the surface is visibly sinking; the docks have already gone down about ten feet, and the bridge over the river Weaver has again to be raised. In the intermediate parts of the valley the whole surface is being submerged, forming a mere called "The Flashes," and, as the navigation follows the valley, "it is evident," says Mr. Dickinson, "from the surface level being at a considerably less elevation above sea level than the thickness of rock-salt underneath, the subsidence now so actively begun at Northwich and Winsford may end in the whole of this portion of Cheshire being submerged." That this danger is a serious one may be inferred from the fact that the thickness of the salt deposit at Northwich is 180, and at Winsford 210 feet; whilst the elevation of the surface at the former place is only 20 feet, and at the latter place about 40 feet above the sea level; but it is hard to say what measures can be taken to avert what would be a national calamity.

Mr. Dickinson refers to the probability that the contortions observed in strata overlying the saliferous rocks in places where salt is not now known to exist, may be due to the former presence of that mineral, and its having been dissolved and carried away—as, for instance, near Nottingham, in the Lias quarries at Newbold near Rugby, and other places; and he remarks that, although it would be premature to affirm that rock-salt has existed along the entire range of the red marls from Rugby to the Cleveland district in Yorkshire, it is possible that this has been the case, and that many of the landslips which have occurred upon that range may have been due to its removal.[1] J. M.

NOTICES OF MEMOIRS.

I.—The Sub-Wealden Exploration.

THE boring to prove the Palæozoic rocks of Sussex, which was commenced in 1872, is now being carried on with great vigour. The adoption of the Diamond method of boring has proved a great success. Mr. Henry Willett, in his Sixth Quarterly Report, dated March 28th, states that a total depth of 671 feet has been reached. The drill, called the "Crown," is a ring of soft steel 3½ inches in diameter, and has 15 diamonds set in it round its lower edge. It revolves at a speed varying from 150 turns a minute in soft strata, to 300 in hard rock. Water is pumped down the centre, and rising at the sides, conveys the débris in suspension to the surface. The diamonds are not brilliant, and have no cleavage planes; they come from Brazil, and are called "Carbonado." The cores brought up are sometimes six or seven feet long in one piece, and form a beautiful section of all the strata passed through. The fact that delicate shells are found lying at right angles to the axis of the bore, is an indisputable proof that the beds are horizontal.

[1] As bearing upon this subject, we would refer to a paper by the Rev. J. S. Tute "On Certain Natural Pits in the Neighbourhood of Ripon," Geol. Mag. 1868, Vol. V. p. 178.—Edit. Geol. Mag.

The following strata have been penetrated :—

	feet	in.
Shales	17	0
Blue limestone	2	0
Shale	5	0
Blue limestone	2	0
Shale	4	0
Limestone	1	0
Shale	4	0
Limestone	3	0
Shale	4	0
Limestone	4	0
Blue shale	16	0
Grey shale	3	0
Hard shale	14	0
Shale with crystals of carbonate of lime	9	6
Grey shale	1	0
Greenish shales with vein of gypsum	20	0
Impure gypsum	9	0
Pure gypsum	4	0
Impure gypsum	8	0
Pure gypsum	3	0
Dark gypsum, impure... ...	13	0
Blue shale	3	0
Gypsum in nodules and veins	13	3
Gypsum marl	8	0
Black sulphurous marl ...	1	0
Greenish sand, with nodules of chert	21	0
Sandy shale, with nodules of chert	38	0
Carbonate of lime veins ...	2	0
Hard sulphurous black shale	12	0
Soft sulphurous black shale	7	0
Hard shale with chert... ...	12	0
Black shale	2	0
Very sulphurous black shale	12	0
Paler shade with gypsum veins	4	0
Dark shale	2	0
Grey shale "Kimmeridge Clay," very fossiliferous ...	378	0

Mr. J. H. Peyton considers that the first 180 feet represent the Purbeck beds, and the next 110 feet the Portland beds.

