A further consequence of this discovery must be the removal of that very great series of compact conglomeratic Grauwacke-beds so common on the right bank of the Rhine and elsewhere—in Devonshire, for example¹—from the Culm to the Upper Carboniferous, thus reverting to the view held some years ago by H. von Dechen and R. Ludwig. This follows from the fact of their lying near Battenberg still higher than the Königsberg strata, shown to be the equivalents of the Visé horizon, i.e. of the Upper Carboniferous Limestone, and that the expression 'Culm' can only be employed to express equivalence with the Lower Carboniferous. We must look upon the Grauwackes, containing the well-known flora (*Lepidodendron*, *Archæocalamites*, etc.), as an equivalent of the Millstone Grit of England and the Flötzeleere Sandstein of Westphalia.

It remains only to be added that the originals of the fossils mentioned in this sketch are preserved in the museum of the Geological Institute of the Imperial University at Marburg.

VIII.—NOTE ON THE MARBELA MANJAK MINE, TRINIDAD.

By R. J. LECHMERE GUPPY.

I HAVE been favoured by James Wilson, Esq., with samples of material from the Marbela Manjak Mine. They are—

No. 1.	Clay from No. 1 Gallery, 75 feet deep.
No. 2.	„ No. 2 „ 127 „
No. 3.	„ foot of shaft, 150 „
No. 4.	Sand-rock.

There is no essential difference between Nos. 1, 2, and 3, and No. 4 only differs in being harder, not liable to disintegration by water, and in containing more arenaceous and less argillaceous matter than the other samples. Calcareous matter in all the samples is from 15 to 20 per cent., and consists almost entirely of shells of Foraminifera. There is a considerable amount of sulphur, chiefly as pyrites, greatest perhaps in No. 3, and fragments of Manjak² occur in No. 1.

In appearance there is much resemblance between this material and that of the Naparima oceanic beds, though the latter is generally of a lighter colour. But on examination a very considerable difference is found to exist between the two formations. Both are extremely fine-grained substances, indicating deposition in some depth of water. But the proportion of argillaceous and arenaceous matter in the Marbela samples is very much greater than in the oceanic beds. This betokens in the former case the greater nearness of land and the influence of rivers. In the Marbela samples the sandy matter mostly occurs in the form of lumps or irregular small

¹ Ussher: "The Culm Measure Types of Great Britain"; London, 1901.

² Manjak is a substance originally found in Barbados. It is geologically coal, but chemically a form of bitumen. It is described in Schomburgk's "History of Barbados," pp. 551, 569; and (as coal) in Proc. Sci. Assoc. Trinidad, 1877, p. 110 (see Guppy on Coal, etc., Proc. Vict. Inst. Trinidad, p. 507).

masses or patches. The Foraminifera are all of species found in the oceanic beds. This might indicate that the deposits were laid down on the ocean border, occupying a position intermediate between the truly oceanic deposits and the shore. The fossils frequently show signs of decay and wear—this is particularly noticeable in the case of *Pulvinulina pauperata*. A very noticeable difference is that the material of the oceanic beds when washed yield a residue consisting almost entirely of Foraminifera (chiefly *Globigerina*), while that of the Marbela deposit consists mostly of small pieces of slaty-looking and ferruginous materials, the foraminiferal fauna being much scantier than that of the oceanic beds, and it shows no relation either to that of the Pointapier beds or to that of Sangregrande.

As the Marbela Mine is in the Nariva Series (see my paper in *GEOL. MAG.*, 1900), this series is possibly newer than the oceanic beds, and was formed during the upheaval of the latter, being partly composed of material derived from the oceanic beds. I admit that this opinion is chiefly conjectural—it is in opposition to that of Messrs. Harrison and Jukes-Browne. The conditions generally of the Marbela deposit would suit a depth of water of 100 fathoms or less, and thus it would appear that the Manjak was deposited or formed on a bottom of that depth. It is easy to conceive that the heavy tropical timber brought down by the rivers might sink to that depth. Moreover, such timber is susceptible of being borne along by currents in the same manner as clastic material generally, and hence we find it in the same region as finely-grained arenaceous and argillaceous deposits derived from the degradation of the continent. This explanation further admits of application to the case of Barbados.

REVIEWS.

I.—MEMOIRS OF THE GEOLOGICAL SURVEY OF THE UNITED KINGDOM.

THE CRETACEOUS ROCKS OF BRITAIN. Vol. III: THE UPPER CHALK OF ENGLAND. By A. J. JUKES-BROWNE, with contributions by WILLIAM HILL. 8vo; pp. x, 566, plate, illustrations. (London, 1904. Price 10s.)

THE Geological Survey are to be congratulated on completing their Official Report on the Cretaceous Rocks of England, for with the publication of this third and last volume the results of many years' work have been given to the public. It is to be regretted that an account of the Irish and Scottish Cretaceous rocks was not included. This volume deals with the White Chalk alone, and of the White Chalk the upper portion only. The beds dealt with are defined by the authors as 'Upper' Chalk, and consist of the following zones:—Zone of *Holaster planus*, of *Micraster cor-testudinarium*, of *Micraster cor-anguinum*, of *Marsupites testudinarius*, of *Actinocamax quadratus*, of *Belemnitella mucronata*, and of *Ostrea lunata*. Since the description of the Chalk Rock by W. Whitaker in 1859, the 'Upper' Chalk of the Survey has