proaching *Primitia mundula* in its bituberculate furrow. We will name this variety *tuberosa*.

All these specimens of *B. impendens* are rather more oblong than those met with in the Pentland Hills; and the three lobes of the valve are not so distinct. Length of valve, $\frac{1}{12}$th; breadth, $\frac{1}{30}$th inch.

3. *Primitia*[1] *protenta*, sp. nov. [Fig. 3.]—One cast is decidedly referable to an elongate-oblong, convex valve, with a centro-dorsal furrow and a pair of small distinct symmetrical tubercles, one on each side of it, along the middle line of the valve.

This is longer than *B. impendens* and its variety above mentioned, and more symmetrical; for it must have been almost cylindrical in the perfect state of united valves; and its two tubercles are lower down, further apart, sharper, and more equal than in *B. impendens*, var. *tuberosa*. Length of valve, $\frac{1}{12}$th; beadth, $\frac{1}{30}$th inch.

4. *Entomis aciculata*, Jones, 1871, MS. Annals Nat. Hist. 1873, ser. 4, vol. xi. p. 416; Monthly Microscop. Journ.[2] 1873, vol. x. p. 76. [Figs. 4*a*. 4*b*.]

Several casts indicate a small *Entomis* related to *E. impendens*, Haswell ("On the Silurian Formation in the Pentland Hills," 1865, p. 38, pl. 3, fig. 11), but narrower and more pointed in front, and bearing a subcentral pointed tubercle, or spine (well-marked on some external moulds of the valve), low down, and in front of the long transverse furrow, which is characteristic of the genus. Length of the valve, $\frac{1}{16}$th; breadth, $\frac{1}{30}$th inch.

NOTICES OF MEMOIRS.

I.—On the Silurian Leperditiæ of Russia, etc. By Magister Fr. Schmidt. [Miscellanea Silurica. I. Ueber die russischen silurischen Leperditien, mit Hinzuziehung einiger Arten aus dem Nachbarländern. Von Mag. Fr. Schmidt, Mem. l'Acad. Imp. des Sciences de St. Pétersbourg, vii. série, vol. xxi. no. 2. 1873.]

In this monograph of the *Leperditiæ* of Russia and the neighbouring countries, M. Fr. Schmidt has revised the known *Leperditiæ* and *Isochilinæ*, and has added several new species. He figures and describes three *Isochilinæ*:—*I. Biensis* (Grunewald), *I. punctata* (d'Eichwald), and *I. Maakii*, nov. sp.; and ten *Leperditiæ*:—*L. grandis* (Schrenck), *L. Barbotana*, sp. n., *L. Tyraïca*, sp. n., *L. Angelini*, sp. n., *L. Balthica* (Hisinger), *L. Hisingeri*, sp. n., *L. Eichwaldi*, sp. n., *L. Wiluiensis*, sp. n., *L. parallela*, sp. n., *L. marginata* (Keyserling), *L. Keyserlingi*, sp. n.

Isochilina punctata and some *Primitiæ*, but no true *Leperditiæ*, have been yielded by the Lower Silurians of Russia. In the lower zones of the Upper Silurian, characterized by the smooth forms of *Pentamerus* (zones 4, 5, and 6 of the Esthonian series), *Leperditiæ* abound; *L. Hisingeri* occurring in all. In Gothland

[1] "*Beyrichia*," by inadvertence, in the former description.

[2] In the memoirs here referred to, "the Pentland Hills" are given by mistake, instead of *Peeblesshire*, as the locality.

this species is found in zones 4 and 5; and *L. Keyserlingi* only in zone 5. The true *L. Balthica* is confined to Central Gothland. In Russia the limestones with smooth *Pentameri* contain *L. marginata*; and in Siberia *L. Wiluiensis*, *L. parallela*, and *Isochilina Maaki*. *Leperditia Eichwaldi* is met with between zones 7 and 8. In some localities *L. Angelini* is one of the most numerous of the fossils. *L. grandis* has been found near Lümmada, together with *L. Angelini*, and in the Uppermost Silurian of the Isle of Gothland. The same strata, with *L. Tyraïca* (a form comparable with the American *L. alta* of Conrad), exist along the Dnieper in Volhynia and Podolia.

