

to their Polyzoal affinities. He remarks that the little bodies appear to come very near the recent genus *Scruparia*, and its ally *Hippothoa*. He adds, there is also a Cretaceous species of the genus *Ætea* (*Æ. anguinaria*) closely related to them. The present form need not be mistaken for either of the following Palæozoic species:—*Hippothoa Voigtiana*, King, Permian Foss. England, 1850, p. 31, t. 3, f. 13; Gienitz, Dyas, p. 120, t. 20, f. 24, 25; *H. inflata*, Hall, Nicholson, Ann. Nat. Hist., 1875, vol. xv. p. 123, t. 11, f. 1. As regards size, *H. inflata*, Hall, approaches nearest to our Carboniferous forms, but it is much larger. I propose to call this *Hippothoa*? *Hancksii*, and hope before long to give a more detailed description and figure.

(To be continued.)

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NOTICES OF MEMOIRS.

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I.—THE FOREST-BED OF EAST NORFOLK. By HENRY NORTON, F.G.S. Paper read before the Norwich Geological Society, May 1st, 1877.—*Norwich Mercury*, May 5th.

THE author first refers to an excursion made to Mundesley and Happisburgh by members of the Norwich Geological Society, an account of which was published in the *Eastern Daily Press*, of February 15th. It was therein stated that "several stools of trees, with roots branching out, were seen, and proved on examination to have grown upon the bright blue clay of the soil of the forest." Having been unable to attend the excursion, he went two days later for the special purpose of ascertaining whether the stumps of trees observed were actually *in situ* as they grew. The few he was enabled to examine, although they had a false appearance of having grown where found, had their roots broken off, and could not have lived on the spots. They might very naturally have been drifted into such positions.

The poor result of his visit induced him to examine what is the evidence on which the belief in the Forest-bed rests; and the main object of the present paper was to point out how unsatisfactory were the statements of those who have written upon the subject. He referred to the observations of R. C. Taylor, Rev. J. Layton, S. Woodward, J. Trimmer, and to those of Mr. Prestwich and Mr. John Gunn. Lyell had never seen the stools of trees *in situ*. The statements made by these geologists were all vaguely general. No one had taken a particular stump, examined the condition of the roots, whether whole or broken, and told us their actual length and their position on the ground. It was known that remains of oak have been found, but we were never told that any particular stool was oak; nor have we ever been told that any particular trunk was ever found lying near its own stool. It was, in fact, only too clear that our observers in general did not appreciate the value of precise facts as opposed to loose generalities.

Mr. Norton was ready to admit the high, very high probability, of a forest *in situ*, but contended that there was yet no absolute proof of it.

H.B.W.

II.—NOTES ON FOSSIL PLANTS.

[Communicated by COUNT MARSCHALL, C.M.G.S., etc.]

1. Sandstones of Gröden, between Neumarkt and Mazzon, South Tyrol.

(Imp. Geol. Instit. Vienna, Meeting January 9, 1877.)

THE strata here are horizontal in a hill, at the summit of which is Mazzon. Beginning with the lowest beds (near Neumarkt, at the foot of the hill), Nos. 1, 3, and 5 are grey and red sandy and argillaceous beds of the "Gröden Sandstone"; 2. White sandstones, with vegetable remains; 4. Subordinate beds of grey shales, with vegetable remains; 6. Yellow dolomitic strata, partly oolitic and glauconitic, and white compact limestones, interspersed with malachite; 7. "Seisser beds," on which Mazzon is situate.

The plant-remains in No. 2 are indeterminable stems and trunks, with carbonized bark, well preserved and large *stobili* (of *Voltzia Hungarica*?), branches with acicular leaves, fronds of Ferns, and here and there some few Calamites. The very friable bed No. 4 includes perfectly preserved bracts, acicular leaves, short branches, and *strobili*.

