exported to Liverpool. It is not improbable that the Mountain-limestone range along the North-Welsh coast would display more of the 'pockets' similar to those at Nant-y-Gamer; and geological tourists, who may be passing through the district, would do well to examine it with the hope of detecting some organic remains, as until this evidence is afforded the true geological age of the deposit must be somewhat uncertain.

The curious hollows and cavernous openings resulting from the singular irregularity with which it disintegrates has preeminently rendered the Mountain-limestone a preserver of little remnants of later formations: most of the bone-caverns, with Pleistocene remains,—the little Tertiary outliers of Tipperary,—the rich Rhætic remains discovered by Mr. C. Moore near Frome, as well as the Nant-y-Gamer deposits, all owe their preservation to the existence of cavities of various forms and character in the Mountain-limestone, without which they must have succumbed to the process of denudation.

ABSTRACT OF FOREIGN MEMOIRS.

On the Occurrence of Freshwater Shells in the Permian Rocks of Thuringia.

By C. W. Gümbel, with Remarks by H. B. Geinitz. [Neues Jahrbuch, 1864, p. 646, &c.]

On the south-western margin of the Thüringer-Wald and the Fichtelgebirge occurs a zone of Rothliegende, here and there interrupted, with certain small coal-fields, as those of Erbendorf and Stockheim, in which Plants of Upper Carboniferous age have been found; and at Irmelsberg, near Crock, is a similar deposit, where a workable bed of coal also occurs. Last summer the author visited the last-named place, where a new shaft was being sunk, and was astonished to find a coal-bed which, by its position and the character of its fossil Plants, evidently belonged to the Rothliegende, the lowest member of the 'Permian' of Murchison, and of the 'Dyas' of Geinitz.

The Plants, some of which occurred in the roof and others in the floor of the coal-seam, were determined by Dr. Geinitz to be characteristic fossils of the Rothliegende; but a greater importance was attached to the deposit on the discovery, by Dr. Gümbel, of Freshwater Shells in the same overlying shale in which some of the Plants were found.

The lower plant-bearing stratum,—a fine-grained sandstone, overlying beds known to belong to the Rothliegende,—contains *Walchia piniformis*, Schl.; *Cyatheites confertus*, Sternb., sp.; *C. Candolleanus*, Brongn., and *Calamites gigas*, Brongn.: then follows the coal-bed itself, which has a thickness, at the outcrop, of from 1½ft. to 4ft., and is overlain by a black shale, 1 foot thick; next comes the upper plant-bearing stratum, which is a fossiliferous coal-shale, and contains, in an intercalated layer, Freshwater Shells and an *Estheria*,

https://doi.org/10.1017/S0016756800161825 Published online by Cambridge University Press

together with *Walchia piniformis*, Schl.; *Calamites gigas*, Brongn.; *Cyatheites confertus*, Sternb., sp.; *C. Candolleanus*, Brongn.; *C. arborescens*; *Odontopteris obtusiloba*, Naum.; *Odontopteris*, sp.; *Cyclocarpon Ottonis*, Gutb., and an *Annularia*.

The animal remains are stated by Dr. Gümbel to correspond, for the most part, with those described by Dr. Ludwig from the coal-bearing beds of Manebach, near Ilmenau; and, as the one deposit belongs to the Rothliegende, it follows, of course, that the other is Permian also. The species that have been determined with the greatest certainty are *Unio tellinarius*, Goldf.; *U. carbonarius*, Goldf.; *U. Thuringensis*, Ludw.; *U. Goldfussianus*, De Kon., and *Anodonta ovalis*, Mart. There is also a large form of *Unio* very much like *U. crassidens*, Ludw., and a new and very small species of *Anodonta*, to which the author gives the name of *A. phaseolina*: the latter is about the size of *A. obstipa*, which the author thinks may possibly be an *Estheria*; and it is very much like young individuals of *Unio Goldfussianus*.

The *Estheria*, named *E. rugosa* by Dr. Gümbel, approaches most nearly in form *E. tenella*, Jordan, and *E. exigua*, Eichw.; the ridges being most like those of *E. Middendorfi*, Jones, but not so regular. One remarkable fact in connection with this *Estheria* is that, whereas the shells of the associated species of *Unio* and *Anodonta* are for the most part replaced by iron-pyrites (or sometimes by zinc-blende, galena, or calcite), the shell of the *Estheria* itself has not been mineralized.

