Joannea Geol. Paläont. 10: 91-125 (2008)

From the Palaeontological Collection of the Provincial Museum Joanneum – The Fossil Crocodylians (Crocodylia)

Aus der paläontologischen Sammlung des Landesmuseums Joanneum – Die fossilen Krokodile (Crocodylia)

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12 Figures

Abstract: The crocodylian remains stored in the collection of the Provincial Museum Joanneum (Graz, Austria) are reviewed. Previous descriptions, geographical and stratigraphical provenance and collection history are discussed. The most important area from which these fossils come from – the Wies-Eibiswald coal-mining district – is briefly discussed. Preliminary taxonomical considerations concerning the type material of *Enneodon ungeri* Prangner, 1845, *Diplocynodon steineri* (Hofmann, 1887a) and *Diplocynodon styriacus* (Hofmann, 1887a) are provided.

Zusammenfassung: Im vorliegenden Katalog werden die am Landesmuseum Joanneum verwahrten fossilen Krokodilreste hinsichtlich früherer Bearbeitungen, ihrer geographischen und stratigraphischen Position sowie ihrer Sammlungsgeschichte dargestellt. In einer kurzen Übersicht wird das wichtigste Fundgebiet – das Wies-Eibiswalder Kohlerevier – behandelt sowie der taxonomische Status des Typusmaterials von *Enneodon ungeri* Prangner, 1845, *Diplocynodon steineri* (Hofmann, 1887a) und *Diplocynodon styriacus* (Hofmann, 1887a) evaluiert.

Key Words: Diplocynodontidae; *Diplocynodon/Enneodon*; Styria/Austria; Wies-Eibiswald; Middle Miocene.

Schlüsselworte: Diplocynodontidae; *Diplocynodon/Enneodon*; Steiermark/Österreich; Wies-Eibiswald; Mittel-Miozän.

Contents

1. Introduction

The current work aims to bring fossil material stored at the Joanneum to a greater scientific audience via printed and online publication (see GROSS 2002). Most of the fossil crocodylian specimens in this museum comprise the type material of the classical publications by PRANGNER (1845) and HOFMANN (1887a). The fossil remains described by HOFMANN (1887a) were acquired through a donation (01.02.2007) of the Institute for Earth Sciences (University of Graz) to the Landesmuseum Joanneum (Geology & Palaeontology). Apart from three specimens found at Wagna (Austria) and Trbovlje (Slovenia), the type specimens and all other crocodylian remains originate from Middle Miocene strata of the Wies-Eibiswald coal-mining district in south-eastern Styria. Figure 1 provides an overview of the mentioned localities.

This catalogue indexes the current **name of the object**, its **inventory number** (Inv.No.) and **figure number** herein, followed by a listing of **previous descriptions** and references. Afterwards a **short description** as well as the dimensions of the whole specimen is specified. The term "**Locality**" refers to the nation state (e.g. A = Austria), federal state (e.g. Stmk. = Styria) and community (e.g. Wies) of the finding place. Behind this, number and sheet of the **Austrian Map** 1:50.000 (ÖK 50-BMN) and the **coordinates** are given. The following **numbers in brackets** indicate the accuracy of the site localisation within in a radius of [1] = 250 m, [2] = 500 m, [3] = 1000 m, [4] = 5000 m. No specification means a precision of about some tens of metres. Data field "**Stratigraphy**" offers information about litho-, bio- and chronostratigraphical position. A careful examination of the occasionally tricky history of the specimens ("**Acquisition**") supplies additional data to the exact localisation, circumstances of discovery and stratigraphy.

The "**Remarks**" point to casts of specimens or some information to their collection history, locality, etc. Supplementary data like storage, state of preparation, borrowing etc. is available on request at the Joanneum.

Fig. 1: Overview of fossil crocodylian locations mentioned in this catalogue.
Abb. 1: Überblick zu den im Text erwähnten Lokalitäten mit fossilen Krokodilresten.

2. The fossil crocodylians at the Joanneum

2.1. Crocodylia – Some background information

The Crocodylia comprises taxa as old as the Late Triassic and is composed of three main suborders including Protosuchia, Mesoeucrocodylia and Eusuchia (Gmelin 1789; Martin & Benton 2008). This classification is based on palatal and vertebral morphology.

