for the publication of this information. Lord Lindsay of Birker explained that the new University College of North Staffordshire is being established as an attempt to overcome the evils of specialization. He had been aware for many years that science and arts students were talking different languages and believed that the position is getting worse. At the new College, the four-year honours course which they would provide would begin with a first year in which general education and the correction of school over-specialization would be prominent.

The third session was concerned with "The Place of Technological Education in University Studies", and opened with an address by Sir Lawrence Bragg (Cambridge) and a paper (read in his absence) by Sir Edward Appleton (Edinburgh).

Sir Lawrence supported the founding of separate institutes of technology, on the lines of the Massachusetts Institute of Technology, but emphasized that he did not want to see all technological studies removed from the universities. Such institutes should be as autonomous as universities, should award their own degrees, and should differ from universities only in outlook. His attempt to draw a line between technological and pure scientific research was criticized by a number of speakers, notably Prof. J. B. Speakman (Leeds), who pointed out that his own university had grown from the Department of Textiles.

Sir Lawrence further maintained that while Great Britain has no need to fear comparison with any other in pure science, its record in technology is less satisfactory.

Sir Edward Appleton affirmed that the aim of the university is to produce engineering scientists, and of the technical college to produce engineers. He would support the establishment of one institute of technology, but was more concerned with the improvement of the existing university provision. He regretted the presence in universities of specialized technologies, and instanced glass, rubber, brewing and textiles.

Prof. Andrew Robertson (Bristol) thought that technological institutes such as the Massachusetts Institute of Technology are too little concerned with fundamental principles, and stated that there is criticism in America on this score. Prof. A. F. Burstall (Durham) supported the establishment of an institute of technology, but Sir John Hobhouse (Liverpool) and Prof. J. F. Baker (Cambridge) were in opposition, the latter declaring that it is the national attitude towards technology in the United States that has most to do with the American success in this field. Prof. J. P. Kendall (Edinburgh) thought that the virtue of the Massachusetts Institute of Technology lies in its lavish equipment and in the excellence of its postgraduate instruction. He was also inclined to oppose Sir Lawrence's proposition. In his opinion the fault in Great Britain lies in the arrangement of school education on the assumption that all the pupils would go to the university. Dr. P. Dunsheath (London) was among those who considered that it would be a mistake to remove technological studies from the university, and Sir Roderic Hill (London), by a statement of the actual proportions, rebutted the contention that technological students are in danger of swamping the universities. Principal J. C. Jones (director of education, Regent Street Polytechnic), a guest of the Conference, stressed the harmful effects of the social prestige of the university degree on the provision of courses by technical colleges, and in his reply to the discussion Sir Lawrence Bragg re-emphasized his desire to see new technological institutions, which would give their own degrees.

At the first session the chair was taken by Prof. Lillian Penson, vice-chancellor of the University of London, at the second by Prof. G. C. Field, pro-vice-chancellor of the University of Bristol, and at the third by Sir Hector Hetherington, principal of the University of Glasgow, and chairman of the Committee of Vice-Chancellors and Principals, which convened the Conference.

VOYAGE OF THE ROYAL RESEARCH SHIP *WILLIAM SCORESBY*

THE Royal Research Ship *William Scoresby* sailed on January 11 on a new voyage of ocean research in continuation of the work undertaken by the former Discovery Committee before the War. She will visit South African waters first, and then make observations across the Indian Ocean. The final months of the commission will be spent in studying whales in the West Australian region.

During the past twenty-five years the Discovery Committee has worked under the Colonial Office, and organised a series of expeditions for scientific research, mainly in the Southern Ocean and Antarctic seas, but sometimes also in subtropical and tropical waters. The work is generally referred to as the "Discovery Investigations", and has been concerned principally with deep-sea oceanography and especially with research on whales. The name "Discovery" was adopted because the work at sea began with Captain Scott's old ship, the *Discovery* (now lying off the Thames Embankment), but most of the investigations have been carried out with the Royal Research Ships *Discovery II* and *William Scoresby*. Since 1939 the ships have been on charter to the Ministry of Transport, but in 1949 the Discovery Investigations, together with the ships and scientific staff, were transferred to the Admiralty and now form part of the National Institute of Oceanography, of which Dr. G. E. R. Deacon is director.

The Institute as a whole covers a wider field, but in the next two years both ships will be engaged in the continuation of the Discovery Committee's programme under the general direction of Dr. N. A. Mackintosh, formerly director of research to the Committee. The *Discovery II*, which is the larger ship, is at present refitting for ocean research; her work will be largely in the Antarctic.

The present voyage of the *William Scoresby* is expected to last about ten months. She is a ship of 324 tons (gross) and has some of the features of a trawler and some of a whale catcher. She carries a commercial otter trawl, and there are deck engines and reels with some thousands of fathoms of wire for deep-sea oceanographical work. The equipment also provides for echo sounding. The latest 'world span' wireless apparatus is in part a gift from the Marconi Co. towards the work of the ship. Dr. T. J. Hart will be in charge of the work at sea until the ship reaches Cape Town. With him will be Mr. R. Clarke (who will take over on leaving the Cape), and Mr. R. I. Currie; Lieutenant-Commander A. F. MacFie will be in executive command.

