

NOTICES OF MEMOIRS.

I.—BEITRAG ZUR KENNTNISS PALÆOZOISCHER SEESTERNE. Von B. STÜRTZ, in Bonn. Palæontographica, Band xxxii. 1886. Mit 7 Tafeln.

A CONTRIBUTION TO THE KNOWLEDGE OF PALÆOZOIC STARFISHES. By B. STUERTZ, in Bonn. Palæontographica, vol. xxxii. pp. 75-98, pl. viii.-xiv.

FERD. ROEMER called attention¹ some years since to the echinodermal fauna occurring in the roofing slates of Bundenbach near Birkenfeld in Oldenburg, which belong to the horizon of the middle beds of the Rhenish Lower-Devonian. More particularly, Starfishes, including in the term the Asteroidea and Ophiuroidea, are abundant. The calcareous tests of these animals have been replaced by iron pyrites, and they are firmly imbedded in the hard slate in such a manner, that at the time when Roemer wrote, only the general outline of the animals could be discerned; but within the last year or two means have been found by which the slaty matrix can be entirely cleaned away, and the skeleton of the animal laid bare, so that the arrangement of the plates of the test, both on the ventral and dorsal surfaces, can be ascertained. The insight thus gained of the skeletal structure of these Devonian Starfishes has enabled Herr Stuertz to make a comparison between them and the more recent fossil and existing members of the group, and amongst other results of his work he has discovered true Ophiuroids, with a structure corresponding with that of living forms, which have not previously been known from Palæozoic strata. These were associated with the simpler Palæozoic Ophiuroids. There are also in these beds a number of true Asterids, associated with Encrinasters; and a representative of the existing genus *Astropecten*.

The single species of the *Ophiureæ veræ* belongs to the genus *Ophiurella*, Ag., and is named *O. primigenia*, St. In the group of the *Protophiureæ* are included Palæozoic Ophiuroids which possess corresponding ambulacral plates on the ventral side of the arms. The author agrees with Lütken in regarding these as doubled ventral shields, which cover the ambulacral system. In this group the author places the *Protaster Miltoni*, Salter, and *P. leptosoma*, Salter, and also a new genus, *Furcaster*, with a single species, *F. palæozoicus*, St.

Fresh observations have been made on the doubtful genus *Helianthaster*, Roemer, examples of which also occur in Devonshire as well as at Bundenbach, but they are still insufficient to determine its true position. The author regards it as an Ophiuroid Starfish with from 14-16 arms and a tolerably large disc.

The author gives the name Ophio-Encrinasteriæ to a group of forms which stand in near relationship to Ophiuroids, but possess peculiarities of structure which ally them to the Encrinasteridæ. In

¹ Palæontographica, Band ix. 1862.

addition to a new genus, *Bundenbachia*, this group also includes the genera *Tæniaster*, Billings, *Eugaster*, Hall, possibly also *Ptilonaster*, Hall, and *Protaster Forbesi*, Hall, with *Protaster Sedgwicki*, Forbes.

Under the *Asteriæ veræ*, or true Starfishes, are placed *Roemeraster asperula*, Roemer sp., *Astropecten Schlueteri*, St., *Palastropecten Zitteli*, St. n. gen. et sp., *Eoluidia Decheni*, St., n. gen. et sp., and *Protasteracanthion primus*, St. n. gen. et sp.

The following genera and species are placed in the group of the *Encrinasteriæ*: *Aspidosoma Tischbeinianum*, Roemer; *Loriolaster mirabilis*, St.; and *Palasteriscus devonicus*, St.

The species described are all figured in the accompanying plates and enlarged representations are given of their structural characters.

G. J. H.

II.—THE EOCENE STRATA OF THE KRAPPFELD, CARINTHIA. By K. A. PENECKE. Imper. Geol. Inst. Vienna, Meeting 17th November, 1885. Communicated by Count MARSCHALL, F.C.G.S.