Isochilina Biensis has been met with near Slatoust in the Upper Silurian, with *Pentamerus Baschkiricus;* and *Leperditia Barbotana* at a somewhat more northern locality, in a rock with *Leperditiæ* only. T. R. J.

II.—Tabular View of the Classification of the Labyrinthodonta.[1] By L. C. Miall.

AMPHIBIA.

LABYRINTHODONTA.

A.—*Centra of dorsal vertebræ discoidal.*[2]—Genera 1 to 27.

I.—Euglypta. Cranial bones strongly sculptured. Lyra conspicuous. Mandible with well-developed post-articular process. Teeth conical; their internal structure complex; dentine much folded. Palato-vomerine tusks in series with small teeth. Short inner series of mandibular teeth. Sculptured thoracic plates, with reflected process upon the external border.

- ✪ *Palatine foramina large, approximated.*
  - † *Mandible with an internal articular buttress.*
    - ‡ *Orbits central or posterior.*
      1. Mastodonsaurus, Jäger.
      2. Capitosaurus, Munst.
      3. Pachygonia, Huxley (?).
      4. Eurosaurus, d'Eichwald (?).
      5. Trematosaurus, Braun.
      6. Gonioglyptus, Huxley.
    - ‡‡ *Orbits anterior.*
      7. Metopias, Von Meyer.
      8. Labyrinthodon, Owen.[3]
  - †† *Mandible without internal articular buttress.*
    9. Diadetognathus, Miall.
- ✪✪ *Palatine foramina small, distant.*
  10. Dasyceps, Huxley.
  11. Anthracosaurus, Huxley.

II.—Brachyopida. Skull parabolic. Orbits oval, central or anterior. Post-articular process of mandible wanting (?).

[1] Presented to the Geological Section of the British Association at Belfast, August, 1874, by the Committee on the Labyrinthodonts of the Coal Measures.

[2] This character is not of primary importance, but seems to be available for an arrangement determined by other considerations.

[3] Orbits unknown.

12. Brachyops, Owen.
13. Micropholis, Huxley.
14. Rhinosaurus, Waldheim.
15. Bothriceps, Huxley.

III.—Malacocyla. Skull vaulted, triangular, with large postero-lateral expansions. Lyra consisting of two nearly straight longitudinal grooves, continued backwards as ridges. Orbits large, posterior, irregular. Temporal depressions, passing backwards from orbits. No post-articular process to mandible.[1]

* *Teeth with large anterior and posterior cutting edges.*

16. Loxomma, Huxley.

** *Teeth conical.*

17. Zygosaurus, d'Eichwald.

IV.—Athroodonta. Maxillary teeth wanting. Vomerine teeth aggregated. Orbit imperfect.

18. Batrachiderpeton, Hancock and Atthey.
19. Pteroplax, Hancock and Atthey.[2]

[V.—An uncharacterized group for the reception of some or all of the following genera.]

20. Pholidogaster, Huxley.
21. Ichthyerpeton, Huxley.
22. Pholiderpeton, Huxley.
23. Erpetocephalus, Huxley.

VI.—Archegosauria. *Von Meyer.* Vertebral column notochordal. Occipital condyles unossified.

24. Archegosaurus, Goldfuss.
25. Apateon,[3] Von Meyer.

B.— *Centra of dorsal vertebra elongate, contracted in the middle.*

VII.—Heleothrepta.—Skull triangular, with produced, tapering snout. Orbits central. Mandibular symphysis very long, about one-third of the length of the skull.

26. Lepterpeton, Huxley.

VIII.—Nectridea.—Epiotic cornua much produced. Superior and inferior processes of caudal vertebræ dilated at the extremities and pectinate.

27. Urocordylus, Huxley.
28. Keraterpeton, Huxley.

IX.—Aistopoda. Limbs wanting.