Altogether the *facies* of this Flora is Triassic, like that of the "Roth" Flora of Zweibrücken. On closer investigation, however, these Floræ do not possess one species in common. Professor Schimper thinks the Flora under notice to be probably of Permian age. Almost all the species are identical with those of Fünfkirchen in Hungary, which, according to Prof. Heer, are of Post-carboniferous or Upper Dyasic age. The branches and *strobili* of *Voltzia Hungarica* prevail in number; with them occur *Baiera digitata*, Heer, *Ullmannia Bronni*, Heer, *Ulm. Geinitzi*, *Carpolithes*, fronds of Ferns, *Calamites* (or *Equisetites*), *Lingula* sp., some few Fish-scales, etc.

More or less frequent and distinct fragments of *Voltzia Hungarica* have been found at several places in the Tyrol, a fact worthy of notice, as, at these localities, the typical black Bellerophon-limestones (represented near Neumarkt by yellow dolomitic rocks) rest immediately on the strata containing plant-remains. The most frequent Foraminifera in the Bellerophon-limestones are *Cornuspirida*, especially a form near *Endothyra*.

2. On some Rhatian Plants from Pälssjö, South Sweden.—By Dr.

NATHORST.

(Imp. Geol. Instit. Vienna, Meeting January 23, 1877.)

Dr. R. H. Nathorst lately presented to the Imperial Geological Institute of Vienna a collection of fossil plants from Pälssjö. The species represented in it are—*Spiropteris*, sp., *Rhizopteris Schenki*, Nath., *Cladophlebis Nebbensis*, Brong., *Gullieria angustiloba*, Presl, *Dictyophyllum Auensteri* (Gopp.), Nath., *Nilssoni* Brong., *Nilssonia polymorpha*, Schk., *Anozamites gracilis*, Nath., *Podozamites distans*, Presl, *Palissyia Brami*. Endl., *Schizolepis Follini*, Nath., *Pinites Lundgreni*, Nath. (a well-preserved *Strobilus*), and *Swedenborgia cryptomerides*, Nath. In a letter to Prof. D. Stur, Dr. Nathorst observes concerning these remains:—*Rhizopteris Schenki* is undoubtedly

the rhizome of a *Dictyophyllum*. Denticulation is visible on a fragment of *Cladophlebis Nebbensis*, as in an Austrian specimen of fructification. The leaves of *Gutlieria* are constantly found with fructification. *Sagenopteris*, *Otenopteris*, and *Thimfeldia* are very rare. The occurrence of genuine *Dictyophyllum Muensteri* and *D. Nilssoni* may be doubted, the Pälssjö specimens of this last species having less regular and shorter secondary segments, although not as short and broad as those of *D. acutilobum*, Schenk, but perfectly concordant with the Transsylvanian *Campt. Nilssoni*. Perhaps the Pälssjö species shows transitions to *Dictyophyllum rugosum*, and *D. Leckenbyi* may be admitted as a distinct species under the name of *D. polymorphum*.

The nerves of *Nilssonia polymorpha* are invariably simple, and the lamina covers completely the upper side of the rhachis. In all the *Pterophylla*, from the Trias up to the Cretaceous, the segments are laterally attached to the rhachis, not covering it completely, and a certain number of nerves at the base are dichotomous; good distinctive generic characters. There are, however, transitional forms, such as *Pterozamites Blasi*, Braun. *Cycadites longifolius*, somewhat reminding us of the Chinese *Taxites spathulatus*, Newb., may possibly be a Conifer. The least frequent variety of *Podozamites distans* is the typical form, *genuina*. *Podozamites ovalis*, Nath., may be a variety of *Podoz. distans*. The Strobili of *Schizolepis* are generally so much worn by rolling that the division of the scales is indistinguishable.

### 3. Fossil Plants from Eastern Siberia.—By Dr. St. T. SCHMALHAUSEN.

(Imp. Geol. Inst. Vienna, Meeting of January 23, 1877.)