Mr. W. Topley, of the Geological Survey of England and Wales, who has carefully examined the cores between the depths of 376 feet and 656 feet, says :—

"We cannot be quite certain at what exact depth in the boring the Kimmeridge Clay began, but it was probably at about 290 feet from the surface; this would give 86 feet below the top of the Kimmeridge Clay as the point at which the detailed examination commenced. In the higher part of the Kimmeridge Clay the following fossils had already been noted (by Prof. Phillips, Mr. Willett, and Mr. Peyton) :—

Discina (Patella) latissima.	*Pecten.*
Lingula ovalis	*Ostrea.*
Modiola.	*Lima* (?).

"The Kimmeridge Clay, as yet met with, presents but few variations in character. It is nearly all a very dark grey or blackish clay, generally rather sandy and calcareous. Some specimens, which were preserved from about 330 to 350 feet from the surface, are rather hard, and show no tendency to split up. Those from about 380 feet, downwards for about the next 100 feet, can only be preserved with great difficulty; the clay is soft, and the cores split up into numerous laminæ, generally breaking at the places where fossils are preserved. Fossils are very numerous in this part, and it is, perhaps, partly owing to this that the cores break up so readily; in the higher and lower parts, where fossils are generally much less abundant, the cores do not so easily break.

"At 500 feet from the surface (and for a few feet below) the cores are hard, and break with a slightly conchoidal fracture; this is again the case at 640 and 650 feet. But the only important deviation from the usual clayey character of the bed is a hard, tough, rather sandy,

and calcareous stratum, of a light grey colour, which occurs at from 600 to 602 feet. This, when slightly warmed or struck, smells very strongly of petroleum. At 604 feet there is again about 6 inches of hard clay with similar characters.

"Slight indications of petroleum have been noticed all through the Kimmeridge Clay, but they become more distinct at about 160 feet from the top of the clay (or about 450 feet from the surface); all below that depth is more or less impregnated with petroleum, it being particularly abundant at the following depths (from surface) —600, 604, 617, 622, and 651 feet. Fossils are scarce, or absent, in those parts of the clay which are richest in petroleum.

"Occasionally there have been veins of carbonate of lime crossing the core obliquely; these were especially abundant at 480 and 549 feet. The core readily breaks along these oblique lines. Some of the strings of carbonate of lime are scarcely visible to the eye; at first it appears as though the beds in these parts were dipping at considerable angles, and that the cores break along the lines of bedding. But this is not the case; all the beds yet passed through are horizontal.

"A list of the fossils hitherto observed is given below. Mr. R. Etheridge, F.R.S., has kindly looked over some specimens about which I felt doubtful; the list of generic names here given may, therefore, be taken as correct. When more specimens have been collected, and time allows, we shall, no doubt, be able to add the specific names to many. We seldom, however, obtain perfect shells, and very frequently the part missing is just that part which is required in order to determine the species.

"It has not yet been possible to make out any distinctive zones of life, correlating the Kimmeridge Clay of the boring with that known elsewhere. Even when all the cores are thoroughly examined, and every species fully tabulated, this will be at best a very uncertain task, for it is never safe to infer the *absence* of any fossil, at certain horizons, from an examination of a vertical section only two inches in diameter.

"The comparative abundance or scarcity of certain shells is, however, worth recording. *Trigonia* and *Alaria* are exceedingly rare; *Ammonites biplex* is tolerably abundant all through; *Cardium* also occurs all through, but most commonly in the higher part; *Modiola pectinata* occurs all through the clay, but in the upper part the shells are small, and it is only in the lower part that full-sized specimens have been obtained; the same remarks apply to *Lingula ovalis*.

"The horny shells of *Discina* and *Lingula* are well preserved; and so, too, are the shells of *Ostrea*, *Pecten*, and *Belemnite*. The shells of *Ammonites*, *Modiola*, *Cardium*, and *Astarte*, are generally less perfectly preserved; whilst *Arca*, and some others, occur only as impressions, but all the markings are plainly visible.

"In the following list it will be seen that *Gryphea virgula*, the shell so especially characteristic of the Kimmeridge Clay, is absent. Although this shell has been carefully searched for, not one specimen

has yet been observed. In the Bas Boulonnais *Gryphea virgula*, whilst occurring all through the Kimmeridge Clay, is especially abundant in the lower part. The absence of this in the boring, whilst other shells are so remarkably abundant, might lead us to fear that there is yet a good deal of Kimmeridge Clay to come. On the other hand, it should be remembered that at Weymouth, as Mr. Bristow informs me, it is the lower part of the Kimmeridge Clay which yields the most petroleum; and as we are now well down in the oil-bearing beds, we may hope that the base of the clay is not far off.