29. Ophiderpeton, Huxley.
30. Dolichosoma, Huxley.

X.—Microsauria, *Dawson.* Thoracic plates unknown. Ossification of limb-bones incomplete. Dentine non-plicate, pulp cavity large.

31. Dendrerpeton, Owen.
32. Hylonomus, Dawson.
33. Hylerpeton, Owen.

[1] Loxomma.

[2] The vomerine teeth are unknown, and this genus may therefore require to be removed.

[3] Of doubtful distinctness.

III.—Geology of New Zealand.

TABLE OF THE SEDIMENTARY ROCKS OF NEW ZEALAND.

By Capt. F. W. Hutton, F.G.S.

Probable Age.	Formations.	Characteristic Fossils.
Pleistocene	Alluvial Deposits..... O	*Dinornis, etc., Mactra rudis.*
Newer Pliocene	Wanganui Formation O	*Pleurotoma Wanganuiensis, Chione assimilis.*
Upper Miocene	PareoraFormation O ≡	*Buccinum Robinsoni, Struthiolaria, Cerithium rugatum. Corbula dubia, Turritella bicincta, Chione vellicata, Solenella australis.*
Lower Miocene	Ahuriri Formation O	*Struthiolaria tuberculata, Turbo superbus, Cardium spatiosum. Crassatella ampla, Pecten Triphooki, Ostrea ingens.*
Upper Eocene	OamaruFormation O ≡	*Pleurotoma hebes, Scalaria rotunda, Struthiolaria senex. Panopæa plicata, Pecten Hochstetteri, Pecten Hutchinsoni. Waldheimia gravida, Terebratella Ganeteri, Hemipatagus formosus, Meoma Crawfordi, Schizaster rotundatus.*
Upper Cretaceous	WaiparaFormationO ≡	*Plesiosaurus, etc. Belemnitella, Conchothyra parasitica, Trigonia, Inoceramus Haastii. Aporrhais, Dosinia, Dicotyledonous plants. Dammara.*
Middle Jurassic	PutatakaFormation ≡	*Belemnites Auclandica, Astarte Wallumbillaensis. Polypodium Hochstetteri, Tæniopteris, Alethropteris.*
Lower Jurassic	Maitai Formation O	*Ichthyosaurus, Inoceramus, Spirifera.*
Triassic	Wairoa Formation (?)	*Monotis salinaria. Halobia lomelli.*
Palæozoic	Kaikoura Formation	*Orthis. Corals, etc.*
	Tuamarina Formation	*Orthoceras, etc.*
	Wanaka Formation	Composed entirely of Crystalline Schists.
	Manipori Formation	

O Contemporaneous eruptive rocks occur in these formations.

≡ Coal is found in these formations.

IV.—Jahrbuch der k. k. Geologischen Reichsanstalt. Wien, 1873. Band 23. Heft 2.

1.—*Geologische Studien in den Tertiärbildungen des Wiener Beckens.* [16.] *Ein geologisches Profil aus der Bucht von Berchtoldsdorf.* (pp. 117–132.) By Felix Karrer.

The sinking of six wells in a continuous line has shown clay alternating with "Leitha-conglomerate." Samples from both beds were examined for organic remains in each sinking. Foraminifera constitute the bulk of the lists and their degree of abundance in each case is very carefully set down, and finally embodied in a table.

[17.] *Das Alter des Rohrbacher Conglomerates.* (pp. 132–136.) By Felix Karrer.

Excavations for the foundation of a bridge have shown that this conglomerate rests on a clay, in which the author found the following Foraminifera: *Nonionina granosa*, *Polystomella obtusa*, and *Hauerina*. These prove that the clay belongs to the "Sarmatic" horizon; hence the conglomerate is newer than the Leitha-conglomerate, and may possibly belong to the Congeria-beds. E. B. T.

2.—*Beiträge zur topischen Geologie der Alpen der Rhaetikon (Vorarlberg).* (pp. 137–174, with a geological map and plate of sections.) By Dr. Ed. von Mojsisovics.

