

of black marble in a bedded state converted into rotten-stone. He believed, however, that a similar cause, operating over a wide area, and during a long period, had produced the altered condition of the firestone.—Prof. Johnston then alluded to the nodules of phosphate of lime in the greensand and crag, and suggested that the phosphorus had been derived from animal remains in higher strata, dissolved out by acids, and redeposited at a lower level. The last example was the *fire-clay* of the coal measures, a stratum almost universally found beneath beds of coal. It differs from the other clays both in colour and composition, being whiter, and containing less of those substances which acid bodies could dissolve, viz., the earthy bases, which would render the clay fusible in fire; the condition of the fire-clay might be accounted for by the action of acids developed during the production of the vegetable matter now forming coal.

The MAYOR OF HULL stated that better rotten-stone was obtained from the Vale of Neath, near Swansea, where coal-measure limestone also occurred; it had also been found in Sligo. Rotten-stone was worth 12*l.* a ton, and he would support any attempt to produce it artificially. To constitute a good article it must be free from grit.—Prof. SEDGWICK stated that geological rotten-stone, unfit for use, was common, and afforded a good illustration of the action described by Prof. Johnston. He recommended that it should be sought for beneath the "dirt-bed" of the Isle of Portland, and wherever ancient deposits of vegetable soil occurred. Fire-clays were not always found under beds of coal; they were absent from many, probably from all, that had been formed of drifted materials carried out to sea.

'On the most Remarkable Cases of Unconformity among the Strata of Yorkshire,' by Prof. PHILLIPS.

'On the Dispersion of Erratic Rocks at higher Levels than their Parent Rock in Yorkshire,' by Prof. PHILLIPS.—The Professor stated that in a comparatively modern geological period, every part of Yorkshire below the level of 1,500 feet, was covered by the waters of a glacial sea. Icebergs appear to have floated over the whole of this district, depositing where they melted or overturned, the materials brought from the higher hills. Amongst these were blocks of stone from Cumberland and the West Riding, now found perched on the limestone hills. Some of them must have come over the Pass of Stainmoor, a height of 1,440 feet; others, on the Feizer, occupied a position rather higher than any at which the parent rock occurred. At Ribbles, there were large blocks near the summit, 150 or 200 feet above the level of the rock from which they were derived. At Long Scar, blocks of limestone lay on the hills *over* their source. These erratic blocks were not much water-worn, and must have been transported by ice, no violent rush of water would have accomplished it. He believed the glacial movement to have been one of Continental elevation and depression, occupying a long period of time.

Mr. J. SMITH referred to the presence of Arctic shells in the basin of the Clyde, still occupying the natural position in which they lived and died, and owing their preservation to the overlying boulder clay; here were proofs both of the glacial climate, and the depression of the sea-bed to a great depth, by which the shallow water and littoral shells were buried beneath an Arctic drift.—Prof. SEDGWICK stated that the depression of large regions beneath the sea might produce great changes of climate, and he believed these movements might be explained by existing causes, but not operating at their present speed. He did not think that the elevation of the Eastern Alps, within the period of the existing races of animals, was produced by movements like those now taking place on the coasts of Sweden and South America.

'On a new Plesiosaurus in the York Museum,' by Prof. PHILLIPS.—It was a curious circumstance that each of the three great Plesiosaurs lately discovered in Yorkshire belonged to distinct and undescribed species. One of these, described by Mr. Charlesworth at a former meeting, was now in the possession of Sir P. Crampton, in Ireland; the other two were in the York Museum. One of them was 18 feet long, and had a very small head; the

other was equal in size to the largest Plesiosaurus of the Kimmeridge Clay. Its head is 42 inches long, and much narrower in proportion than in the other species; the neck is much shorter, being only half as long, in proportion, as in the *P. dolichodeirus*. The paddles are five feet in length. The vertebrae are like those of the other species; the teeth slightly different. It was found in Lord Zetland's works, at Lofthouse, on the Yorkshire coast.

'On a singular Fault in the Southern Termination of the Warwickshire Coal-field,' by Mr. TWAMLEY.—This narrow coal-field is described as extending from Polesworth, near Tamworth, to Sow, three miles east of Coventry. At the Victoria Colliery, near Bedworth, the coal-seams lie nearly together, with very thin partings, and measure from 8 to 10 yards. At Polesworth the seams are widely separated, forming, with the interposed strata, a thickness of more than 70 yards. The fault described is in the Victoria Colliery; the coal lies at the depth of 225 yards, dipping S.W. 12 inches in the yard. In driving a gate-road south-erly a fault occurred, the coal-seams being cut off in succession by an upthrow to the south of rocky shale. The road was continued on a level for about 120 yards, when the coal-seams were again met with, in the same order in which they disappeared, and having nearly the same dip—viz., 20 inches in the yard. The interval in the ironstone band at the top of the coal was 180 yards; in the bottom coal 120 yards. The level at which the coal reappears is 22 yards higher than it would have been but for the fault. A headway was driven 60 yards, and a shaft sunk 40 yards in the shale, without finding a trace of coal. The fault has an irregular N.W. and S.E. course, at right angles to the dip of the beds.

TUESDAY.

'On the Production of Gold in the British Isles,' by J. CALVERT.—We have already reported the substance of this paper as read on Thursday in Section E.

