

advantage of federation or of separation, the greatest peril to university education in South Africa lies in the excessive multiplication of institutions with poor endowment and small, underpaid and overworked staffs. The discussion was well sustained; and, in summing up, the chairman, Mr. S. J. Jennings, pointed out that in Germany and England a population of a million could support a university. Roughly speaking, a population of a million in South Africa would correspond in fee-paying capacity with a population of two millions in Germany or England. It therefore seemed within the range of possibility that South Africa could support two universities.

INTERNATIONAL MARINE INVESTIGATIONS.¹

THIS summary of the results so far obtained by the international investigation of the North and adjacent seas is drawn up by the executive committee of the Swedish Hydrographic-biological Commission, and is the second of its kind. Being well written, illustrated by good charts and plates, and demanding no great previous knowledge from the reader, it is one of those accurate yet popular accounts which, by educating public opinion in the utility of research, possess a real public value. Its slight unevenness is probably inevitable in the rapid survey of so wide a field, and it is to be regretted that the language in which it appears will restrict so narrowly the number of its readers.

The introduction patriotically reminds us that Sweden took the initiative in cooperation in marine research when King Oscar issued invitations to the conferences of Stockholm (1899) and Christiania (1900), and states the aim of the work to be, in the terms of a resolution of the latter meeting, "to prepare for the rational exploitation of the sea on a scientific basis." The aim is thus practical; the writers proceed at once to discuss the urgent practical question which played a considerable part in securing British participation in the international scheme, namely, the over-fishing question.

The belief that the catch of fish (mainly trawl-caught fish) was greater than nature replaced had arisen, declined, and revived when the international work began. Remedies had been proposed, and, being based on insufficient knowledge of the sea, had failed. The authors unreservedly include among the failures the closure of areas to trawling and the replenishment of the sea by fish-hatcheries; they speak hopefully of the value of market statistics, recognise the recent improvements in English methods of collection, and pass to the biological attack on the problem. This section is a little disappointing. Much has been ascertained concerning intensity of fishing, migration, &c., the bearing of which on over-fishing is not clearly brought out in the text. Since, for instance, over-fishing is stated to affect plaice mainly by reducing the average size at which they are caught, any experimental evidence of a possibility of increasing the rate of growth deserves close consideration; yet the promising results of transplanting plaice from crowded "nurseries" to good feeding-grounds where growth is more rapid are very briefly dealt with.

To make any proposal for restrictive legislation before the International Council has fully sifted the evidence collected on over-fishing seems premature, and, from the representatives of a country not greatly interested in trawling, even a little out of place. The writers, however, advise that each country fix an inshore size limit independently, while no plaice should be landed from off-shore grounds of less length than 28 cm., that limit to be gradually increased to 33 cm. As to the practicability of enforcing this rather complicated scheme they are silent; possibly wisely.

Numerous biological researches are described, but by far the greatest detail is accorded to hydrography. Even Prof. Petterssen's theory of the effect of ice melting is included, although, as Nansen's "Northern Waters" has shown, it is still controversial. The Baltic hydrography is perhaps the freshest section for English readers. Hydrography gained much from cooperation; the standardising of instru-

¹ "Resultat af den Internationella Hafsforknings arbete under åren 1902-1906, och Sveriges andel deraf. By G. Ekman, O. Petter-sen, F. Trybom. Pp. 164. (Stockholm: Isaac Marcus, 1907.)

ments and reagents removed one frequent source of wasted opportunity in earlier voyages, by making all observations more strictly comparable, while the periodic cruises of the numerous vessels employed ensured regular observations over the whole great area involved. The main result has been the discovery that European seas are flooded every autumn by Atlantic water (of 35 per mille salinity or more) which withdraws in spring, and that many fisheries depend on these movements. Such a fishery is that of the Swedish "winter herring"; the fish is abundant, and the fishery prosperous when southern bank-water, of characteristic salinity, temperature and plankton, forms a thick layer in the Baltic entrances, while in years of exceptional abundance of Atlantic water this displaces the overlying bank-water, and a "bad herring year" results. These years occasion considerable distress.

The summary closes with appendices, some of which, semi-diplomatic documents now apparently published for the first time, are worth careful perusal by all interested in fishery legislation and research. One, written by Prof. Petterssen in reply to a question from the English Board of Agriculture and Fisheries, as to the probability of practical results shortly appearing, is especially interesting. Prof. Petterssen mentions the confusion of ideas and opinions that, owing to lack of knowledge of the sea, prevailed before the international work began, describes the results attained and the value set on cooperation by the investigators, and, speaking of the protection of immature fish, he makes the noteworthy remark, "International measures of this kind must be founded on strong and indisputable evidence. . . . Such evidence can only be the outcome of a joint investigation of the total area in question, executed by the best specialists of every nation concerned." These words constitute now, as they did three years ago, a weighty defence of international cooperation in fishery research.

THE TRANSVAAL DEPARTMENT OF AGRICULTURE.

WE have received from the director a copy of the annual report of the Transvaal Department of Agriculture for the year 1905-6. The department was formed soon after the close of the war, and was placed under the charge of Mr. F. B. Smith, who had been trained at Cambridge and had gained experience as an agriculturist at Wye College, of which he was for some years the vice-principal. On his arrival in the Transvaal Mr. Smith gathered round him a band of zealous and competent workers, and organised the new department on American lines, assigning the work to a number of "divisions." Each of these, while independent and under the charge of separate heads, was kept in close touch with the work of the other divisions through the director of the department and his office staff.

The report for the past year gives a *résumé* of the work on which the new department is now engaged, which should prove of interest not only to those directly concerned, but to many in our own country who may wish to know what the trained agriculturist can do to assist the development of the colonies. The most obviously beneficial work of the department is that of the veterinary division, which was formed partly to investigate the numerous diseases which threatened the live stock of the colony at the close of the war, but chiefly to check the spread of disease by treating diseased animals and by administering acts regulating their movements. The need for this type of work may be inferred from the fact that during the year 726 outbreaks of contagious disease were dealt with, 140,000 animals inspected, and 660,000 examined for soundness at the ports or on the borders of the Transvaal before being admitted into the country.

The acts regulating the movement of diseased animals have caused stock-owners some inconvenience and have been the subject of occasional complaints, but they have succeeded in a remarkable way in improving the health of the live-stock. For example, the disease known as East Coast fever, which at the close of the war was a serious menace to the cattle of the colony, has been overcome, and large areas have been altogether freed from it. In 1904-5 about 8000 cattle died of this disease; in 1905-6 the number was