In referring to the break produced in the Trias deposits by the Rhine valley, the author argues against the notion of their having once been present on both sides of the valley, and their absence on the west side being due to dislocations and denudation. He infers that this line marks rather the original boundary; and points out the transgressive character of the Trias deposits on the east side, and again that on the west side the Verrucano (Dyas) is overlain by Lias; moreover, in the Vorarlberg, the strike of the Trias beds, which in the eastern district has been mostly east and west, verges round to an almost north and south direction. This paper, besides new facts, contains many suggestions on theories of Alpine elevation. E. B. T.

3.—*Der Graptolithen-Schiefer am Osternig-Berge in Kärnten.* (pp. 175–248.) By Dr. Guido Stache.

Controverts views of Prof. Suess, according to which certain mica-schists and granites which occur in them (*e.g.* Cima d'Asta granite) are all of Carboniferous age; these schists being by him grouped as Casanna-schists, and placed above the Carboniferous beds of the Stangalp. Stigmatizes these assertions as too speculative, and shows that the Casanna-schists instead of being simply Upper Carboniferous, contain other and much older beds, probably in the Casanna district, and indubitably in the Gailthal. The Graptolites found in schists at Osternig-Berg show beds of the age of the Coniston flags. The Upper Silurian is also represented, as shown by fossils; and

above are more schists, which may perhaps be Devonian. The crystalline schists of the Gailthal, erroneously attributed to the Carboniferous, are in an unconformable position below the older Greywacké, which last far surpasses the Carboniferous beds in importance. E. B. T.

4.—[Heft 3.] I. *Ueber das Verhältniss der böhmischen Steinkohlen- zur Permformation.* (pp. 249–282, with a plate of sections.) By Dr. O. Feistmantel.

Notices the occurrence of workable coal-beds in Bohemia of Permian age. The lower part of the series contains the coal-seams, but both the upper and lower beds contain plants usually considered typically Carboniferous, e.g. *Stigmaria ficoides, Sigillaria alternans, Alethopteris Serlii, Pecopteris arborescens, dentata,* and *oreopteridis, Sphenophyllum Schlotheimii, Calamites Suckovii,* etc., mixed with some Permian plants. The Permian coal-beds are separated from the Carboniferous beds below by shales with characteristic Permian animal remains. These Bohemian lower Permian beds may be paralleled according to our author with the beds containing *Archegosaurus* in the Saar and Rhine district, which he also considers Dyas, and which lie upon the true Saarbrücken Coal-measures. E. B. T.

5.—*Basalt-Vorkommnisse in Mährisch-Ostrauer Steinkohlenbecken.* (pp. 282–288, with a map.) By J. Niedzwiedzki.

Eruptive dykes occur in the coal-basin of Ostrau (Moravia), and have in one case turned coal into columnar coke. The rock has the outward characters of Basalt, and microscopic examination confirms this determination. E. B. T.

6.—*Ueber das Vorkommen tertiärer Bildungen im oberen Marizathal.* (pp. 289–294, with a sketch-map.) By Anton Pelz.

A contribution to the geology of the country between the Balkans and Mount Rhodope. Tertiary beds, Nummulitic, etc., had not been noticed before in this basin. E. B. T.

7.—*Beiträge zur Geologie der Fruska Gora in Syrmien.* (pp. 295–316.) By Dr. Oskar Lenz.

The Fruska Gora is one of a low chain of hills that rise out of the plain between the rivers Save and Danube, near the fortress of Peterwardein. The nucleus of the range consists of crystalline schists, interrupted by two principal bands of serpentine. The Trias is very sparsely represented, and the Jurassic beds not at all. Tuff beds, containing Upper Cretaceous fossils, of Gosau type, are the next stage met with. Then follow fossiliferous and lignite-bearing beds of Aquitanien age, one bed of coal being 9ft. thick. Above come Leitha-conglomerate, Sarmatic, and Congeria-beds, as in the Vienna basin, some being very fossiliferous. E. B. T.