In the Appendix, Dr. Geinitz states that this interesting discovery of Dr. Gümbel's has induced him to examine independently the whole of the Freshwater Shells that have been found in the Coal-measures and in the Lower Dyas. With respect to those from near Crock, Dr. Geinitz has come to almost the same results as Dr. Gümbel; the chief points of difference being that the former considers that *Anodonta phaseolina*, Gümb., may perhaps be the young of *Unio Goldfussianus*, and that the shell referred by Dr. Gümbel to *Anodonta ovalis*, Martin, more probably belongs to *A. subparallela*, Portl., sp. Dr. Geinitz differs from Dr. Ludwig, however, in many important points; and he also thinks that the shell described by Mr. Salter as *Anthracomya carbonica* * is really a *Dreissena*.

H. M. J.

Geological Notes on Mentone, near Nice.

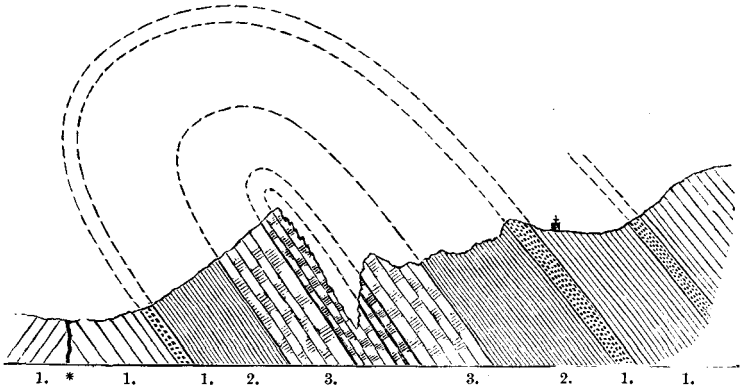
By C. H. Gaudin and Matthew Moggridge, F.G.S. 8vo. pp. 16; 1 Plate. Lausanne, 1865. (From the Bulletin Soc. Vaud. Sc. Nat., vol. viii. No. 52.)

Mentone is sheltered by an amphitheatre of calcareous hills, composed chiefly of Middle and Upper Cretaceous rocks: a portion of a Belemnite, and fragments of *Inoceramus Cuvieri*, and some Foraminifera, are all that have been discovered in them. The latter are *Textularia globulosa*, Ehr., *Nonionina globulosa*, Ehr.,

* The shell referred to by Dr. Geinitz was described and figured as *Anthracoptera carbonaria*, Quart Journ. Geol. Soc., vol. xix. p. 79, fig. 3.

https://doi.org/10.1017/S0016756800161825 Published online by Cambridge University Press

and *Lagena ovalis*, Kaufmann, which are common species in the White Chalk of England, and the 'Danian' of Seeven; but the latter two make their first appearance in the Gault. The limestones of the Nummulitic formation constitute the major part of the Eocene System that is seen in the neighbourhood of Mentone: they are charged with *Nummulites perforata*, D'Orb.; *N. Lucasana*, Defr.; *N. Brongniarti*, D'Arch. (?); *N. Ramondi*, Defr.; *N. Guettardi*, D'Arch.; *N. exponens*, Sow.; *N. granulosa*, D'Arch.; *N. mamillata*, D'Arch., and *N. spira*, De B. (?); and *Opercularia ammonea*, Leym., and *Turritella imbricataria*, Lamk. Grey clays of great thickness, surmounted by compact conglomerates, contain twenty-five species of fossils characteristic of the Upper Pliocene ('*Plaisancien*').



Inversion of Cretaceous upon Tertiary Strata near Mentone.

1. Nummulitic Beds (Tertiary). 2. Upper and Middle Cretaceous Beds.
3. Lower Cretaceous Beds. * Fault.

One of the chief points of interest in this pamphlet is that furnished by a part of the section in the plate accompanying the work, representing an inversion of the strata, namely, Cretaceous beds thrown over upon the Eocene.—R. T.

REVIEWS.

THE AMERICAN JOURNAL OF SCIENCE AND ARTS, conducted by Professors B. Silliman, B. Silliman, jun., and J. D. Dana, 2nd Ser. No. 113, Sept. 1864, is rich with geological information, as is usual with this well-known and valued periodical. Prof. E. W. Evans describes the action of Oil-wells in the coal-regions of South Ohio and Western Virginia, based on Prof. Andrews' hypothesis of many of the borings tapping either the bottom, middle, or the top of cavities occupied by gas, oil, or water, highly compressed. Mr. Sterry Hunt continues his 'Contributions to Lithology,' describing certain Dolerites (anorthic felspars with augite) and Diorites (anorthic fel-

https://doi.org/10.1017/S0016756800161825 Published online by Cambridge University Press