Tate's admirable classification presents us with well-defined types, generally recognizable almost at a glance by the practised eye, and bounded by lines as good probably as from the complications of the structure (faults, obscurities, etc.) could be expected. His names, if not high-sounding, are at least sufficiently expressive.

II.—The Carboniferous Limestone of North Flintshire. By G. H. Morton, F.G.S.

(Abstract of Paper read before the British Association, Birmingham, September, 1886.)

IN the year 1870 I described before the Association the subdivisions into which the Carboniferous Limestone of North Wales is naturally divided by clear lithological characters, and in 1877 more fully described the subdivisions of the formation as they occur in the Eglwyseg ridge, near Llangollen. Since then the whole of Flintshire has been examined, and the original classification found to extend to the sea-coast at the north of the county. Although the subdivisions are not piled up, one over the other, in a precipitous outcrop, the succession is as clearly shown between Prestatyn and Meliden as at Llanymynech and Llangollen, and the uniform character of each subdivision along the intervening 44 miles of country is remarkable.

The following four subdivisions of the Carboniferous Limestone are all well exposed in a fine mural section $3\frac{1}{4}$ miles in length, from Castell Prestatyn on the north to the end of Moel Hiraddug on the south, and occur in the following descending order :—

Upper Black Limestone—a black, fine-grained, thin-bedded limestone, containing very few fossils, but including *Posidonomya Becheri* and the remains of many plants. Thickness, 200 feet.

Upper Grey Limestone—a dark grey, thin-bedded limestone, with thin seams of interstratified shale, containing numerous fossils, including *Productus giganteus* and Corals. Thickness, 500 feet.

Middle White Limestone—a white or light grey, thick-bedded limestone, containing very few fossils. Thickness, 600 feet.

Lower Brown Limestone—a brown or dark grey, irregularly-bedded limestone, containing few fossils, but with interstratified shales at the base of the subdivision, which contain the remains of Plants. Thickness, 400 feet.

The total thickness of these four subdivisions, forming the Carboniferous Limestone of the North of Flintshire, is 1700 feet, which is much greater than anywhere else in North Wales.

Although the line of the section is nearly N. and S., the average dip of the strata is about 14° to the E.N.E. at Coed-yr-Esgob, N.W. at

which crops out for some miles along the coast at Lamberton . . . But in the Upper Coquet district (Mid-Northumberland), where the Tuedians are extremely well developed, no such limestone can (could) be traced, and the Harbottle Grits are so thoroughly Bernician in facies, and so well divided stratigraphically from the Tuedians, that *there* the base of this great sandstone series forms quite the most convenient boundary-line. Now there is little doubt that the horizon of the Lamberton or Dun Limestone is *above* the Harbottle Grits, so that the merely expedient and artificial character of the boundaries thus arrived at is shown at once. The truth is that no line should be drawn at all except as the merest matter of convenience."—Lebour, Outlines of the Geology of Northumberland, p. 44. In the diagram it is of course a matter of convenience that this confessedly artificial limit should be represented by a dotted line.

Bryniau, and N.E.N. at Moel Hiraddug, so that it is greater than it appears to be in the section. The highest subdivision, the Upper Black Limestone, occurs at the north end, and the Upper Grey Limestone crops out from under it, and extends to Nant-yr-ogof, where there is a considerable fault, which brings up the top of the Lower Brown and the base of the Middle White Limestone. From the fault the Middle White extends three-quarters of a mile, when the Lower Brown Limestone crops out, continues some distance, and forms the conspicuous hill, Moel Hiraddug, on the top of which the lower beds of the Middle White Limestone are again exposed.

Along the west and parallel with the section there are two great faults, known as the Prestatyn fault and the Vale of Clwyd fault, and on the western side of the former a bare limestone hill, Graig-fawr, rises to an elevation of 500 feet, and presents a grand exposure of the Middle White Limestone, which is 600 feet in thickness. Numerous fossils occur at the north end of Graig-fawr, and a greater number has been obtained there than from the Middle White Limestone anywhere else.

On the west of the Carboniferous Limestone shown along the line of section several faults, including the two already referred to, have thrown down the limestone beneath the level of the sea, and the Lower Coal-measures have been proved to occur at Meliden and Dyserth, beneath a deep covering of drift. In one of the recent "Memoirs of the Geological Survey," by Mr. A. Strahan, M.A., F.G.S., a full description of the Geology—*Explanation of Quarter-sheet* 79 *N.W.*—will be found, with all the details of the drift and underlying strata.

III.—A Sketch of the History of the Rivers and Denudation of West Kent, etc. By F. C. J. Spurrell, F.G.S. 8vo. Greenwich, 1886. [Reprinted from the Report of the West Kent Natural History Society, 1886.]

THE author commences with some remarks on the "plane of marine denudation" which was produced over the Wealden area before the present features were carved out by subaërial forces. He observes that nowhere over the Wealden rocks is there to be found any deposit belonging to that old marine age; but it is quite possible that the Pliocene deposits of Lenham, etc., may be relics of the period. He then refers to the denudation by rain and rivers, and the breaching of the Chalk Downs, and states that "On the crest of the Downs there may be found in some places relics of the rocks from the Weald, Gault Clay, Chert, Greensand, Sand and Limestone, etc., lying on the Chalk, not in the condition of river gravel, but of patches of the old beach." The gravel of Shooter's Hill is, in his opinion, largely composed of the wreck of Bagshot Beds, and there are many similar outliers of pebbly gravel. These beds occur, as a rule, at a higher level than the Thames Valley gravels, and they may be distinguished from them by the absence of the erratic pebbles and fossils of northern origin (derived from Glacial Drifts), that occur in the newer deposits. These Thames Valley gravels, in Mr. Spurrell's opinion, lie below the 200 feet contour-line, the highest elevation being at Wimbledon, 190 feet.