NOTICES OF MEMOIRS.

I.—THE STRATA BELOW THE TRIAS IN THE COUNTRY AROUND LIVERPOOL; AND THE PROBABILITY OF COAL OCCURRING AT A MODERATE DEPTH. By G. H. MORTON, F.G.S. [A Paper read before the Liverpool Literary and Philosophical Society, 1873.]

AFTER mentioning two papers on this same subject by E. W. Binney, Esq., F.R.S., Mr. Morton explains the use of the Government Geological Survey Maps, and gives from them a table of the strata as they occur in the country bordering the Dee and Mersey, in ascending order, viz.:—

PALÆOZOIC.	*Silurian*	Wenlock Shale		
	Devonian	Old Red Sandstone	100	feet.
	Carboniferous ...	Carboniferous Limestone	1200	,,
	,, ...	Millstone Grit	1000	,,
	,, ...	Lower Coal Measures ...	1800	,,
	,, ...	Middle or Productive Coal Measures	1500	,,
	,, ...	Upper Coal Measures ...	1200	,,
	Permian	Permian Sandstone...	300	feet.
	,, ...	Permian Marl...	50	,,
MESOZOIC.	*Trias*	Lower Bunter...	400	,,
	,, ...	Pebble Beds	350	,,
	,, ...	Upper Bunter...	400	,,
	,, ...	Keuper Sandstone	450	,,
	,, ...	Keuper Marl	100	,,
	RECENT	Superficial Accumulations ...	50	,,

The Carboniferous strata have in places suffered great denudation. The whole series 6700 feet in thickness has been denuded from the Wenlock Shale of Denbighshire and Flintshire, where it formed an anticlinal curve, and only scattered patches of the Limestone are left at the base to indicate their former position. More to the N.E. there is less elevation, and consequently such a reduced denudation that a fringe of Coal Measures occurs along the S.W. of the Dee. Still further to the N.E., in Wirral, the New Red Sandstone comes in, overlying the Coal Measures, which seem fully developed and undenuded. The Coal Measures continue thus relatively depressed until thrown up by a great fault to the E. of Liverpool, where the Trias and Permian have been denuded.

The author next alludes to several papers, which the present state of the supply of Coal has called forth, and points out that none of them question the occurrence of the Coal Measures beneath the Trias.

The Coal Measures, it seems, however, do not always underlie the New Red Sandstone, as proved by numerous sections in North Wales, where the Carboniferous Strata has been deeply denuded, and in some places entirely removed before the deposition of the Permian and Trias.

This great denudation of the Carboniferous Strata on the S.W. of the Dee has been caused by the upheaval and consequent exposure of the country to denuding influences, while the Coal Measures in

the N.E., owing to the remarkable dip of the strata, were protected in a depression, probably beneath the sea.

Mr. Morton next gives four sections tending to prove that the Coal Measures lie fully developed beneath the Trias.

1. Sections at Sutton St. Helens. Here the lowest strata visible are the Upper Coal Measures, dipping at various angles from 6° to 12°; and underlying the Permian, which is supposed to be about 350 feet thick. About five miles N.E. of this locality, at Edge Green, near Wigan, there has been considerable denudation of the Coal Measures; the "*Main Delph Coal*" being reached at a depth of only 475 feet.

2. Section at Halsnead. The section represents a line across the country south of Huyton Quarry. But the succession of the strata is not so distinct as at that place, on account of the land being everywhere covered with drift. The Upper Coal Measures occur here, and seem to be 1200 feet thick. They are succeeded by the Lower Bunter Sandstone, but there is sufficient unproved ground for the Permian to crop out between it and the Upper Coal Measures.

3. Section at Thatt's Heath. Here the Middle Coal Measures are thrown up by a great fault. This dislocation cannot have destroyed any of the strata, being a simple fracture, leaving the order of succession on both sides of the fault unchanged. And since at Sutton, within two miles, the Upper Coal Measures and the Permian are both fuller exposed, these formations, along with the higher Coal-seams above the Ravenshead Beds, and the Permian, have all been denuded, along with the Trias, from off the Middle or productive Coal Measures exhibited in the section.

4. Section at Denna, Little Neston. This intersects the boundary fault between the Bunter Pebble Beds and the Middle Coal Measures. The Upper Coal Measures and probably the Permian have been denuded on the S.W. of the fault, but underlie on the N.E. At Shotwick, about four miles S E. from Neston, a boring made for Coal proved the Lower Bunter to be 510 feet, and to rest upon the Coal Measures.

From these four sections Mr. Morton infers that there are Coal-fields beneath the Trias, and concludes with a few remarks as to the practicability of working them.—B.B.W.

II.—Proceedings of the Bristol Naturalists' Society, vol. vii., part 2, June to December, 1872.—In this little work Mr. E. B. Tawney, F.G.S., records his discovery of *Zoophycus scoparius* (Thollière), a plume-shaped Alga, in the Inferior Oolite of Dundry. This species is, so far as he knows, new to English geology, but it is extremely characteristic of the Inferior Oolite in the Alps of the Canton de Vaud, being sometimes almost the only fossil to be found in those beds. It is also characteristic of the Inferior Oolite (Bajocien) in the South of France.

Mr. Tawney also contributes some notes on the Upper Greensand Fossils in the Bristol Museum.

III.—The American Association for the Advancement of Science; August 20th, 1873. Portland, Maine.

Notes on the Fructification of Sigillaria.—At the meeting of the American Association in Portland, Principal Dawson exhibited and described a specimen of *Sigillaria* from Cape Breton, exhibiting zones of marks of fructification on the stems and branches, in the manner of *S. elegans* and *S. Lalayana*, and other species, to which the species in question, *S. Lorwayana*, is closely allied. He pointed out that these fruit-scars are really modified leaf-scars, and that they could not have borne strobites or modified branches, but may have produced single nuts of the nature of *Trigonocarpa*, or flattened racemes of such fruits like *Trigonocarpum racemosum*, or some Antholithes, which seem to be modified leaves with marginal fruits, structurally resembling the fertile leaves of Cycads. These points will be more fully brought out in a forthcoming Report of the Geological Survey of Canada. They confirm the views already stated by the author in his "Acadian Geology," and were supported in the discussion by facts from the Coal-fields of Ohio, stated by Dr. Newberry, and shortly to be published by him in the Reports of the Survey of that State.

REVIEWS.

Whitaker's Geological Model of London.

UNTIL within the last twelve months, the work of the Geological Survey in connexion with the surface geology of the London district was unknown to the world at large. The nature of the ground at the surface in any given district of the metropolis and its suburbs, the range and thickness of the loams, gravels, and superficial clays, and the questions of hygienic geology connected with them, were only to be settled by the outside world in an empirical manner, unless the excellent maps and sections by Mr. Mylne gave the desired information. The principle upon which the Survey work has been conducted could hardly be expected to be in advance of the age, and hence, with one exception, the maps of the London district which we have hitherto had have only represented the so-called solid geology of the area. London has suffered largely from this curious division of labour. Until the last year there was no delineation of those important surface accumulations of marine and fluviatile material, varying from ten to twenty feet in thickness, which have such an enormous spread about London, and largely determine the sanitary character of the area, whilst they are also connected with the foremost geological questions of the present day. Within the last few months, however, and for the first time, a complete representation of the geology of London, with all the aids of colour and relief contour, has been produced under the auspices of the Survey. A large block-model, showing both the superficial and solid geology of the metropolis, has been placed in the Museum of Practical Geology in Jermyn Street.