Berlin Academy, as the English specimens. Studied in the same manner as the latter, these French forms appear to us to belong to the following species and notable varieties:—

Lagena globosa, Montagu.
Nodosaria ovicula, D'Orb.
Bolivina punctata, D'Orb.
Virgulina squamosa, D'Orb.
——— *Schreibersii*, D'Orb.
Textilaria striata, Ehr.
——— *gibbosa*, D'Orb.
——— *aculeata*, Ehr.
——— *sagittula*, Defrance.
——— *agglutinans*, D'Orb.
Heterostomella aculeata, Ehr. sp.
Verneuilina pygmœa, Egger.
Polymorphina Thouini, D'Orb.
Sphæroidina bulloides, D'Orb. sp.
Cristellaria cultrata, Montf. sp.
Globigerina cretacea, D'Orb.
Planorbulina ammonoides, Rss. sp.
Planorbulina fareta, F. & M. sp.; small varieties.
Pulvinulina truncatulinoides, D'Orb. sp.
——— *Micheliniana*, D'Orb. sp.

(See above, page 510.)

These may be with advantage compared with the Foraminifera from the Chalk near Paris, described and figured by Alcide D'Orbigny, in 1840, "Mém. Soc. Géol. France," vol. iv., part 1, pl. 1–4. We must, however, premise that, to bring all to the same terms of comparison, some of the generic terms used for these Foraminifera in 1840 have now to be altered, thus:—

Rotalina Voltziana = *Planorbulina*.
——— *Micheliniana* = *Pulvinulina*.
——— *umbilicata* = *Rotalia*.
——— *crassa* } = *Pulvinulina*.
——— *Cordieriana* }
Rosalina Lorneiana } = *Planorbulina*.
——— *Clementiana* }
Uvigerina tricarinata = *Tritaxia* (near *Verneuilina*).
Pyrulina acuminata = *Polymorphina*.
Sagrina rugosa = *Heterostomella*.

A full list of D'Orbigny's species from the Chalk is given in Mr. Weaver's Appendix to his Abstract of Ehrenberg's Memoirs, Ann. Nat. Hist., vii., p. 395, etc.; together with notes on their localities and distribution in France, England, and elsewhere.

Lastly, we must not lose sight of the fact that the specimens figured in the "Mikrogeologie" are for the most part very minute, such as lie among the finer débris of washed Chalk; whilst those treated of by D'Orbigny were larger individuals picked out by means of hand-lenses from the coarser dust of the disintegrated material. The great difference of size, however, among individual Foraminifera carries but little weight in the determination of species; for the conditions, not only of growth, but of feeding-ground, depth of water, and climate affect them so greatly, that a form which may be gigantic in one *habitat*, will be arrested or dwarfed in another, retaining all the essential characteristics of shape and structure which are required for its specific identification.

NOTICES OF MEMOIRS.

On the Geology of the Kingsclere Valley.

A Lecture addressed to Newbury District Field Club, during an Excursion, on September 19, 1871.

PROFESSOR RUPERT JONES, who took his stand on the northern edge of Ladel Hill, from which an extensive view of the country was obtained, proceeded to deliver a lecture "On the

Geology of the Kingsclere Valley," with various illustrative maps and diagrams placed around him on the sward. He prefaced his observations with an apology for having to deal with such a large subject in so limited a time, and for the difficulty of treating in a popular way such complicated geological facts as were concerned in the origin and history of the beautiful valley lying at the feet of his audience. He would take for granted that all present were acquainted to some extent with geology; that they knew that chalk is not always what it seems; that it is made up of innumerable microscopic shells, and is subject to change; that the valleys were due to causes of which even geologists had not in all cases a very clear idea; that the hills were not masses of earth or stone placed, as it were artificially, upon a given horizontal surface, but were intimately connected with the internal structure of the earth, and that their constituent strata could be traced out as massive stony sheets or layers, stretching away, not only through Berks and Hants, but through England and Europe, and other parts of the world. The hills and valleys spread out before them were not created as such. There was a time when this valley did not exist, but its place was occupied by a great solid arching of the Chalk and other strata, continued on all sides as a vast plateau, gradually rising from the sea. The broken upper courses of this great arch, or elliptical dome, two miles by six in its chief diameters, were washed away, together with the softer materials, by sea and rain; and the broad undulating hollows and sloping sides were left that now form the Kingsclere "valley of elevation," so well described by Buckland many years ago. It is of a long triangular shape, pinched in at the sides; and it constitutes what geologists term an "inlier" of some of the strata below the Chalk. The containing hills, or scarped edges of the broken Chalk, stand high up above the floor of the valley, because of their relative hardness. Their white calcareous substance, though soft as a rock, is homogeneous and tough, especially in their lower tiers or courses, where the greyish Chalk-marl (or Malm-rock) is tougher still, and projects around the valley as low, smooth, rounded hills and level benches, too tough for the natural growth of trees, but yielding rich crops to the plough and harrow. Of this formation, Beacon Hill (just visited by the Field Club) is a part, where the more forcible curvature of the strata, in the chief focus of elevation, raised this Lower Chalk higher than elsewhere. The central portion of the valley is made up of a different substance, which is called the "Greensand," or "Upper Greensand." It is a calcareous or chalky substance, with a considerable quantity of sand in its constitution. Some of this sand is green, being fragments and minute concretions of a mineral called glauconite. In Wiltshire the green sand predominates, hence these strata got the name of "Greensand." Here and there this rock is hardened into a "rag-stone" by the infiltration of silex; just as some of the Chalk is frequently changed into lumps of flint. The Greensand, being more friable than the Chalk or the Chalk-marl, and of unequal texture, has rotted away at the surface into a rich loam, bearing trees and copses, which still abound in the valley round about Burghclere and Sydmonton; and it well repays the farmer's toil.