'Some Observations on the Interior of the Australian Continent,' by J. CALVERT.—The writer stated his belief that as there was a great range of hills on the eastern side of Australia, there must also be another great granitic range on the N.W. He had made an expedition into the interior, which he had ascertained to consist of great salt plains considerably depressed below the level of the sea. In the S.E. of Australia he had observed two sets of boulders: one series, derived from distant snowy ranges, consisted of hard masses of granite, with scratched surfaces, were dispersed over the plains to the south-east; the other set consisted of masses, not transported, but bouldered by the action of the weather, which caused large hemispherical layers to shell off, some of them capable of holding water.

'On the curious Spiral Body in certain Fossil Sponges, and a notice of several remarkable Fossils from the Yorkshire Strata,' by Mr. CHARLESWORTH.—Mr. Charlesworth exhibited a diagram of a specimen of *Choanites Königi*, described by Mr. Cunningham at a former meeting of the British Association, (and reported in the *Athenæum*); and stated that he had formerly doubted the correctness of Mr. Cunningham's account, but now agreed with him that the spiral body was an essential part of the sponge. The remarkable fossils were an *Inoceramus* from the chalk, and a coprolitic-looking substance from the lias.

Mr. H. E. STRICKLAND exhibited a recent British sponge, which commonly exhibits a spiral cavity, but from a totally different cause. The sponge grows on a spiral shell inhabited by the hermit-crab, and continues to enlarge much beyond the shell; the crab also grows, and having a tendency to develope obliquely, produces a spiral cavity in the sponge.

'On the Formation of Boulders,' by the Rev. T. RANKIN.—The writer's observations were made in some of the valleys on the Scotch borders, with the view to disprove Mr. Hopkins's theory, and to explain the phenomena of the boulder formation by the general Deluge, and subsequent river-action.

'On Pseudomorphous Crystals in New Red Sandstone,' by H. E. STRICKLAND.—These pseudocrystals were cubical projections from the under surfaces of laminae of white sandstone, of the age

of the red marls, and had been detected at various localities in Gloucestershire, Nottinghamshire, and Cheshire. They might have been formed in cavities left by the decomposition of iron pyrites, or by the removal of crystals of common salt. That the latter was really the case seemed evident from some of the specimens, in which the faces of the cubes were concave, and exhibited concentric lines. The author inferred that the crystals of salt were formed on, or in, the mud of the shore, during a temporary exposure to the sun, and being again covered by the sea, the crystals had dissolved, and their form assumed by the material of the next succeeding deposit.

MONDAY.

SECTION D.—ZOOLOGY AND BOTANY, INCLUDING PHYSIOLOGY.

'On a curious Exemplification of Instinct in Birds,' by the Rev. F. F. STATHAM.—The author commenced by stating that his communication partook more of the nature of an anecdote than of any elaborate disquisition,—but that he apprehended that a great portion of the science of Natural History consisted in the careful collation of such anecdotes, with the inferences to which they naturally led. He made some references to the theory of the facial angle, as indicative of the amount of sagacity observable in the animal race,—but expressed his conviction that this theory was utterly at fault in the case of birds: many of those having a very acute facial angle being considerably more intelligent than others having scarcely any facial angle at all. Size also seemed to present another anomaly between the two races of beasts and birds—for while the elephant and the horse were among the most distinguished of quadrupeds for sagacity and instinct, the larger birds seemed scarcely comparable to the smaller ones in the possession of these attributes. The writer instanced this by comparing the ostrich and the goose with the wren, the robin, the canary, the pigeon, and the crow; and made some amusing allusions to the holding of parliaments or convocations by birds of the last species, while the ostrich is characterized in Scripture as the type of folly. The author then proceeded to describe in detail the particular case of instinct which formed the burden of his paper. It referred to the poisoning of two young black-birds by the parent birds when they found that they could neither liberate them nor permanently share their captivity. The two fledgelings had been taken from a blackbird's nest in the garden of S. Swonnell, Esq., of Surrey Square, London, and had been placed in a room overlooking the garden, in a wicker cage. For some time the old birds attended to their wants, visited them regularly, and fed them with appropriate food; but at last, getting wearied of the task, or despairing of effecting their liberation, they appeared to have poisoned them. They were both found suddenly dead one morning shortly after having been seen in good health; and on opening their bodies, a small leaf—supposed to be that of *Solanum nigrum*—was found in the stomach of each. The old birds immediately deserted the spot, as though aware of the nefarious deed befitting their name.

The reading of this paper led to the notice of several instances of instinct amongst animals.—Dr. HORNER stated that rooks built in the Infirmary trees at Hull, but never over the street. One year a young couple ventured to build over the street, and for eight mornings in succession the older rooks proceeded to destroy the nest, when at last the young ones chose a more fitting place.—Mr. A. STRICKLAND, after referring to the tendency of birds to build their nests of materials of a colour resembling that around their nests, related an instance in which the fly-catcher had built in a red-brick wall, and used for the nest mahogany shavings. He also referred to the meetings of rooks for judicial purposes. He had once seen a rook tried in this way, and ultimately killed by the rest.—Dr. REDFERN drew attention to the distinction to be made between instinct, intelligence, and reason. Instinctive actions were dependent on the nerves, intelligence on the brain, but that which constituted the peculiar qualities of the mind of man had no material organ.—Mr. ALLIS stated,