observation and physiological tests prove; nor is such preformation necessary if a mechanical hypothesis is adopted.

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(*To be concluded.*)

CURRENT NOTES ON PHYSIOGRAPHY (VIII.)

CROWLEY'S RIDGE.

CROWLEY'S RIDGE, rising above the alluvial lowland of the Mississippi in Missouri and Arkansas, has long been a subject of discussion. Branner (Geol. Surv. Ark., Ann. Rep., 1889, ii., p. xiv.) has suggested that the lowland to the west of the ridge was excavated as an early path of the Mississippi, from which it was diverted into its present course east of the ridge by the Ohio; but it is difficult to understand how the smaller of the two rivers could divert the larger one. A new explanation of the ridge has recently been offered by C. F. Marbut (Proc. Boston Soc. Nat. Hist. xxvi., 1895), to the effect that the ridge is homologous with the Chunnenugga ridge of Alabama, and that it belongs to a family of geographical forms frequently found on coastal plains during the mature stages of their development. These ridges or uplands normally run parallel to the coast line; they mark the outcrops of comparatively resistant strata, dipping toward the coast; they descend inland by a relatively rapid slope, often strong enough to be called an escarpment, towards an inner lowland which has been eroded on an underlying and weaker member of the coastal formations; they descend more gently on the coastal side. The inner lowland is drained by longitudinal streams, which enter transverse streams that cut their way through the ridge or upland on the way to the sea. In a region of uniform uplift all these features of relief and drainage have a regular rectangular system of trends; but where the former shore line or the uplift is irregular the trends will depart more or less from a rectangular towards a curved pattern. Marbut regards Crowley's ridge as a portion of an inland-curving ridge of this kind. The master stream of the region is the Mississippi, which bisects the inland curvature of the ridge. The upland along whose eastern base the Tennessee river flows northward in an adjusted subsequent course forms the eastern part of the curve; while Crowley's ridge forms the western part. The lignitic strata by which the ridge is determined weaken southwestward, and hence the ridge soon disappears in that direction. The lowland west of Crowley's ridge, ascribed by other writers to erosion by the Mississippi, is explained by Marbut as comparable to the lowland on the inland side of the Chunnenugga ridge of Alabama, and the rivers which follow this lowland are thought to be adjusted subsequent rivers.

THE CUSPATE CAPES OF THE CAROLINA COAST.

THE systematic repetition of certain features in Capes Hatteras, Lookout and Fear is explained by C. Abbe, Jr. (Proc. Boston Soc. Nat. Hist., xxvi., 1895) as the result of a number of backset eddying currents, turning from right to left between the Gulf Stream and the coast. The generally southward movment of the sands along the shore being well known, some special explanation is needed for the acutely pointed capes between the smooth concave curves of the sand bars. Although this is a conspicuous feature of the coast, it seems to have been little considered. Shaler, in his recent general account of Harbors (U. S. Geol. Survey, 13th Ann. Rept., 1893, 180), suggests that the greater inflow of the tides in the middle of the curved bays between the capes would cause a lateral current in either direction, and that the cusps would form where the outward flow from two curves became confluent; but this is contradicted not only by the general southward movement of sands along the shore, but also

by certain minor features to which Abbe gives special attention, and which indicate an outward movement of the prevailing currents on the north side of each cape, but an inward movement on the south side. The V-shaped bars on the shore of ancient Bonneville (Monogr. I., U. S. Geol. Survey, 57) seem to correspond with the cuspate capes in essential features, but their relation to eddying currents is not clearly brought foward by Gilbert. Penck, in his recent *Morphologie der Erdoberfläche*, mentions backset shore currents as of frequent occurrence, and suggests that the V-shaped bars of the Bonneville shore may have been produced by such movements (II., 485, 486), but he does not refer to other examples of this kind. Yet cuspate sand-bar capes of moderate size are certainly not rare, as may be seen by consulting the maps of our coast in the lower part of Chesapeake Bay.

Dungeness, on the southeastern coast of England, seems to be a similar form; but no other examples are known of so great a size as those of our Carolina coast, nor has any other instance been adduced of so pronounced a control exerted by the general oceanic circulation upon the form of the continental shore line.

THE MIGRATION OF CAPE CANAVERAL.

In connection with the foregoing, mention may be made of the southward migration of Cape Canaveral, as indicated by the Coast Survey Charts (Nos. XIII., and 159–163). Like the capes further north, Canaveral is a sand-bar cusp, the details of its form indicating a control by two adjacent eddying currents, after the manner described by Abbe. Its history appears to have been in brief as follows: The position taken by the first blunt cusp between the adjacent eddies seems to have been about ten miles south of Mosquito inlet and forty miles north of the present cape; this being, as it were, a provisional location adopted by the currents before much work had been done in shaping the coast by building long bars for the transportation of sand. As an improved and continuous bar grew from north to south, its relation to the general curvature of the Carolina bight was such that it ran past the first-formed cape, and a new location for the cusp was then chosen thirty miles farther south, the outline of the old cape being still faintly traceable inside the newer bar. But a still better adjustment of the currents to the shore brought another bar down from the north, this one running past the apex of the second cape in much the same way that the second bar ran past the first cape; and thus the third cusp, the present Canaveral, was formed ten miles south of the second. The southward migration of the cape appears to be still continued, as indicated by the arrangement of the sand dunes; but it is now going on with a slowly progressive, creeping advance, and not by a leap, such as that which shifted the second cape from the first, or the third from the second. All this, however, is based only on a study of the charts. Those who have opportunity for a study of the cape on the ground might make it the subject of fruitful observation.

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ANNUAL MEETING OF THE CHEMICAL SOCIETY (LONDON).

In the course of his address at the anniversary meeting of the Chemical Society of London, the President, Professor Armstrong, after referring to the notable growth of the Society in the twenty years during which he had been a member, stated that the Council had decided to break through the practice which had always obtained and by which the Faraday Lectureship has invariably been filled by some foreign scientist, and had bestowed the Faraday Medal upon Lord Rayleigh 'in recognition of the