Recurring to the evidences of the arching or dome-structure of strata over the area of the Kingsclere Valley, Professor Jones insisted on the importance of the evidences seen in chalk-pits and other excavations, where the sections show that the strata incline, or "dip" away north or south, or in other directions, as the case may be; and he referred to the value of stratification in elucidating the history of the earth's crust. The uprising and the washing away of twelve, twenty, or hundreds of square miles of upraised strata, even a thousand or more feet in thickness, has been of relatively common occurrence, when we look over the world geologically; for many such hollow areas, or "inliers," have been swept clean of the broken upper layers of an "anticlinal" fold of crumpled strata. Another such "valley of elevation" lies six miles to the north-west, along the Hampshire Hills, where Ham and Shalborne are built on similar "Greensand;" and still further west, the Vale of Pusey, of still larger dimensions, indicates the continuance of the line of elevation towards the Bristol area. On the south-west also a similar and parallel line of uplift has exposed the beds beneath the Chalk in the picturesque Vale of Wardour; and on the south-east, in the extensive and interesting Valley of the Wealden, including the Wealds of Kent, Surrey, and Sussex. The destruction of so much rocky material as that not only which, in the form of continuous strata, connected the side-hills of the valleys, but which also had once existed to a great height above the present surface of the plateaux, is a subject of serious geological thought. That the land was below the level of the sea, as a sea-bed, must be remembered; and, though once in a way the sea may have been accumulated to an extra height in this or that part of the world, yet, as a rule, the rising of the sea-beds from beneath the sea is owing to crumplings of the earth's crust, from contractions, as the layers in a great roll of cloth or linen, when crushed and folded by side pressure, rise up above the general level; and if such ridges of the crumpled cloth were pared down, as the curved strata have been by the waves and currents of the sea, the lower layers would be exposed, and, if soft, would be still more deeply worn away. Further, this destruction, or rather removal, of the upper beds, and the exposure of the lower by "denudation," would be continued, if not enhanced, by the action of snow, frost, ice, rain, and torrents, when the land rose higher and higher. Such work we see is going on around us, even on a common rainy day; and much more active are these agents of nature in the tropical and the arctic regions respectively. And there was a time not long ago geologically, though at least ten thousand years since, when an arctic climate was succeeded in these regions by a time of snow and rains, called the "Pluvial Period" by Mr. Alfred Tylor, to which the old broad valleys and gravel-beds of our rivers and many other features of this country bear witness.

Regarding the continuity of the Chalk with the other great strata,—it forms the country south of Ladel Hill to right and left, with a diminished thickness, compared with its original condition, and with the loss of all the once overlying Tertiary beds, as far as the confines