In 1873, Mr. Lopatin, a Russian Mining Engineer, discovered, among the pebbles of the River Ogux (an affluent of the Yenisei), impressions and casts of plants in fragments of sandstone. The species, as far as they can be ascertained, are :

<i>Bornia radiata</i> (Brong.).	<i>Lepidodendron Wiikianum</i> , O. Heer.
<i>Filicites Ogurensis</i> , Schmalh.	<i>Lepidostrobus gracilis</i> , Schmalh.
<i>Lepidodendron Veliheimianum</i> , St.	<i>Knorria</i> , sp.
<i>Bergeria regularis</i> , Schmalh.	<i>Cyclostigma Kiltorkense</i> , Haught.
„ <i>alternans</i> , Schmalh.	<i>Stigmaria ficoides</i> , St.

The presence of *Cyclostigma Kiltorkense* proves these remains to have belonged to the Lower Carboniferous.

### 4. On the Permian Plants of Fünfkirchen, Hungary.—By Prof. O. HEER.

(Imp. Geol. Inst. Vienna, Meeting of January 23, 1877.)

The species found in this locality are :

<i>Baiera digitata</i> (Brong.)	<i>Carpolithes Hunnicus</i> , Heer.
<i>Ulmannia Geinitzii</i> , Heer.	„ <i>foveolatus</i> , Heer.
<i>Voltzia Hungarica</i> , Heer.	„ <i>Eiselianus</i> (Gein.).
„ <i>Boeckiana</i> , Heer.	„ <i>libocerooides</i> , Heer.
<i>Schizolepis permianensis</i> , Heer.	„ <i>Geinitzii</i> , Heer.
<i>Carpolithes Klockeanus</i> (Gein.).	

They occur in shales, intercalated between brownish, yellowish-grey, and occasionally red sandstones, beneath coarse Triassic quartz-

conglomerates, at the base of the variegated sandstones with *Myophoria costata*, being a part of the lower horizon of the Fünfkirchen shelly limestones. Nearly one-half of these species are found in the Copper-shales of the Saxon and Franconian "Zechstein." *Ullmannia Geinitzi* and its congener *U. Brauni* are characteristic Dyasic (Permian) forms. The specimens of *Voltzia Hungarica*, Hr., are identical with *Palüssya Brauni* in the form and the distichous arrangement of their leaves, and in the form of their branches, and would find a better place in this genus; the forms generally ranked among *Voltzia* having no median nerve, and the arrangement of their leaves being polystichous. The scales of strobili, possibly not connected with the branches found here, stand very near those of *Voltzia*.

5. *On the Upper Tertiary Plants of Sicily.*—By Dr. H. TH. GEYLER.  
(Imp. Geol. Instit. Vienna, Meeting of March 6, 1877.)

These plants, together with fossil Insects, have only been found in the lacustrine gypsum and sulphur-bearing beds of the hill range of Cannatone, north of Racalmuto and Grotte, in the Province of Girgenti. The species, denoting an earliest Pliocene origin, represent the genera *Xylomites*, *Furcellaria*, *Algacites* (?), *Pinus*, *Phragmites*, *Poacites*, *Potamogeton*, *Palmacites*, *Myrica*, *Alnus*, *Quercus*, *Cinnamomum*, *Laurus* (?), *Diospyros* (?), *Celastrus* (?), *Berchemia*, *Juglans*, *Casalpinia* (?), *Robinia* (?), and *Acacia* (?). Several of them are identical with those from the Tertiaries of Öeningen.

6. *On the Arctic Fossil Plants.* By D. STUR.

(Imp. Geol. Instit. Vienna, Meeting of March 6th, 1877.)