"List of Fossils from the Kimmeridge Clay of the Sub-Wealden Boring:—

Discina (*Patella*) *latissima*.
Lingula ovalis.

Arca.
Astarte Hartwellensis.
A. aliena, Phil.
Cardium striatulum, Sow.
C. ? sp.
Exogyra nana, Sow.
Lucina (? young forms of *L. Portlandica*).
Modiola.
Myacites.
Ostrea deltoidea (?), Sow.
Ostrea ? sp.
Pecten arcuatus, Sow.
P. (a form with coarse ribs).
Thracia depressa, Sow.
Trigonia.

Alaria.

Ammonites biplex, Sow.
Belemnite.

Hybodus (tooth).
Fragments of fish bones.

"W. Topley."

According to Mr. Bristow, the Kimmeridge Clays, near Weymouth, have been ascertained, by actual cliff measurement, to be 530 feet thick. They are supposed to thin out towards the east, and at Netherfield will probably not exceed 400 feet, of which 360 feet have been already pierced. Mr. Willett states that during the last quarter, gypsum beds, which would probably never have been known but for this scientific enterprise, have been sought for and found at Archer's Wood, on the estate of the Earl of Ashburnham, who was the earliest patron and one of the most munificent donors to the Fund. A shaft for verifying and working the gypsum beds has also been commenced upon Mr. Egerton's estate, within a few yards of our shed, just across the stream. It is a matter of congratulation that by this discovery there has been developed for Sussex a new industry, which promises to be highly remunerative to all parties.

Mr. Topley speaks of the classification of those rocks formerly known as the Ashburnham beds, and which consisted of those clays which formed the cliffs of Fairlight. It was at one time very doubtful whether the Geological Survey should give this name to the strata in the interior of the country near Battle, and when the gypsum was discovered there, it decided them what to do, as they did not find gypsum in the Weald proper. They resolved to call the beds in the country near Battle the Purbeck beds, and to keep the strata on the coast about Hastings in the Wealden, and they now called them the Fairlight clays. H. B. W.

II.—On the Antiquity of Mining in the West of England.

By R. N. Worth, Esq.[1]

THE author said the inquiry into the antiquity of mining in the West of England naturally divided itself into three branches —the historical, the inferential, and the geological. The historical records of their own country showed that long before the date of the first existing Stannary Charter, that of John, A.D. 1201, tin mining in Cornwall and Devon was a settled and organized occupation. Greek and Latin writers about and before the Christian era made frequent reference to the existence of a trade from the East for tin with the Cassiterides, carried on by the Phœnicians. In proof of this, the writings of Diodorus Siculus, Strabo, and others were cited. The earliest direct evidence was that given by Herodotus, who, writing in the fourth century B.C., stated that tin was brought from the Cassiterides, but that he did not know where the Cassiterides were. It was clear, however, that under that name parts of Cornwall, if not Devon, were intended, and hence a definite recorded antiquity was given to the mining of the West of at least 2300 years. The use of metals by man clearly pre-supposes the existence of some kind of mining. Tin and copper were two of the oldest metals known, and were mentioned either by their separate names or under the title of bronze in the very oldest writings—in Homer, Hesiod, and in the Pentateuch, the 'brass' of which was really bronze. Prehistoric archæology gave a high antiquity to what was known as the Bronze Period, which in Switzerland had been considered to date back 4000 years. Mr. Worth was inclined to agree with the position of Sir John Lubbock, that the use of bronze in Europe originated with an Indo-European race, and could not accept the theory that bronze was first produced in the West of England by the smelting of mixed metal ores. Given the antiquity of the bronze age, the next point to be decided was, whence the tin used in its manufacture came. He held that so far as Europe was concerned, the balance of evidence—tin being a metal which occurred nowhere in Europe in large quantities save in the West of England—was overwhelmingly in favour of Cornwall and Devon. The examination of the third branch of the inquiry—the geological—was prefaced by an explanation of the different modes of occurrence of tin ore, in lodes or in detrital deposits; and the manner in which the one was wrought by mines and the other by streaming—the latter the oldest form of tin mining practised. The oldest streamers of which they had any knowledge had no other implements than a pick of wood or horn and a wooden shovel—many of which had been found in old workings. It was entirely due to the fact that streaming was the oldest method of raising tin ore that they were enabled to form any far-reaching conclusions as to its antiquity. There was not a valley on the South Coast of Cornwall—at all within the mining area—that had not been streamed again and again; but nowhere had the stream works been so extensive and important as at Pentuan and