ONLY small portions of the Eocenes, resting partly on Cretaceous rocks and partly on Palæozoic schists, have escaped denudation. In one of these patches, the succession (upwards) is—

1. Lower red clays, with gravelly beds and conglomerates. 2. *Modiola*-marls, with, for the most part, badly preserved remains; *Modiola*, sp. (compare *crenella*, Desh.), is the most frequent. 3. Two or three seams of bright coal, with bituminous shales, containing brackish-water shells as *Faunus combustus*, Brongn., *F. undosus*, Brongn., *Melanopsis*, sp., *Planorbis*, sp., and *Cytherea Lamberti*, Desh. 4. Gasteropod-marls; similar to the foregoing marls, and abounding with well-preserved shells, as *Turritella Fuchsi*, sp. nov., *Cerithium mutabile*, *C. Canavali*, sp. nov., *Natica perusta*, and *Ostrea Canavali*, sp. nov.; together with *Nummulites contortus*, Desh., *Serpula spirulæa*, *Modiola crenella*, *Cyrena Veronensis*, *Faunus combustus*, *F. undosus*, *Fusus longævus*, etc. 5. Nummulitic Marls. Here Gasteropods are gradually being superseded by Nummulites. The prevalent fossils are: *Orbitoides Fortisii*, *Operculina Karreri*, sp. nov., *Nummulites complanatus*, *N. perforatus*, *N. Lucasianus*, *N. contortus*, *N. exponens*, *Natica Vulcani*, and *Cerithium Canavali*. 6. Nummulitic Limestones gradually coming out of the uppermost horizon of No. 5. They contain many Echinids, Molluscs, etc., as *Alveolina longa*, *Nummulites complanatus*, *N. perforatus*, *N. contortus*, *Conoclypeus conoideus*, *Echinolampas* (comp. *Suessi*), *Pygorhynchus Mayeri*, *Linthia Heberti*, *Ostrea rarilamella*, *Velates Schmiedeliana*, *Ovula gigantea*, etc. 7. Variolarius-strata. Rather thin sands, and beds of compact sandstone, full of *Nummulites variolarius*.

Some of these beds, to a greater or less extent, are wanting, or are represented by other deposits, elsewhere in the Krappfeld. At one place some fine sands occur in the uppermost horizon of the Nummulitic Marls; and they contain good specimens of *Echinanthus tumidus*, Agass., *Linthia scarabæus*, Lbe., *L. Heberti*, Cott., and *Ottiliaster pusillus*, nov. gen. et sp. A comparison of the several sections proves the existence of two special horizons in the Krappfeld Eocenes: an

upper, marine, with abundance of Nummulites, and assuming a brackish character to the north, and a lower partly brackish horizon. The fauna throughout is Lower Eocene, and has several species in common with the fauna of Ronca, and presenting some analogy to the *Sables inférieurs* of the Paris Eocenes. This fauna numbers about 85 species,—among them are 6 *Nummulites*, 4 other *Foraminifera*, 11 *Echinida*, 2 *Serpulæ*, 1 *Terebratula*, 1 *Dentalium*, 25 Bivalves, 29 Gasteropods, and 1 *Nautilus*, besides remains of Fishes and Crustaceans. The new forms are—1. *Operculina Karreri*, with conspicuous transverse ribs. 2. *Ottiliaster pusillus*, new genus of the *Echinolampas* type, the anterior ambulacra having but one series of single pores; approaching *Eolampas*, Dunc. and Slad., from Sind, India. 3. *Ostrea Canavali*, Gryphæa-like, allied to *O. cymbiola*. 4. *Arca Rosthorni*, very small, with craticulate sculpture. 5. *Corbula semi-radiata*, somewhat like *Neæra radiata*, fore-part radiately ribbed. 6. *Turritella Fuchsi*, approaching *T. imbricata*, Lamk. 7. *Natica Ottiliæ*, a small and rather indifferent form, resembling *N. Woodi*. 8. *Cheilostoma Rosthorni*, like some species from the lowermost Belgian Eocenes. 9. *Melanopsis? Reineri*; the genus uncertain, most of the specimens being crushed. 10. *Cerithium Canavali*, very near to *C. lunatum*, Mstr. 11. *Nautilus Seelandi*, very broad and inflated. 12. *Myliobates Haueri*, near to *M. goniopleurus*, Agass.

III.—THE ROCK-SALT FORMATION OF WIELICZKA, GALICIA. By J. NIEZWIECKI. Imp. Geol. Instit. Vienna, Meeting 17th November, 1885. Communicated by Count MARSCHALL, F.C.G.S.