Professor Oswald Heer has lately published the fourth volume of his classic "Flora fossilis arctica," in which he treats of the following localities:—

A. ROBERT VALLEY, RESEARCH BAY, 77° 33' N. Lat., explored by Prof. Nordenskiöld. The species collected there are—*Sphenopteris frigida* (compare *Sph. bifida*, Lindl.), *Sph. geniculata*, Germ. (*Sph. sub-geniculata* Stur (from the "Culm")), *flexibilis*, Heer, *Sph. distans*, Stb. (an exclusively "Culmian" form), *Adiantites concinnum*, Goepp. (*Ad. tenuifolius*, Goepp., from the "Culm"), *Ad. bellidulus*, Heer (compare *Ad. oblongifolius*, Goepp., "Culm"), *Staphylopteris*, sp. (India only found in the "Culm"), *Lycopodites filiformis*, Heer, *Lepidodendron Sternbergi*, Brong. (*Lep. Veltheimianum*, St., Gein.), *Lep. selaginoides*, St., *Lepidophyllum caricinum*, Heer, *Stigmaria Lindleyana*, Heer (*Stigm. inaequalis*, Goepp.), *Sphenophyllum longifolium* (?), Germ., *Sphenoph. bifidum*, Heer, *Sphenoph. subtile* (compare *Sphenoph. tenerimum*, Ett. sp., "Culm"), *Rhynchogonium crassirostre* Heer, *Rh. costatum*, Heer, *Rh. macilentum*, Heer, *Rh. globosum*, Heer, *Cordaites palmæformis* (Goepp.), *Cord. borassifolius* (St.), *C. principalis* (Germ.), *Walchia linearifolia*, Goepp. (compare *W. antecedens*, Stur), *Samaropsis Spitzbergensis*, Heer, and *Carpolithes nitidulus*, Heer. According to Professor Heer, this Flora is Middle Carboniferous; the *Calamites*, *Annularia*, *Asterophyllites*, *Neuropteridæ* and *Pecopteridæ*, wanting in the above list of species, may have been overlooked by the collector.

Mr. Stur remarks that many of the above-named plants belong to the "Culm" series, or have, at least, very nearly related representatives in this horizon. The genuine *Sphenopteris distans* is a characteristic form of the "Culm."

B. CAPE BOHEMAN. The sandstone and carbonaceous beds of this locality, formerly thought to be Tertiary, have proved to be Jurassic ("Brown Jura"; "Bathonian" of the French geologists). Ten of the thirty-two species composing this flora are known to exist in other Jurassic localities. The most remarkable forms are *Podozamites lanceolatus* (Lindley), and *Ginko digitata* (Brong.).

C. CAPE STARATCHIN. A total of 19 species of Cretaceous forms.

D. CAPE LYELL, SCOTT GLACIER, and CAPE HEER, explored by Prof. Nordenskiöld. All these localities together yield 71 species of Miocene plants. The specimens from Cape Lyell are beautifully preserved, those of the two other localities are not in nearly so good a state.

E. EAST SIBERIA and AMOOR PROVINCE, explored by MM. Schmidt and Glehn. The fossil plants of these regions are of the highest interest for the study of the Jurassic Flora. The species are:—

From East Siberia, Government Irkutsk :

*Thyrsopteris Murrayana* (Brong.)  
 ——— *Maakiana*, Hr.  
*Dicksonia clavipes*, Hr.  
*Asplenium* (*Diplazium*) *Whitbiense*  
 (Brong.)  
 ———, var.  
                   *tenuis*, Hr.  
*Lycopodites tenerimus*, Hr.  
*Phyllothea Sibirica*, Hr.  
*Phœnicopsis angustifolia*, Hr.  
*Baiera longifolia* (Brong.)

*Baiera Czekanowskiana*, Hr.  
*Ginko Schmidiana*, Hr.  
 ——— *Sibirica*, Hr.  
 ——— *lepidia*, Hr.  
*Czekanowskia setacea*, Hr.  
 ——— *rigida*, Hr.  
*Leptostrobus laxiflora*, Hr.  
*Samaropsis rotundata*, Hr.  
 ——— *caudata*, Hr.  
 ——— *parvula*, Hr.  
*Kaidacarpum Sibiricum*, Hr.

