Coal-measure fossils which might have been met with ; but the only fossils shown me or spoken of were ferns, and what are called calamites. There seems among Hobarton geologists a strong desire to have their coal-deposits ranked with the English coal-measures ; and any person venturing a statement to the contrary is looked upon with disfavour. Yet, notwithstanding this feeling, I could hear no hint whatever that either *Stigmaria* or *Sigillaria* had ever for certainty been found in any of either the shale or the sandstone beds. Mr. Wintle's *Stigmaria* was probably the stem of some tree-fern, which is a very common fossil in the Tasmanian coal-deposits. If I am not greatly mistaken, Mr. W. admitted as much to myself in a conversation which took place after the paper referred to was posted for England. Of this, however, I am by no means certain.—T. H.

V. NOTES ON CHARNWOOD FOREST.

By D. MACKINTOSH, F.G.S.

IN the midst of a comparatively tame and highly cultivated plain of New Red Sandstone near the centre of England, there rises up a part of the under crust of the earth which presents so much the appearance of an island as to lead the imagination at once to those remote ages when its Porphyritic Peaks and Syenitic Knolls were surrounded by the sea. The geological history of this celebrated spot has been skilfully unravelled by Professors Sedgwick and Jukes (Article in Potter's Charnwood Forest) ; the Rev. W. H. Coleman (Article in White's Directory) ; Mr. Edward Hull (Memoirs of Geol. Survey) ; and others. It has lately been invested with additional interest by the announcement of the opinion that it is one of the 'uncovered areas' or wrecks of the Laurentian or pre-Cambrian continents, which Dr. H. B. Holl* and others suppose may have extended or may still extend underground, from Scandinavia to Charnwood, from Charnwood to the Malvern Hills, and from the latter to North America. The late Mr. Coleman founded his opinion of their pre-Cambrian age on the absence or extreme paucity of organic remains.† But Dr. Bigsby has well shown that this characteristic would rather favour the idea of a formation being posterior to the Laurentian (Quart. Journ. Geol. Soc., vol. xix. No. 73) ; and whatever may be the age of the *Syenitic* Knolls or Bosses of Charnwood Forest, the stratigraphical dissimilarity of its slates and porphyries from the Laurentian formation of America, and their resemblance to the Cambrian rocks of North Wales, ought to make us cautious in assigning to them a very remote antiquity. In many respects there is not perhaps in England a district more puzzling to the geologist than Charnwood Forest ; but all agree with Professor Sedgwick in believing its

* Quart. Journ. Geol. Soc., vol. xxi. No. 81, p. 72.

† Apparent traces or impressions of vegetable or animal life have been discovered in the Southland slate-quarries on the eastern side of the Forest.

general conformation to have arisen from an anticlinal elevation by which its stratified masses were divided so as to cause those on one side to dip to the NE. and those on the other to the SW. Some have supposed that the upcast to the south-west was very much greater than in the opposite direction.

Syenitic Knolls.—A line of knolls or patches—in some places syenite, in others greenstone—stretches at intervals from New Cliff and Long Cliff, by Benscliff, towards Bradgate, which Mr. Coleman believed to run roughly parallel to the anticlinal line of the forest.* But the principal Syenitic bosses are Mount Sorrel to the east, and Markfield Knoll, Cliff Hill, and Stanton Fields to the south-west. Syenite may likewise be seen at Hammercliff and Birchwood Plantations, at Bardon Castle, Groby, &c. Some have supposed that these syenitic bosses are remaining portions of a great mass or masses erupted previously to the deposition of the slates, which, so far as yet observed, lie apparently *undisturbed* in their immediate neighbourhood;† others believe that the syenites were erupted contemporaneously with the slates and porphyries of which the Forest district is principally composed. Do these syenites mark the craters or centres of eruption from which beds of lava overflowed?—these beds at first assuming a syenitic structure, and at a greater distance becoming porphyry? and can the origin of the porphyritic beds of Charnwood Forest be in this way explained?‡ Or does the great difference in lithological structure between the syenites and porphyries preclude this supposition? At Hammercliff, Mr. Jukes observed an apparent transition from syenite to porphyry—the summit and probable nucleus of the hill being syenite, with a surrounding porphyritic mantle. But might not these phenomena be regarded as equally indicative of the syenite having been thrown up since the formation of the porphyry so as to elevate the latter all around it, and at the same time obliterate the line of junction by metamorphism? Bardon Hill, to the west of Hammercliff, appears to be greenstone at the top, with a porphyritic structure lower down, which Mr. Hull regards as a passage between the greenstone and the porphyritic ridges to the north—the two having been separated by a fault. But might not this fact be likewise regarded as a proof that Bardon Hill was elevated after the formation of the porphyry? In the neighbourhood of Bardon Hill, and resting unconformably on the Coal-measures, is a sheet of greenstone quite distinct from porphyry in its composition, and in many places differing but little from compact basalt; specimens of it may be seen near the office of the Whitwick Collieries.§

* Had these igneous rocks anything to do with the anticlinal upthrow, which Mr. Hull and others believe to have occurred at the close of the Carboniferous period, or are they of much older date?

† Too much importance cannot be attached to the examination of fresh excavations in the quarries of Markfield Knoll, Groby, &c., in order to discover, if possible, the actual contact of the igneous and sedimentary rocks.

‡ See Prof. Ramsay on North Wales, in the first volume of 'The Geologist.'