[1] Being the substance of a lecture delivered on March 5th at the Plymouth Athenæum.

Carnon. In 1829 Mr. J. W. Colenso gave the Royal Cornwall Geological Society a description and section of the Happy Union stream work at Pentuan. Here, at a considerable depth under beds of gravel and silt, the result of both marine and fresh-water deposition, there were found the remains of an ancient forest growing upon and out of the stratum which contained the tin stones, the trunks of many of the trees being *in sitû*. This was thirty-four feet below the level of the sea at low water springs. A piece of wood shaped by man was found twelve feet above, and twenty feet above that again the bones of a whale of an extinct species, and human skulls. Higher up the valley, in Wheal Virgin stream-work, at a point where the tin ground was still below the level of the sea, it was found to have been worked. About the same time Mr. W. J. Henwood, F.R.S., communicated to the same Society a paper on the "Deposits of Stream Ore in Cornwall,"[1] which contained sections and descriptions, amongst others, of the stream-works at Carnon. The sections in the two valleys, though differing, presented the same general characteristics; and whereas at Pentuan human remains were found 40 feet below the surface—34 feet below high-water—at Carnon they were discovered at a depth of 58 feet—64 below high-water. And as at Pentuan traces of the "old men's workings" were found below the tide level, so at Carnon, at a depth of 40 feet, there were disinterred a wooden shovel and a deer-horn pick. Although a mound would have been required to prevent the influx of the tide in working this spot, no traces of such an erection were discovered. De la Beche held that the discoveries at Pentuan and Carnon proved that a considerable change had taken place in the relative levels of sea and land since man inhabited Cornwall. The mere fact of the occurrence of traces of human existence and industry at a certain depth in valley deposits did not of necessity imply any great antiquity. The special industries of Cornwall had caused large quantities of *débris* to wash down; but the deposits overlying the traces of ancient mining operations at Carnon and Pentuan, were, in Mr. Worth's opinion, indicative of a gradual formation. They were fluviatile, estuarine, marine, possibly lacustrine also; and to the geologist they indicated the lapse of considerable time, changes of level, and other alterations of condition. After contending that the remains to which he directed attention were clearly antecedent to the deposits, Mr. Worth said that in that case they were driven to one of two conclusions—either the ancient miners must have worked beneath the level of the sea, or whereas the tin bed was now beneath the sea-level, at the date of these operations it must have been above. The first supposition did not require examination. There were evidences of geologically recent and gradual changes of level all along the coasts of Devon and Cornwall in the raised beaches which were found 30 feet or so above the beaches now existing, and in the submerged forests so frequently discovered, which showed that since they flourished the land had sunk at least 70 feet. These

[2] See GEOL. MAG. April, 1874, p. 177. Also, Journ. Royal Inst. of Cornwall, Truro, No. xv. 1873.

grew immediately on the tin ground in Carnon and Pentuan, and during the forest epoch, therefore, the tin ground could have been worked at surface. Unless the premises were wholly incorrect, tin must have been an object of search in Cornwall when the now submerged portions of these ancient forests had not disappeared wholly beneath the waves. When was this? The positive evidence was small. The Mammoth existed during part of the forest period, but the submergence was so gradual that it was not absolutely needful to hold that there were miners contemporaneous with the Mammoth. But there was some valuable negative evidence in the fact that the level of England could be proved to have remained unaltered since the days of the Roman occupation. The fact, too, that St. Michael's Mount still answered to the description of the Iktis of Diodorus Siculus, was another proof that the subsidence of the forests and the accumulation of the bulk of the overlying deposits must have occurred long before. The general conclusions tended to show: that the historical evidence of the antiquity of Western mining carried it back at least 2,300 years; that the inferential evidence nearly, if not quite, doubled that period; that the geological evidence antedated its commencement to a time when the Mammoth either still existed or had not long disappeared, and when the general level of Cornwall and Devon was at least 20 to 30 feet higher than it was at present.