Amoor Province :

*Anomozamites Schmidtii*, Hr.  
*Podozamites Eichwaldi*, Sch.  
*Phœnicopsis speciosa*, Hr.  
*Czekanowskia setacea*, Hr.

*Thyrsopteris prisca*, Eichw.  
*Dicksonia Saportana*, Hr.  
 ——— *acutiloba*, Hr.  
*Asplenium spectabile*, Hr.

These Floræ, like the scanty one of the Islet of Andœ on the West coast of Norway (only eight species), are characteristic of the Middle Brown Jura (Bathonian).

III.—THE DISTRIBUTION OF CEPHALOPODA IN THE UPPER CRETACEOUS SERIES OF NORTH GERMANY. By HEITZ C. SCHLÜTER.

(Imp. Geol. Instit. Vienna, Meeting January 23, 1877.)

A. Lower Pläner (Cenomanian, d'Orb.).

1. Zone of *Pecten asper*, and *Catopygus carinatus*.
2. Zone of *Ammonites varians* and *Hemipneustes Guepenkerli*.
3. Zone of *Ammonites Rhotomagensis* and *Holaster subglobosus*.

B. Upper Pläner (Turonian, d'Orb.).

1. Zone of *Actinoceras plenum*.
2. Zone of *Ammon. nodosoides* and *Inoceramus labiatus*.
3. Zone of *Ammon. Woolgari* and *Inoc. Brongniarti*.
4. Zone of *Heteroceras Reussianum* and *Spondylus spinosus*.
5. Zone of *Inoceramus Cuvieri* and *Epiaster brevis*.

C. Embser (analogous to the Alpine "Gosau").

Zone of *Ammonites Margæ* and *Inoc. digitatus*.

D. Lower Senonian.

1. Sandy Marls of Recklinghausen, with *Marsupites ornatus*.
2. Quartzose beds of Haltern, with *Pecten muricatus*.
3. Calcareous sandy beds of Dülmen, with *Scaphites binodosus*.

E. Upper Senonian (Cœloptychian Chalk).

1. Zone of *Becksia Sackelandi*.
2. Zone of *Ammonites Ciesfeldensis*.
3. Zone of *Ammon. Wittekindi* and *Heroceras polyplacum*.

COUNT M.

IV.—THE FOOD OF A SIBERIAN RHINOCEROS.

(Imp. Geol. Instit. Vienna, January 23, 1877.)

Dr. St. J. Schmalhausen has microscopically examined the remnants of food contained in the cavities of the teeth of a North-Siberian Rhinoceros (*Rh. antiquitatis*) whose remains are preserved in the museum of Irkutsk. These are remnants mostly of leaves, and of some stems, chiefly monocotyledonous. There are fragments of grasses, and of small twigs of some woody plants, such as *Picea* (*obovata*?), *Abies* (*Siberica*?), *Larix* (*Siberica*?), *Ephedra*, sp., *Salix*, sp. (prevalent), and *Betula* (*fruticosa*?). All these plants still exist in high northern latitudes, and confirm Brandt's supposition, that the Pachyderms of North Siberia lived in the regions where their remains, partly preserved by frost, are now found.—COUNT M.

V.—THE SPECIES OF MASTODON IN EUROPE.

Herr M. Vacek stated at the meeting of the Imp. Geol. Instit. Vienna, February 6, 1877, that of the seven species of Mastodon known to exist in the European Tertiaries, five have been ascertained to have lived within the region of the Austro-Hungarian empire. These are *Mast. Borsoni*, *Mast. tapiroïdes*, *Mast. angustidens*, *Mast. longirostris*, and *Mast. Arvernensis*.

VI.—ON AN OSSIFEROUS CAVE IN THURINGIA. By Dr. K. TH. LIEBE.

(Imp. Geol. Instit. Vienna, February 20, 1877.)