§ In one of the neighbouring Snibston pits it was found to be 21 feet in thickness. In two of the Whitwick shafts its thickness is 63 feet.

Can this flow of trap be traced to Bardon Hill? or (according to a local geologist) to a greenstone-rock near Whitwick? or to neither?

Porphyritic Rocks.—These rocks may be seen exposed at intervals along the irregular ridge extending from Grâce-Dieu to Green Hill. The rocky projections called High Cademan, High Sharpley, Ratchet Hill, Pedlar or Peldar Tor, High Towers [Tors?], Timberwood Rocks, Flatfield Rocks, the Hanging Stones, &c. are more or less composed of porphyry; these tors, taken as a whole, present a wonderfully uniform porphyritic structure, as may be seen in the stones of which the roadside walls near Whitwick have been built. But as the geologist proceeds with his hammer to examine the rocks of the different tors he now and then finds unexpected variations in their composition, graduating from felspar, and compact feldspathic porphyry, through the ordinary varieties, to porphyritic and compact greenstone. He may in some places see the porphyry covered or underlain by what Mr. Hull calls 'slaty ash.' That gentleman has observed a bed of altered slate in the interior of the Forest, apparently dipping under the porphyry. This would seem to indicate that the overlying bed or beds of porphyry must have flowed over the slate from a submarine volcanic vent. On ascending from the Hanging Stones to the High Towers, I have noticed some striking variations in the composition of the rocks. At the Hanging Stones, a brecciated structure is combined with a porphyritic. At a high level, between Mr. Green's house and the lodge, the rock is a very coarse breccia, which, if not directly volcanic, must have been highly metamorphosed; higher up the structure becomes more decidedly porphyritic. On this acclivity groups of rocks, reminding one of what may often be seen on sea-coasts, may be traced at different levels, with intervening flat areas which may have been sea-beaches during the last emergence of the Forest district.

On the side of the foot-path leading from the Reformatory road towards Green Hill, I noticed a block of porphyry enclosing a fragment of fine slate, with the boundary line between the two very distinctly marked. Many similar instances have been discovered; and how far these included fragments furnish evidence of the porphyry of the district having once been in a molten state, is a very important inquiry in the present state of geological speculation. Mr. Coleman, an advocate for the metamorphic origin of the Charnwood porphyries, admitted that there must have been fusion at those places where the slaty fragments were caught up; but why, it may be asked, have recourse to this explanation in the case of particular phenomena, and deny the volcanic origin of the rocks in general? The advocate of metamorphism might reply that the doctrine of 'easier fusibility' is implied in the very fact of unaltered or little altered fragments of slate occurring in the porphyry; and that the latter therefore, generally speaking, may be of metamorphic origin, though in parts it may have been 'heated to the melting point.' In this district the respective claims of the rival theories—metamorphism and igneous fusion—may be studied within a very limited area. The observer ought previously to be well acquainted with the results of

the experiments of Delesse and Daubrée* and the discoveries and opinions of Sedgwick, Ramsay, and Murchison, concerning the origin of the porphyritic rocks of North Wales and the Lake District.

NOTICES OF BRITISH AND FOREIGN MEMOIRS.

I. DER HANNOVERSCH E JURA. By KARL VON SEEBACH. Berlin, 1864. 4to. 158 pp.

THIS work is a very useful and very valuable addition to the previous memoirs illustrative of the geology and fossils of North Germany, by Roemer, Strombeck, Credner, Wagner, Schlonbach, &c., as also to those of Oppel and Quenstedt. It is divided into two parts, Geological and Palæontological, comprising 158 pages of letterpress, a geological map, and 10 plates of fossils. The first part contains a sketch of the geographical distribution of the Jura formation in North-west Germany, a description of the various strata, and some general remarks on the whole group. The lowest bed, which is but briefly noticed, is the zone with *Avicula contorta*. The Jurassic beds are described under three sections—the Lias, Dogger, and Upper Jura; each of these again subdivided into certain zones or strata, somewhat similar to those usually adopted by geologists for the Oolitic group. The Lias comprises nine of these zones, of which four belong to the lower, three to the middle, and two to the Upper divisions. The Dogger contains six, and the Upper Jura nine.

Dr. Seebach's subdivisions, and his lists of characteristic fossils, will doubtless be found useful for comparison with those of the British area. Dr. Seebach himself is inclined to consider that the Lower Jura formation of Hanover, up to the Cornbrash, resembles that of South Germany, whilst the Baltic Jurassic strata present a greater similarity to the French and English types.

The second or Palæontological part contains a table of 373 species, zoologically classified, and showing at the same time their geological distribution. This is followed by a description of the new species named by the author, and critical remarks upon species previously described; the whole forming a useful contribution to the palæontology of the Jurassic formations.—J. M.

II. SKETCH OF THE GEOLOGICAL STRUCTURE OF THE SOUTH STAFFORDSHIRE COALFIELD. By J. BEETE JUKES, M.A., F.R.S., &c. (Prepared at the request of the South Staffordshire Local Committee, for the use of Members of the British Association, at the Birmingham Meeting, 1865.) Birmingham, 8vo., pp. 20.

WE reprint the following extract from Professor J. Beete Juke's pamphlet on the Position and Lie of the Rocks in the South Staffordshire Coalfield.

* Also, Observations on the Structure of Mount Sorrel Syenite, by H. C. Sorby, F.R.S., noticed at p. 448 of GEOLOGICAL MAGAZINE for October.