The Evolution and Colonisation of Tidal Lands.

THE joint discussion on "The Evolution and Colonisation of Tidal Lands" between the Sections of Botany and Geography during the British Association meeting at Southampton was opened by Prof. F. W. Oliver, who spoke of the raw materials that go to the making of tidal lands, namely, shingle, sand, and fine silt, and of the transport of these by tide, currents, and wind. Plants can only become established on tidal lands during periods of quiescence. Vegetation thereon arises almost entirely from sea-borne seeds, the sea also bringing drift which in time enriches the ground with humus. Plants as they become established collect and hold silt and blown sand, and are, therefore, in effect creative. In the case of sand dunes, the conditions were traced which lead to permanence. The parts played by *Agropyrum junceum* and *Psamma arenaria* in the building of dunes were discussed, it being pointed out that the latter was liable to be killed when invaded by abnormally high tides for some hours. Gales of 60-70 miles an hour stimulated the formation of dunes owing to the consolidation of the sand by wind force. Salt marshes differ markedly in type according to the nature of the ground, being either sandy or slushy or consisting of firm mud. Their proper development requires the concurrence of a number of plants at each successive phase. Reference was made to the almost unique capacity of *Spartina Townsendii* to occupy the softest muds and to spread rapidly on them. Its efficiency in such ground is comparable to that of marram grass in sand and *Suæda fruticosa* in shingle.

The possibilities of artificial control of the shore line by appropriate planting and conservation of plants were alluded to, and the possibility of consequent injury to navigation pointed out. Extensive mud flats are the natural "hinterland" of a system of tidal creeks or channels, and if the level of these muds be unduly raised by the silting action of halophytes, by so much is the volume of tidal water that can enter a harbour reduced. In the absence of sufficient water to scour out the channels at later stages in the ebb, they are always liable to become shallow and ultimately choked.

Prof. J. W. Gregory laid stress on the fact that although deposition by rivers and currents in the formation of tidal lands was of vast importance, coast erosion was also accompanied largely by the deposition of the matter thus set free. This deposition took place rapidly in sheltered positions. Sedimentation was much more rapid and complete in salt water than in fresh. Thus the transport of the products of erosion was restricted, and sedimentation in protected places along the coast was easy. Three processes are involved in the deposition of such tidal lands; first, the formation of a sand bar; second, the formation of a spit of longshore drift; and third, the deposition of plains in quieter waters behind the bar or spit. The development of these features on the British coasts was illustrated by reference to the records, from Roman times onwards, of the mouth of the Humber and other rivers. Mention was also made of the occurrence of similar phenomena on the coasts of Australia and Burma. In conclusion it was pointed out that the conditions controlling tidal-land formation at the present time were probably similar to those under which the great coal fields of the world had originated.

Prof. R. H. Yapp dealt particularly with the colonisation of the mud flats in the Dovey estuary in Wales. The vegetation succession Salicornia → Glyceria → Armeria → Festuca was described. In the early stages vertical accretion of silt is rapid, but the rate decreases as age advances. Stress was laid on the efficiency of the dominant plants as silt-binders. Sun-cracks, even during prolonged drought, rarely appear on such surfaces covered with vegetation, except in the earlier phases of colonisation when roots are few and binding less complete. Erosion resulting in the undercutting of the margins of the marsh and of the numerous drainage "pans" was described step by step. The rate of retrogression due to such erosion is slow compared with the rate of the various constructive forces leading to the increase of tidal lands.

Dr. Vaughan Cornish pointed out that little attention had been given to the importance of the ebb and flow tides in the formation of tidal lands. This was mainly due to the difficulty of observation. He described the interplay of ebb and flow tides in the passage of detritus, and held that the beach is stroked intermittently in one direction only, that of the flood tide. In this connexion it is important for local authorities and coastal engineers to examine carefully the movements of detritus at the turn of the tides.

Lord Montagu of Beaulieu spoke of his contact with the work of Prof. Oliver, and of his firm belief that only by the co-operation of local authorities with trained botanists could the problems of coast protection be dealt with adequately. His own experiments on reclamation were referred to with the object of dispelling the belief that easy and quick returns from grass crops could be secured by enclosing and draining salt marshes. He stated that Spartina sometimes acted indirectly as a denuding force, owing to the current being concentrated into narrower channels through the growth of the grass. This led to the falling in of the banks in consequence of undermining.

Dr. E. J. Salisbury described chiefly the ecological changes occurring in sand dunes with increasing age. There is a gradual diminution of calcium carbonate as the dune gets older, owing to the accumulation of carbon dioxide through the action of micro-organisms leading to a rise in the hydrogen-ion concentration. This is correlated with changes in the types of plants found on the dunes at different ages. Whereas the pioneer plants of the dunes are "lime-loving," several chalk down plants being commonly found, the character of the vegetation gradually changes until the old dunes are covered with plants characteristic of acid soils, such as heather.

Natural Mental Tests.

NATURAL mental tests are defined, in a pamphlet recently received, by Mr. Arthur MacDonald, of Washington, as "studies of man which have for their object an estimate of him with reference to his reputation, education, and culture, and also with regard to the things he has done, the results he has accomplished . . ., in short, his mental products." Thus a study of the occurrence in a group or community of men of genius or talent, those who are noted for literary, scientific, or any other educational achievement, forms a test of the mentality of that group. Such a series of natural tests is of considerable anthropological significance. By means of them we compare the effects of various conditions and

environments upon the mental status of the average man, who is the representative of the community. Mr. MacDonald has brought together the data from a number of studies of man's mentality which, though not designed for that purpose, form such a series.