III.—Brief Abstracts—A. Mineralogy.

1.—On Pseudomorphs of Rock-salt from Westeregeln. Uber Steinsalz-Pseudomorphosen von Westeregeln. Von Herrn E. Weiss, in Berlin. *Zeitschrift d. Deutschen Geologischen Gesellschaft.* Band xxv. 1873, Heft 3, pp. 552–561.

TWO shafts sunk for working rock-salt near Westeregeln, N.W. of Stassfurt, in Prussian Saxony, have yielded the pseudomorphs described in this paper. A collection of specimens of the various rocks pierced by the shafts has been presented by Mr. Douglas, of Westeregeln, to the Mining Academy of Berlin, and it is on these specimens that the present communication is founded. The pseudomorphs are of two distinct kinds: the one a pseudomorph of rock-salt after rock-salt, the other of rock-salt after carnallite. A section of Shaft I. shows that the crystals were found chiefly in beds of saliferous clay at a depth of about 125 meters from the surface.

The pseudomorphs after rock-salt present the appearance of small white, yellow, or pale-red cubes, more or less distorted or elongated, and frequently with oblique angles, so as to resemble rhombohedra. However irregular the angles, the crystals may always be readily cleaved into laminæ in three rectangular directions, representing the ordinary cubic cleavage of rock-salt. The external surface of the pseudomorphs is formed by a very thin layer of quartz which remains behind, as a hollow shell, when the salt is removed by solution. The history of these pseudomorphs is thus interpreted by the author: the salt originally crystallized in the form of true cubes scattered through a matrix of soft clay; these crystals were then dissolved out, leaving cubic cavities which were afterwards distorted either by

displacement or by contraction of the surrounding clay; quartz was then deposited on the walls of the cavities, as a thin layer of crystals, having their apices directed inwards; and, finally, a solution of chloride of sodium was introduced into these drusy cavities, which thus became gradually filled by a second deposit of salt. There are reasons for supposing that in most cases the original cube of rock-salt was not completely removed, but that a fragment remained in the cavity, and served as a nucleus for the second deposition.

The pseudomorphs of rock-salt after carnallite occur chiefly in a bed of clay immediately below that which yields the other pseudomorphs, but in some cases the two kinds are associated in the same bed. The crystals present forms characteristic of carnallite, and are coloured red by the presence of ferric oxide.

The following analyses show the composition (I.) of the white pseudomorphs after rock-salt, and (II.) of the red pseudomorphs after carnallite. The salts were dissolved in water, with addition of a little nitric acid; the insoluble residue consisted chiefly of silica, with a small proportion of ferric oxide and alumina.

	I.	II.
Residue	16·92	4·24
Chloride of Sodium	63·71	90·35
Sulphate of Calcium [1]	8·97	1·46
,, Sodium	2·94	0·24
,, Magnesium	1·66	1·04
Ferric Oxide and Alumina	0·92	0·83
Loss (water)	4·88	1·84
	100·	100·

F. W. R.

BRIEF ABSTRACTS—B. GEOLOGY.

2.—TAYLOR, J. E. A Sketch of the Geology of Suffolk. From White's History, etc., of the County, pp. 13. Large 8vo. *Sheffield*, 1874.

An account of the literature of the subject is first given, and then the geological formations are described, in ascending order, beginning with the Chalk, the places where it crops out being noticed, and also the various depths at which it has been found in wells. The Reading Beds and London Clay follow next, and many sections are named. The "Box Stone Deposit" is then described; it underlies the Crag, and is characterized by containing many large flints, foreign boulders, and brown water-worn sandstone masses, which last often contain casts of shells, that are disclosed by a sharp blow; and it is now concluded that these stones are the remnants of a deposit older than the Coralline Crag, to which they were once thought to belong. The peculiar Suffolk formations, Coralline and Red Crags, with their chief sections, are noticed, and followed by accounts of the Norwich Crag, Chillesford clay and Forest-bed, a description of the sandy gravels and clays of the Lower and Upper Glacial Drifts and of the Post-Glacial beds concluding the essay. W. W.

