At Harcott, however, which is twelve miles South of Madeley, it seems to me that we have some representative of them. The Coal No. 7, in Section C, which lies 17 feet above the Coal No. 11, Section C, is probably the Ganey Coal. At 100 feet above this Ganey Coal is a Black Shale, No. 5, Section C, which I consider to be the representative of the Viger Coal; and 25 feet above this is No. 3 Coal (Section C), only one foot thick, which I take to be the Sulphur Coal. Upon this is a Blue Bind, five feet, which is probably the Pennystone Measure, without any Ironstone in it, as at Knowlbury. Now from No. 11, Section C, which represents the Great Coal to this Bind, No. 2 (Section C), is 150 feet, about the same as at Cornbrook. I admit the case is not so strongly in favour of the upper measures as of the lower.

In the Billingsley Engine Pit Section we have two small Coals of ten inches each at seventy feet below the zone of productive Coal-seams. These may represent the Lancashire Ladies' or Crawstone Coal of Coalbrook-dale.

If the co-relation is thus established, many curious and interesting inquiries will spring out of it, as to the denudation of the Coal-measures to the South of the Coalbrook-dale field, and as it would appear by the same process as channelled out the valley of the Symon fault as far North at least as Prior's Lee, leaving the Coalbrook-dale field in fact an isolated Coal-patch, as we have shown the Clee Hills, Harcott and Shirlot to be from the main Coal deposits of the Midland counties, unless it be connected with them somewhere to the North of Prior's Lee.

NOTICES OF MEMOIRS

I.—Report of the Chief Commissioner of Mines for the Province of Nova Scotia, for the Year 1870. 8vo. pp. 66. (Halifax, 1871.)

THIS report of Mr. Roberston, the Chief Commissioner, supplemented by that of the Inspector of Mines, Mr. Rutherford, shows the gold and coal mining operations that have been carried on in the various districts during the past year. As regards gold mining, the districts of Stormont, Wine Harbour, and Sherbrooke, have each returned more gold than in the year 1869, and Tangier, Oldham, and Montagu, more than in any year previous. The other districts show a falling off, but on the whole there has been a considerable increase in the quantity of gold obtained. Better modes of mining and amalgamating are wanted, and until these are introduced, gold mining cannot be carried on in any but the richest places.

As for the coal mines, it is stated that there are a number so well managed, that they would be a credit to any country, and could now supply any demand that is likely to be made upon them for some years.

II.—On the Cause of the Motion of Glaciers.

By John Ball, F.R.S.

[*Philosophical Magazine*, February, 1871.]

In the Geological Magazine for December last we gave a short notice of a paper by Mr. Croll, in which he endeavoured to prove the motion of a glacier to be molecular. To this Mr. Ball replies in the paper now before us. He questions whether the ordinary theory, which affirms that a glacier descends by its weight through the processes of fracture and regelation, has been overthrown by the arguments and observations opposed to it by Canon Moseley, and which, according to Mr. Croll, successfully show the insufficiency of the theory. These opinions are combated by Mr. Ball, who then proceeds to explain the cause of glacier-motion as it appears to him to be most consistent with the facts. He remarks that glacier-ice is a substance which at the temperature of freezing is capable of yielding, very slowly, to moderate pressure, and that a portion of the motion of all glaciers is due to this cause, and is effected independently of fracture and regelation. Glacier-ice, though imperfectly solidified, is yet rigid enough to transmit very considerable pressure; but there is a limit at which pressure upon the ice (which has a fixed internal temperature of 32° Fahr.) has the effect of reducing it to the liquid state. At any given moment of the progress of a great glacier, especially in summer, certain points are subjected to enormous pressure. The effect may either be that fracture ensues at that point, and so continues further; or else the pressure liquefies a portion of the ice: and the water, even if it cannot escape, occupies less space than it did before; so that the effect of transferring the maximum pressure from one point to another is accomplished. It is this process which Mr. Ball has compared to the progress of a huge snake, whose movements are effected not by simultaneous effort at every point, but by the transmission of muscular energy from one point to another.

III.—The Spirorbis Limestone in the Forest of Wyre Coal Field.

By Daniel Jones, F.G.S.

[A paper read before the Manchester Geological Society, 20th December, 1870.]

Mr. Jones brings forward some additional information respecting the occurrence of Spirorbis Limestone in the Forest of Wyre Coal-field, occupying a district lying between the Abberley Hills and Bridgenorth. This limestone, which occurs in the Upper Coal-measures, has been described by Sir R. Murchison in the Shrewsbury Coal-field as being about seven feet thick, and divided into two beds, the uppermost of which is a compact cream-coloured rock, slightly argillaceous, with a splintery conchoidal fracture and dull lustre; the lower is a cellular limestone, the cavities being filled with calc-spar and black bitumen. Singularly enough these two beds are still developed in the Forest of Wyre, where the formation is of much

less thickness. It was originally pointed out in this area by Mr. Binney, to whose observations Mr. Jones has been enabled to add several new facts regarding its distribution.

IV.—Ernest Favre on the Geology of the Alps.[1]

THE group of mountains which forms the subject of this little work lies between Châtel-Saint-Denis and the valley of the Sarine; it is composed of Niremont and the Corbettes, of the Moléson group, and of a part of the Verreaux chain.

The work is divided into two parts: the first is devoted to a geological description of the area, illustrated by plates of sections; the second, to a special study of the strata and of the organic remains found in them.

The structure of Niremont is shown to be that of an inverted fold, the crown or apex of which does not occur at the highest part of the mountain, and this is also the case with Corbettes, which presents two inverted folds. The Moléson group forms an elongated mass, stretching in a north-east and south-west direction, and isolated from the surrounding mountains; its structure is very regular. On whatever side one climbs, one reaches from the base to the summit more and more recent beds of Jurassic and Neocomian age, which dip on either side (north-east and south-west) towards the centre. Further to the east, at the foot of the mountain mass, the lie of the strata is different. Here Rhætic and Triassic beds are met with, highly inclined, and, indeed, plunging beneath the mountain mass. These beds are repeated further East, owing to an anticlinal. The Verreaux chain forms an abrupt escarpment to the West, the beds dipping gently to the East. Jnrassic and Cretaceous strata form this ridge.

The author then turns his attention to the palæontology of the beds, which include the Triassic, Rhætic, Liassic, Oolitic, Neocomian, Cretaceous, and Tertiary strata.

REVIEWS.

I.—The Phosphate Rocks of South Carolina and the "Great Carolina Marl Bed." By F. S. Holmes. pp. 87. (London: Trübner & Co., 1870.)

THE object of this pamphlet is to give a popular and scientific view of the origin and geological position of the Phosphate rocks, to point out their chemical and agricultural value, and to record the history of their discovery and development.

The "Great Carolina Marl Bed" is regarded as of Eocene age. It is extensively developed on the Ashley and Cooper Rivers, where

[1] Etudes sur la Géologie des Alpes. Par Ernest Favre. I. Le Massif du Moléson et les Montagnes environnantes dans le Canton de Freibourg. 8vo. pp. 48. Geneva et Basle, 1870. Tiré des Archives des Sciences de la Bibliothèque Universelle, tome xxxix.