

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 *Suaeda 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 MacDonal, 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