortunately, many of our rulers are little, if at all, better informed. As a consequence, much inertia still remains to be overcome, and a great deal of leeway has to be made up. Happily, signs are not wanting that we are at last directing our footsteps on the right path, and those of us who know, and who have the real interests of their country truly at heart, will earnestly pray that our progress along that path may be certain and rapid.

At the outbreak of war, the authorities were seemingly unaware of the vast and multifarious services rendered to the State by professional chemists, and of the extent to which the welfare of the nation depended upon the adequate utilisation of their services. As a result, many hundreds of highly-trained chemists were to a great extent wasted by being put to military duties which could easily have been performed by men whose normal activities were of no special value to a nation at war.

This state of affairs lasted until a few months ago, when the authorities apparently began to appreciate the facts of the situation, and the Board of Trade issued a circular of instructions to local tribunals under Lord Derby's scheme, together with a "list of occupations (reserved occupations) of cardinal importance for the maintenance of some other branches of trade and industry." Since then the Board of Trade has issued a further schedule of "reserved occupations," in which occurs the following important paragraph:—"Chemists: Analytical, Consulting Research Chemists (not to be accepted for immediate enlistment or called up for service with the Colours without the consent of the Royal Society); Chemical Laboratories: Head Laboratory Attendants."

It will have been noticed that chemists are not only not to be enlisted, but are not allowed to enlist without the express permission of a recognised body, the only other persons in the schedule who are treated similarly being "licensed pilots, officers, and crews of vessels belonging to the General Lighthouse Authorities and lighthouse-keepers"—that is to say, men whose services are absolutely essential for the public safety.

During the past eighteen months the columns of the technical and of the general Press have been inundated with letters and with articles bewailing the neglect of chemical science in this country, and deploring the want of appreciation of the services of chemists so often shown by manufacturers. That we have shamefully neglected the claims of science is a

¹ From the presidential address delivered to the Society of Public Analysts and Other Analytical Chemists on February 2, by Mr. A. Chaston Chapman.

fact of which many of us have been painfully aware for a good many years, and one which through the stern teaching of the war is gradually being brought home to the bulk of the nation. This, however, is a matter which is intimately bound up with our whole system of education, and until that system has been thoroughly reformed it is hopeless to expect that chemistry and the other experimental sciences will take their proper position.

So far as our colleges are concerned, I feel very strongly that a more thorough training in analytical chemistry is desirable, and I would, in addition, venture to suggest that the present curriculum of those chemical students who intend to become professional chemists should, whenever possible, be amplified so as to include a further year of study. During this post-graduate year, the student should be trained by thoroughly competent and specially selected teachers under conditions approximating more to those of the technical than to those of the academic laboratory.

Whilst words fail to express the indignation which one sometimes feels at the miserable wages (the word "salary" would be out of place) offered to men who have devoted several years and a not inconsiderable sum of money to their training, yet, on the other hand, the young chemist seeking a position should remember that his future lies very largely in his own hands. The manufacturer on his side must understand that in engaging the services of a young chemist from one of our universities he is getting the partly-manufactured material, and not the finished product. He should be told that his future employee is merely a well-trained apprentice who knows how to use the tools of his craft, but will have to be given time in which to find his feet and to learn something of the new conditions under which he will have to work. It is here that our university professors can do much to prevent misunderstanding and disappointment by pointing out to manufacturers the limitations of the men whom they may be recommending.

A good many manufacturers (I am not, of course, referring to the heads of large concerns where many chemists are employed, and where their functions are thoroughly well understood and appreciated) do not always know very clearly what they want. They have a vague idea that some sort of chemical assistance is necessary in a modern factory, and they consequently go to one of our colleges and state that they want "a chemist." As one of the objects of our colleges is very properly to find employment for the men they have trained, he is offered the services of a man who has perhaps just finished his chemical course, but knows little or nothing of the nature of industrial chemistry or the requirements of the factory.

It is at this point, however, that the trouble to which I have alluded commences, for the young man in question is offered to the manufacturer labelled "chemist" without any qualification at all. As a very general rule no intimation is given to the manufacturer that his prospective employee is little more than a senior student, and, in the absence of any statement to the contrary, there is some justification for regarding him as thoroughly competent not only to carry out the routine work of the factory, but also to undertake industrial research, to cheapen production, and to effect improvements in the manufacturing processes concerned. At the end of the year, in many cases, nothing very definite has resulted, no additional profit has been made, and there is no obvious improvement in the factory working, and the manufacturer is very apt to give emphatic expression to his disappointment, and to inveigh against science in general and chemistry in particular.

I wish it to be understood that my remarks apply especially to the general works chemists, to whom is

entrusted the testing of the raw materials and finished products, and the exercise of a general scientific supervision. With the more important question of industrial chemical research it is quite impossible to deal within the limits of an annual address. I would only say that chemists competent to initiate and to carry through to a successful issue the kind of investigations which are of importance to manufacturers are, comparatively speaking, few in number, and that the chemical investigator, like the poet, must be born. He may be shaped, but he certainly cannot be made, and it would save not a little disappointment if it were recognised more generally on the industrial side that men possessing all the special qualities of intellect and of character which go to make a successful chemical investigator are not very frequently combined in any one man, and that the chances of obtaining the services of such a man in a more or less haphazard way, and at a salary which would be rejected with scorn by many an artisan, are not very great.

Summarising the points on which I have briefly touched in this address, I would appeal for—

(1) Greater sympathy, freer intercourse, and closer co-operation between the two great branches of the chemical profession—the teachers and the practitioners.

(2) The establishment of chairs of analytical chemistry in our universities and colleges as a practical step towards securing the more adequate treatment of that important branch of our science.

(3) The more general provision in our universities and colleges of post-graduate facilities for acquiring a good general knowledge of certain subjects which form an indispensable part of the professional equipment of every technical chemist.

SCIENCE AND BRITISH TRADE.¹

WE were appointed on July 13, 1915, to be a Sub-Committee to prepare and submit a Report showing what steps should be taken to secure the position, after the war, of firms who have undertaken industries in consequence of the Exchange meetings leading up to the British Industries Fair, held under the auspices of the Board of Trade.

The following were the branches of industry to which it appeared that our inquiries could most usefully be directed, having regard to our terms of reference:—(i) Paper manufacture; (ii) the printing trade (including colour printing); (iii) the stationery trade; (iv) the jewellers' and silversmiths' trade; (v) cutlery; (vi) fancy leather goods; (vii) glassware, including table glass, laboratory ware, and glass bottles; (viii) china and earthenware; (ix) toys; (x) electrical apparatus; (xi) brush, etc., trade; (xii) hardware.

The value of the imports into the United Kingdom of goods of the kinds included within the scope of our inquiry may be taken as approximately 16,000,000*l.*, and of this total nearly 7,700,000*l.* represented goods of German origin, and 500,000*l.* goods of Austro-Hungarian origin. But it has to be remembered that there is also a large German and Austro-Hungarian export of these classes of goods into other parts of the British Dominions. In the absence of strictly comparable statistics, no absolutely definite figures can be given, but we estimate that the total value of such goods imported into the five self-governing Dominions and India in 1913 cannot have been less than 3,000,000*l.* Austro-Hungarian competition is noteworthy only in the case of jewelry and glassware. As regards German competition in the branches of trade under review, it is limited, as a rule, to certain special lines of goods

¹ Abridged from the Report of a Sub-Committee of the Advisory Committee to the Board of Trade on Commercial Intelligence with respect to measures for securing the position, after the war, of certain branches of British industry. (London: Wyman and Sons, Ltd.) [Cd. 8181.] Price 2*d.*