The most important work to be done on the present cruise is to mark whales off the north-west coast of Australia in the southern winter (July and August). First, however, the ship will make a preliminary survey of the Benguela Current off the coast of South-West Africa, which is a region of interest because cold water from the ocean depths wells up like a spring to the surface. The *William Scoresby* formerly surveyed a similar region off the west coast of South America, where the deep water brings certain nutrient salts to the surface, and causes a rich development of the marine fauna and flora.

She will call at Cape Town, East London and Mauritius, and during the voyage will undertake various oceanographical work both in shallow water, and where the bottom slopes down to oceanic depths. Little is known of the water masses and currents of the central Indian Ocean, and during the passage from Mauritius to Fremantle it is expected that valuable observations can be made. If time permits, some trawling may be carried out in Australian waters, and then about two months will be spent off the north-west of Australia. Before the War the *William Scoresby* marked some thousands of whales in the Antarctic, but this was done in the summer months; it is now necessary to mark them in the winter when they migrate towards the equator. At this time of year an important species, the humpback whale, is known to congregate near the north-west Australian coast.

AGAR FROM BRITISH SEAWEEDS

A WELL-ILLUSTRATED account has been published* of the manifold investigations which led to the exploitation of the available supplies of the British seaweeds *Gigartina stellata* Batt. and *Chondrus crispus* (L.) Stackh. as a source of agar. The book is of value in many different directions. Quite apart from the economic importance of the achievement, these researches afford much information on the growth and seasonal development of these seaweeds, and especially of *Gigartina*. They thus provide one of the most important contributions to the autecology of a red seaweed that has so far been published. Moreover, the very extensive explorations which were necessary and which are a testimony to the immensity of the effort involved have afforded much information of general ecological interest with reference to the marine flora, particularly that inhabiting the shores of the Scottish Isles. The various botanists who co-operated in these researches, and particularly Prof. L. Newton, who played an important part, are heartily to be congratulated on the result. It is to be regretted that work of such marked scientific importance can only be achieved when war-time exigencies demand it.

Up to 1939 most of the agar used in Great Britain and other countries was imported from Japan. Even before the Japanese became belligerents, the need to find substitutes became urgent, so that the comprehensive investigations described in this memoir were initiated already early in the War. Of the various red seaweeds that seemed likely to provide a suitable agar, only the two already mentioned can be gathered in sufficiently large quantities, and *Gigartina* is far more abundant than the almost equally suitable and better-known *Chondrus*. It is therefore not surprising that the greater part of the memoir concerns itself with the former. Except for parts of Northumberland, extensive growths of *Gigartina stellata* are met with only on the west coast, the richest localities being those of the Clyde sea-area, where yields of 8–30 lb. per yard of coast were obtained. This seaweed favours rather gently sloping rock surfaces on exposed or semi-exposed coasts and occurs usually at the base of the *Fucus serratus* zone, either as separate tufts or as an almost continuous belt, sometimes as much as twenty yards wide; it is frequently associated with *Himanthalia lorea*.

Little new information on the life-cycle of *Gigartina stellata* is provided. The occurrence of fertilization remains as doubtful as ever, and even these intensive investigations have not brought to light any tetrasporangiate plants. On the other hand, the detailed studies of seasonal development, that had to be undertaken to determine the best methods of harvesting, have added considerably to our knowledge of *Gigartina*. Although in some districts it behaves as an annual, the plants commonly last for three or four years, the new growth in spring arising either from persisting parts of old erect fronds or often in large part from the conspicuous attaching disk. This increases in thickness with the years and exhibits a number of layers, one probably corresponding to each year of growth. Much the same is true of *Chondrus*, where, however, the holdfast is less firmly attached. The growth of the erect fronds terminates between July and September, and soon after this the gel-strength is at a maximum, while the period of maximum carpospore-discharge lasts from September until December.

These observations indicated that, during harvesting, care must be taken not to destroy or remove the holdfast, so that hand-picking rather than shearing was recommended. Furthermore, it was concluded that a single yearly harvest between July and September would be most appropriate, when a maximum yield would be obtained and there would be no interference with the discharge of spores from remaining plants. It is of interest that these conclusions can be correlated with the past experience of some of the crofters on the Scottish Isles who "are aware that the maximum growth has developed by August and September, that the extract is at its best, that the dried weed keeps better and that it is most easily torn from the holdfast at that time".

The extraction was carried out by boiling in lime water and removing the residue. The cooled extract sets to a weak gel. Various methods of hardening the latter were tested, but the one finally adopted was to heat the extract with potassium hydroxide and neutralize with hydrochloric acid; the amount of the former should not exceed 15 per cent of the dry weight of the extract. Best results were obtained by carrying out the potassium hydroxide treatment in an autoclave for eight hours at 20 lb. per sq. in. or for two hours at 40 lb. per sq. in. The resulting agar has a deep yellow colour which can be removed by treatment with activated charcoal. It has a lower melting point, dissolves much more readily and is denser when set than the Japanese product. It contains a much greater percentage of inorganic material; however, this is not an impurity but forms part of the gel complex.

F. E. FRITSCH

* A Study of certain British Seaweeds and their Utilization in the Preparation of Agar. By S. M. Marshall, L. Newton and A. P. Orr; with the collaboration of P. W. Carter, E. Conway, K. M. Drew, E. A. Lewis, J. Macnaughtan, H. T. Powell and others. Edited by L. Newton. Pp. viii+184 (12 plates). (London: H.M. Stationery Office, 1949.) 27*s.* 6*d.* net.