THE borings, undertaken in order to explore the supposed westward continuation of the Salt beds, gave the following results. An alluvial deposit, 1½ meter thick, covers a grey clay (partly a marl), with seams of micaceous sand, and boulders of compact marl. This clay continued to the depth of 204½ meters, and contained some few stalks and leaves of plants, with Foraminifera (*Globigerina*, *Poly-morphina*, and *Truncatulina*). This may be regarded as an eastward continuation of the sulphuriferous deposits of Swoszowice, which likewise has terrestrial plant-remains and marine shells. Coarser sand, or friable sandstone, with thin intercalations of clay, fibrous gypsum, and pieces of anhydrite, continues from 204½ to 210 meters depth. Between this and the present depth of the bore (227½ meters), saliferous clay, with scattered granular rock-salt, gypsum, and anhydrite, was pierced. Water drawn from this depth was highly saturated with salt.

IV.—GEOLOGICAL FORMATIONS IN AFGHANISTAN. By C. L. GRIESBACH, F.G.S. Imper. Geol. Inst. Vienna, Meeting 3rd November, 1885. Communicated by Count MARSCHALL, F.C.G.S.

1. Pliocene. Sandstones and loose sands, with great deposits of loess, and badly-preserved Mammalian remains. 2. Pliocene. Red and light-coloured clays, with beds of loess and gypsum. Nos. 1 and 2 may be equivalent to the Manchhar and Siwalik Formation

of India. 3. Miocene (and Eocene?). Thick deposits of green and red clays, with friable limestones, and salt-beds. Miocene fossils in the upper horizons. 4. Cretaceous. Inoceramus-beds, marls (mostly variegated), and limestones with Cretaceous fossils. Marine limestones abounding in organic remains. 5. Jurassic and Lias. Light-coloured sandstones and grit, with marine limestones, and plant-remains. 6. Triassic. "Red-grit Group;" an enormous assemblage of red sandstones, conglomerates, breccias, and volcanic tuffs, with intercalated eruptive rocks (mostly melaphyres), and several horizons of Brachiopod limestones. 7. Permian. Green and grey schists, sandstones and conglomerates, with "Boulder-beds," thin coal-seams and imperfect impressions of plants S.E. of Herat and in Khorassan, alternating with hard limestones, containing Brachiopods, Conchifera, and Fusulinæ. Nos. 5, 6, and 7 may possibly correspond to the Gondwana Formations of India. 8. Carboniferous (and Devonian?). Very thick, compact, grey limestones, with subordinate shales, containing *Fenestella*, *Productus semireticulatus*, *Athyris Royssyi*, etc., in the upper horizons. No. 8, answering to the Kulling strata of Cashmere, constitutes the lowermost horizon in the large folds of the Davendar, Doshatch, Bizd, and other mountain-chains.

V.—ATMOSPHERIC DUST. By Dr. M. SCHUSTER. Imper. Acad. Vienna, Meeting 14th January, 1886. Communicated by Count MARSCHALL, F.C.G.S.

THIS dust was collected at Klagenfurt in Carinthia, after a rain of muddy substance, which had taken place on the 14th October, 1885. The chief constituents of the dust are minute fragmentary crystalline granules and flakes of the following minerals:—quartz, opal, orthoclase, biotite, phlogopite, pyroxene, amphibole, light-coloured mica, talc, kaolin, chlorite, rutile, anastase, zircon, tourmaline, ferruginous clay, spinel, magnetite, pyrites, magnetic pyrites, calcite, magnesite, ferruginous dolomite, and apatite. The presence of metallic iron could not be ascertained. The microscope showed a prevalence of siliceous, silicified, and calcareous remains of organisms, especially of Diatomaceæ, either in single or in pairs, together with a few carbonaceous or carbonized substances, such as the spores of Fungi and such like, filaments of Algæ and other plants, silicified membranes of parenchymal cellules, and pyritized and silicified spherules, resembling pollen. This dust bears a great general resemblance to the atmospheric dusts described by Ehrenberg and Silvestri. The reddish-yellow colour, which it has in common with the "Passat" dust, may be an objection against its having come direct from the Sahara.

[Compare the results of Prof. Judd's examination of Nile mud, Proc. Roy. Soc. vol. xxxix. No. 240, p. 216, Nov. 1885.]