of the New Forest, where it dips below the Tertiary clays and sands there preserved; but it comes out again in the Isle of Wight, and passes on beyond the water-worn hollow (called the Channel) in its surface, to form a great portion of Northern France and other parts of Europe. On the northern edge of the Kingsclere valley the Chalk immediately dips at a high angle, leaving little more than its escarped edge to form the surface there, and continues in a wide thick sheet beneath the clays and sands that form the country drained by the Enborne, until it emerges at Newbury and elsewhere along the Kennet. Here it is masked by peat and gravel along the valley bottom, but to the north and west it is soon found to constitute the soil, except where "outliers," or remnants of the Tertiary strata, chiefly Woolwich beds and London Clay, form hills and spurs near the confluence of the Kennet and Lamborne. At Shaw brickfield, one mile north-east of Newbury, is seen the best exposed section of the Chalk, overlain by the Woolwich beds (with fossil oysters, leaves, etc.), and these surmounted by the lower portion of the London Clay. Here, however, these Tertiaries have suffered more loss by denudation than in the country south of Newbury, where broad patches of a still higher formation, the "Bagshot Sands," constitute the heaths and commons on the borders of Berks and Hants. These are based on the London Clay, which is exposed along the deep-cut valleys of the Enborne and its tributaries. This rests on the Woolwich beds, noted for their plastic clay, which crops out at their edge as a narrow riband along the northern foot of the Chalk hills of Hampshire, and as a broader and more irregular area on the Chalk of the Kennet valley.

The lecturer then alluded to the conditions of land and water existing when the Chalk was formed as a deep-sea deposit, mainly composed of innumerable microscopic shells, similar to such as still live in deep seas at great depths, and form white calcareous ooze. The different depths of this old sea, stretching east and west where now Europe and Asia exist, were filled with different materials, and hence the differences in Chalk beds and their equivalents in different countries. The succeeding changes that produced the fresh-water Woolwich beds, and the subsequent marine London Clay and Bagshot Sands, were alluded to; and these sands, seen on the Wash Common and elsewhere (as above mentioned), were noted as having been formed in shallow water, and continuous with and equivalent to other sea-deposits of deep-water origin. Thus these barren and here non-fossiliferous sands are of the same age, and were formed in the same sea, as the great Nummulitic limestone, which has not only supplied material for the Pyramids of Egypt, but forms natural buttresses to the Alps and Himalayas.

The consideration of the gravel-beds, coating many parts of the country, was not attempted for want of time; but the great features due to the crumpling of strata in course of the earth's contractions, and the effect of water as a denuding agent in making and modifying geographical contours, were specially treated of in the Professor's *résumé* of the facts and notions offered to his audience.

Dr. Stevens, of St. Mary Bourne, thought that a vote of thanks

was due to Professor Rupert Jones for his very full and interesting lecture. He wished further to say that when coursing in the Burghclere Valley, he had observed that there was very little flint drift, which was singular, considering the large amount of denudation the Chalk hills had undergone. This had also been noticed by Mr. Bristow, in the Memoir on Sheet 12 of the *Geological Survey Map*. Dr. Hills, of Basingstoke, intimated that there is a small exposure of the Gault near Burghclere.—[From the *Newbury Weekly News* of September 26, with corrections by T. R. J.]

REVIEWS.

I.—Transactions of the Royal Geological Society of Cornwall. Parts I. and II., Vol. VIII. Containing Observations on Metalliferous Deposits and Subterranean Temperatures. By William Jory Henwood, F.R.S., F.G.S., President of the Royal Polytechnic Institution of Cornwall. London, 1871. 8vo. Trübner & Co.

THE conditions under which mineral matter has filled fissures in the earth's crust, and thus formed veins or lodes, has long been the subject of observation and study among scientific men, and others who have been desirous of rendering the search for metallic ores more of a science, and less of a speculation, than has hitherto been the case. Careful and accurate observations, therefore, upon all the modes of occurrence of mineral or metalliferous matter, and of the apparent causes affecting their distribution in veins, is of the highest importance to a generalization of facts, and the consequent deduction of sound rules whereby the miner may in future be guided. Of such a character are the many contributions to this study which have appeared in the past volumes of the Transactions of the Royal Geological Society of Cornwall, a high place being accorded to those prepared by Mr. William Jory Henwood, who indeed appears to have devoted the whole of his time for many years past to this one subject, and, avoiding all theories and speculations, has been content to record what he has himself seen and noted. His works will form a foundation upon which the theorist can erect his edifice. Science, in all its branches, owes much to those who devote themselves to the hard practical work of accumulating and recording the minutest details of phenomena coming immediately under their own observation, and who concentrate the whole power of their intellect upon such work.

The present volume, like one of its predecessors, is occupied exclusively with a continuation of Mr. Henwood's observations on metalliferous deposits and subterranean temperatures, with the exception that in this volume he has extended his sphere of work and carried us to important mining districts in the North-west of India, North and South America, West Indies, the Continent of Europe, etc. In Cornwall and Devon, however, the conditions of the mineral deposits are so varied, that we have in that small