[1] The sulphates are calculated as anhydrous salts.

3.—Kerr, C. M. An Excursion of Mr. Wilson's Geological Class to Mount Sorrell. *Rep. Rugby School Nat. Hist. Soc. for* 1873, pp. 7–9. [1874.]

The soil produced by the decomposition of the syenite was noticed to be thick, and there is also Glacial Drift. Some of the sections are briefly noticed. W. W.

4.—Wilson, J. M. The Rugby Drift. *Rep. Rugby School Nat. Hist. Soc. for* 1873, pp. 10–13. [1874.]

The cutting on the London and North-Western Railway between the Station and Clifton-road showed Drift over Lias, the former consisting, in ascending order, of a foot of clay full of chalk-pebbles; three to five feet of clay with little chalk; a sandier clay with pebbles of quartzite and of chalk; and at top sand and gravel. The author then enters into the question of the glacial origin of the beds, and the direction from which the materials must have come, and concludes that all the drift is the result of one process, while the land was sinking, the materials being derived at first from the neighbourhood, and then from greater distances. W. W.

5.—Mann, E. Geological Expedition to Atherstone and Nuneaton. *Rep. Rugby School Nat. Hist. Soc. for* 1873, pp. 19–22. [1874.]

Notices sections of Millstone Grit, with intruded greenstone. W. W.

6.—Oldham, Dr. Coal Fields of British India. *Rep. Rugby School Nat. Hist. Soc. for* 1873, pp. 45–54.

The lowest formation in India is gneiss, with trap-dykes of great length. This is succeeded by the schistose and quartzitic *Kuddapa* rocks, above which an unconformity occurs, and the overlying rocks have various local names. Above these comes the Vindhyan series (sandstones with limestones and clays), of great thickness and area, probably of "Old Red" age, and of freshwater or estuarine origin. There is then another unconformity, and the succeeding thick series of sandstones and shales is marked by the occurrence of terrestrial plants. The lowest part of this "plant-bearing series" is the Talcheer beds, consisting of fine silt with large blocks of rocks from distant localities, which have been transported by ice, as some show glacial polishing and scratching. To the Talcheer beds succeed the Damuda beds (10,000 feet thick), which contain all the productive coal, and consist of ironstone-shales, sandstones, and coals, the last varying up to thirty-five feet in thickness. Westward the coal-bearing rocks change in character, some divisions dying out, and the coal being concentrated in a few thick beds.

The coal-fields are in basins, largely owing to original limitations of deposit, and not merely to denudation. They are in groups related to the great drainage courses, which seem to have been marked out at the time of the deposit of the coal-bearing beds. All the coals consist of fine layers of vegetable matter and silt, and are less mineralized than most English coals; their age has been wrongly given as Oolitic and Carboniferous (plants being the only

fossils); but from the probable Triassic age of certain overlying beds, they may be partly Permian and partly Carboniferous.

W. W.

7.—Maxwell, L. Geological Section (Report of). *Rep. Rugby School Nat. Hist. Soc. for* 1873, pp. 64, 65 (Plate).

Three sections of "the Oolitic Drift at Brownsover" are given. The beds are gravel and sand, arranged in a sort of basin. Four other sections in gravel, sand, and clay (Bilton), are noticed. W. W.

8.—Anderson, J. On the Geological Formations of the County Down. *Proc. Belfast Nat. Hist. and Phil. Soc. for the Session* 1871–72, pp. 41–49. [1873.]

The author gives a general sketch of the geology of County Down. He points out that the Keuper and Bunter divisions of the Trias appear conformable. He disputes the identification of certain Permian rocks at Fortwilliam and Cultra, considering them to be of Carboniferous age. The Carboniferous and Silurian rocks are referred to, as likewise the igneous dykes, and some rocks supposed to be of Cambrian age. The mineral veins are briefly alluded to, and lastly the author points out some of the later changes in the physical geography of the district. H. B. W.