Mental ability has been found to resemble the physical properties of man in range and distribution; it conforms to the normal curve of distribution. Thus among a representative group, the proportion of successful men is about the same as that of morons and individuals of low-grade intelligence; and the proportion of men of great talent and genius the same as that of idiots and imbeciles. The range of intelligence above the normal ordinary man is as great as the range below.

In general, men of outstanding ability obtain a great reputation among their contemporaries; so that we are enabled to compare the varying occurrences of men of genius and of talent by means of their reputations. The number of such occurrences varies chronologically, with nationality and geographical situation, with social origin and parentage, and with degree of education. Finally, there are various types of genius and talent which occur in fairly constant proportions among different communities.

Not much reliance can perhaps be placed upon data dealing with the number of eminent men who have lived in the various centuries and decades of our history; for the spread of publicity and the improved means of communication are likely to give an advantage to more recent periods of time. It is interesting to note, however, that while men of talent increase in number up to recent years in Great Britain and in the United States of America, the largest number in France lived in the seventeenth century.

When we turn to a comparison of the number of great men of science in various countries, however, we do not find any advantage resting with the English-speaking races. Ever since 1750 Switzerland has had the largest number of associates of foreign Royal Societies; Holland has sunk from second place to tenth, Germany has risen from low down to third, and France is high throughout. England is about sixth, and the United States about tenth throughout. In Great Britain itself, the Nordic races have a great advantage as regards men of genius. England and Scotland much out-top Ireland and Wales—a fact which is fairly generally recognised.

Coming to the influence of social origin and environment, we find that it is the great middle class, the commercial and professional group, the "neither poor nor wealthy," which produces the bulk of talent and genius both literary and scientific. In France and in the United States also, it is the urban rather than the rural districts which have the advantage in this respect. This is probably connected with the superiority of educational opportunity in the former, for naturally we find more talent among educated than uneducated persons; 80 per cent. of a group of distinguished American men of letters had received at least a high-school education, while 98 per cent. of a group of talented French men of letters were well educated.

Dividing men of genius into men of letters, sciences, arts, and action, we find that in all countries the greatest number of men of genius are men of letters, especially in France and Germany. Men of action come next in all countries except Germany, where there are more men of arts and sciences with genius. In most countries the arts have the advantage of the sciences.

These conclusions probably need the support of more statistical evidence to become firmly established, and to show clearly their bearing upon one another. They nevertheless form the introduction to a number of interesting problems connected with variation of mentality in man. M. D. VERNON.

Bergens Museum.

ON April 25 Bergens Museum celebrated its centenary by a festival to which representatives of Norwegian, Danish, Finnish, Icelandic, and Swedish institutions were invited, and by the publication of a handsome volume, which permits the friends of the museum in other countries to share the interest and to offer congratulations to their colleagues of Bergen. In 1900 a complete history down to that date was published by Dr. J. Brunchorst. The present work records the remarkable expansion during the succeeding quarter of a century, and the fruition of ideas that germinated in the bygone decades.

Bergens Museum has never been content to remain a mere storehouse and exhibition. It has been a centre of scientific research and of the publication of the results to all classes. The museum itself has so grown that it has occupied three successive buildings. To the last of these, two wings were added about 1900, and an entirely new building for the history of culture now approaches completion. The museum also has a separate laboratory and a modern biological station, and is about to erect a building for its geophysical institute. It possesses a seismological station, a bio-chemical laboratory, and a botanical laboratory.

The two serial publications of the museum—the yearbook for researches and *Naturen* for popularisation—are widely known. Among many separate publications, "An Account of the Crustacea of Norway" by Dr. G. O. Sars stands pre-eminent. To the printed word is added the spoken. Not only are there popular lectures, but there have also arisen regular schools in zoology, botany, and geology, with the right of examining their students for public posts.

Thus we arrive at the goal of the museum's activities, its incorporation—which cannot much longer be delayed—as the University of Bergen. Already its staff of 25 men of science includes 8 recognised professors. The ideas that had been gaining ground since 1892 were set on a broader basis in 1915. Plans were prepared and funds solicited. The intention was first to establish faculties of natural science and of medicine based on the museum and such medical institutions as exist in Bergen. Unfortunately the hard times have rendered it impossible to have these two faculties at work in the centenary year; but the course of future development is marked out and will undoubtedly be followed so soon as the economic situation permits. Many a university has founded a museum of high rank; but we do not remember a museum that, beginning as a private institution in a single school-room, has so determinedly used its energies for the highest and widest ends of learning as to blossom into a university for which a prosperous future is assured.

In its earlier years men of the highest scientific distinction were connected with Bergens Museum, such as D. C. Danielssen, Herman Friele, Fridtjof Nansen, G. Gustafson, A. Appellof, and Jørgen Brunchorst. A welcome feature of the present volume are the portraits and brief biographies of those who have served the institution during the present century. Into the hands of the present staff the future of Bergens Museum and Bergens University may be entrusted with confidence. F. A. B.