A small Bone Cave was discovered late in the autumn of 1874, in the Linden Valley, South of Gera in East Thuringia. The animals whose remains are found in this cave (probably a Hyæna-den, of rare occurrence in Germany), arranged according to their relative frequency, are, *Equus fossilis*, *Hyæna spelæa* (nearly all the bones broken and evidently gnawn), *Rhinoceros tichorhinus*, *Bos primigenius*, *Ursus spelæus*, *Felis spelæa*, *Cervus elaphus*, *Cerv. alces*, *Cerv. tarandus*, *Elephas primigenius*, *Alakdaga geranus*, *Vulpes vulgaris*, *Canis*, sp., *Arctomys marmotta*, *Arvicola gregalis*, *Mus rattus*, *Cervus capreolus*, *Mustela*, sp., *Lepus*, sp., *Tetrao tetrix*, *Pandion haliaëtus*, and *Charadrius*, sp. The presence of *Alakdaga* (a species of Gerboa), now living in the Steppes of extreme East Europe, and of *Arvicola gregalis*, an inhabitant of high Northern latitudes in Europe and Asia, are specially worthy of notice. The

remains of these two species have also been found by Dr. Wehring near Westeregelt, associated with those of Rhinoceros, Horse, Marmot, Lemming, etc.

Split bones, worked fragments of horns, and flint implements were also found in this cave. The dolomitic detritus, heaped in form of a terrace before the cave, is full of bone splinters and broken antlers of Reindeer, without any traces of having been gnawed by Hyænas.—COUNT M.

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## REVIEWS.

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I.—THE FORAMINIFERA OF THE PLIOCENE BEDS OF BELGIUM. By E. VANDEN BROECK and H. MILLER. Part I. GEOLOGICAL AND PALEONTOLOGICAL SKETCH OF THE PLIOCENE DEPOSITS OF THE NEIGHBOURHOOD OF ANTWERP. By E. VANDEN BROECK. Fasc. i. THE LOWER ANTWERP SANDS. pp. 101. Svo. (Brussels.)

THIS important contribution to Belgian geology is endorsed "Extracted from the Annals of the Malacological Society of Belgium, vol. ix. 1874," but was published separately late in 1876. It forms the first instalment of a series of publications in course of preparation, constituting a monograph of the Belgian Pliocene Foraminifera. The second instalment is on the eve of publication.

The chief points to which the author draws attention in the portion before us are:—1st. The conditions under which the Pliocene deposits of W. Europe were formed; and 2nd. The alterations which those deposits have subsequently undergone.

The Miocene Period is unrepresented in the Anglo-Belgian area by any deposit; the subsidence of that area initiating the Pliocene Epoch. The gulf thus formed was partly occupied by mollusca, etc., migrating from the Vienna Miocene Basin (then beginning to shallow) through Silesia and N.W. Germany.

The earliest deposit is characterized by *Panopæa Menardi*; it is a slightly clayey sand, of a dark olive-green colour from the abundance of glauconite grains. The fauna denotes water of 100 to 200 feet in depth, about two-thirds being Gasteropods. Partly synchronous with the later beds of this zone are sands characterized by *Pectunculus pilosus*, equally glauconitic but less clayey, and with a littoral fauna, two-thirds of which are Lamellibranchs. Of slightly later date are the Gravelly Sands of Diest and Antwerp, completing the Lower Sands of Antwerp, which have no British equivalent except the traces of questionable age on the Kentish Downs. The synonymy of this part of the series is treated at considerable length by the author, resulting in the following condensed statement:—

### LOWER ANTWERP SANDS.

Diestian System: Dumont, 1839; Dujardin, 1862; Dewalque, 1868.

Lower or Black Crag: Lyell, 1852; Dewael, 1853.

Diestian Sands: Dewalque, 1868; Mourlon, 1873; Cogels, 1874.

Black Antwerp and Edeghem Sands: Omalius d'Halloy, 1862.