9.—Macpherson, J. Geological Sketch of the Province of Cadiz. 8vo. pp. 59. Cadiz, 1873.

The author first describes the physical geography of the district, and then points out the general features of the Secondary rocks. These form three distinct series, perfectly well defined by their respective faunas. The lower one is formed by strata which belong to the Liassic formation; in the second organic remains are found, which prove it to belong to the Upper Jurassic series; whilst in the third, beginning with the fauna of Stramberg, the strata terminate with true Neocomian deposits. Eocene, Miocene, Pliocene, and recent deposits are briefly described. Gypsiferous rocks form a broad belt, which traverses the entire province; the author hints at their possible Triassic age, but "is more inclined to consider these deposits as the result of a profound epigenesis which has taken place since the Miocene epoch." Salt and sulphur springs are numerous in the region, and there are some mud-volcanos in activity.

The work is accompanied by several plates of sections, which the author describes, pointing out the nature of the disturbances which have taken place; and indeed the structure of the country as displayed in these sections is one of numerous undulations.

A geological and an isometrical map accompany the paper, and it is interesting to compare the two: there is hardly any connexion between the geological boundaries and the contour-lines, owing to the great disturbances that have taken place, and the vast denudations that have succeeded them. H. B. W.

10.—Young, R. Some Remarks on the Recent Changes of Coast Level at Ballyholme Bay, Co. Down. *Proc. Belfast Nat. Hist. and Phil. Soc. for the Session* 1871–72, pp. 39–40. [1873.]

A section of the Post-Tertiary beds exhibited at Ballyholme Bay is described. These comprise, first, Boulder-clay, which rests

on the Lower Silurian slates; for a short distance it occupies a horizontal position, and then sinks gradually below the beach. Above the Boulder-clay, and resting conformably upon it, is a bed of dark sandy mud, which likewise dips under the beach. At low water, and when a storm has removed the loose shingle, portions of trees, mostly of the alder and willow, are to be seen imbedded in the upper surface of the mud. The author considers that there must have been a greater elevation of the land at the time when the trees were growing, to the extent of at least eight feet above the present level, and that subsequently a subsidence to the extent of at least thirty feet took place, and again an elevation to the level at the present time. H. B. W.

BRIEF ABSTRACTS—C. PALÆONTOLOGY.

11.—WINKLER, Dr., Mémoire sur des Dents des Poissons de Terrain Bruxellien. In the *Archives du Musée Teyler*, vol. 3, part 4, 1873.

Dr. Winkler gives a list of 44 species of fish teeth belonging to the Sharks and Rays, from the Terrain Bruxellien (Middle Eocene) of Belgium, of which five are new and fully described in his memoir, viz.: *Corax fissuratus*, *Galeocerdo recticonus*, *Otodus minutissimus*, *Lamna gracilis*, and *Plicodus Thielensis*, the latter being a new genus belonging to the Cestracionts, and closely related to the genus *Orodus* from the Carboniferous Limestone of Bristol, but of which no intermediate or similar form has been found in the long series of intervening strata. J. M.

12.—MACLOSKIE, Rev. Dr. G. The Silicified Wood of Lough Neagh, with Notes on the Structure of Coniferous Wood. *Proc. Belfast Nat. Hist. and Phil. Soc. for the Session* 1871–72, pp. 51–65. [1874.]

The silicified wood is found in the drift deposits at Sandy Bay and other places inland, on the eastern and northern borders of the Lough; it is only found on the beach on the western side of the water. In certain places near Sandy Bay the silicified wood has been found in connexion with lignites, but it is not co-extensive with them, nor does it, like them, occur intercalated between the masses of trap rock. The author considers that there is an intimate connexion between the silicified wood and the lignites of Antrim, and that the former is probably a representation of Miocene vegetation.

The original wood was coniferous, of the type *Cupressoxylon*, and may have been of the genus *Sequoia*, but this is uncertain. The process of silicification was, in Dr. Macloskie's opinion, probably due to cold water holding silica in solution; a rapidly running river containing silica in solution, and having logs of trees in its channel, would, he thought, afford favourable conditions for the production of silicified wood. In conclusion he pictures the conditions under which these remarkable fossils may have been deposited in the positions in which they now occur. H. B. W.