Modern-day crocodylians are all eusuchians and consist of twenty-three species, which can be included in the following three families: Alligatoridae, Crocodylidae and Gavialidae. They all belong to a lineage that extends back to the Cretaceous and radiated throughout the Cenozoic. The family Gavialidae is currently represented by two long-snouted species, *Gavialis gangeticus* and *Tomistoma schlegelii*. Alligatoridae includes only two extant *Alligator* species and the South American caimans. The remaining species belong to Crocodylidae. Alligatoridae and Crocodylidae can be differentiated on the basis of their pattern of occlusion: Alligatoridae tend to show an overbite whereas the dentition of Crocodylidae shows upper teeth interfingering with lower teeth.

Fossil crocodylians deposited at the Joanneum are relatives of extant alligators but under the current hypothesis, their position lies in a more basal group than Alligatoridae (Brochu 1999; Piras & Buscalioni 2006). These Austrian crocodylians are included in the family Diplocynodontidae.

Most eusuchians are adapted to a semi-aquatic environment. The rostrum of such aquatically adapted crocodylians has a low profile with a dorsoventrally compressed snout. The remains of primitive alligatoroids do not differ drastically from those of extant members. A skull outline, representing a hypothetic diplocynodontid, is given in Figure 2 in order to help the reader to understand the anatomical position of the skeletal elements mentioned in the text.

Extant crocodylians can only tolerate warm climatic conditions. As a consequence, they are mostly distributed around the tropics with a single exception at a temperate latitude: *Alligator sinensis*. Fossil crocodylians, particularly eusuchians have been used as indicators of past climatic conditions (Berg 1965; Markwick 1998; Böhme 2003). Their presence in the Middle Miocene of Austria indicates subtropical conditions during the Mid-Miocene climate optimum, in agreement with studies on isotopes and floras (Zachos et al. 2001; Mosbrugger et al. 2005; Kvacek et al. 2006; Kovac et al. 2007).

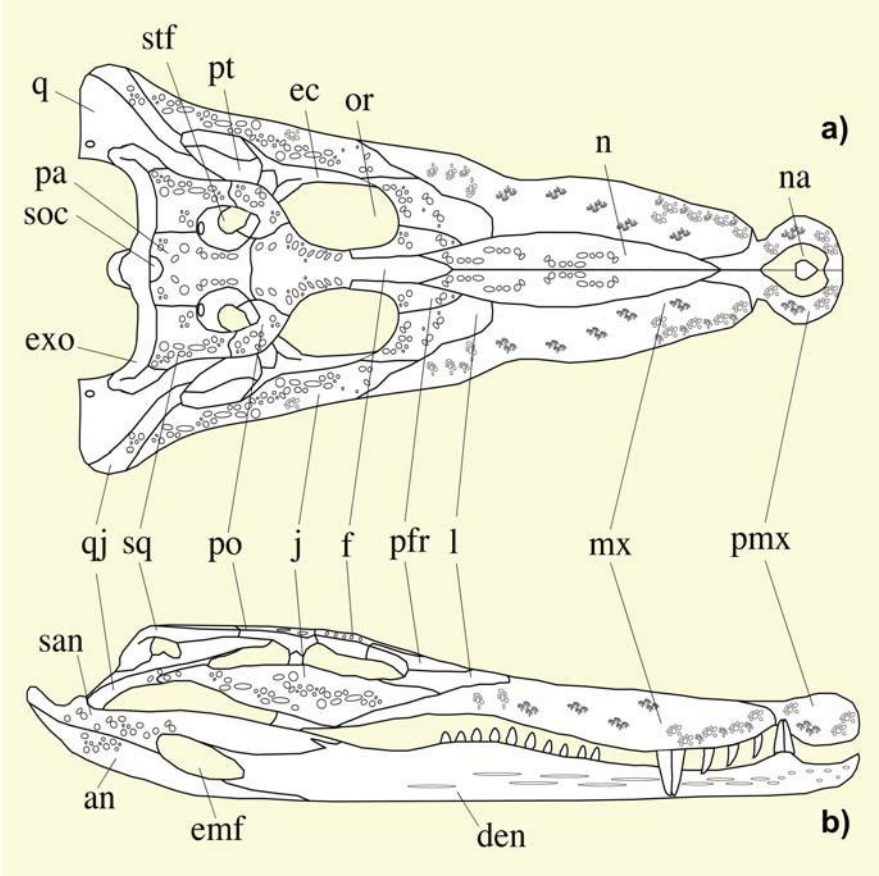


Fig. 2: Hypothetical reconstruction of a diplocynodontid skull. a) Dorsal view. b) Right lateral view (**an**, angular; **den**, dentary; **ec**, ectopterygoid; **emf**, external mandibular fenestra; **exo**, exoccipital; **f**, frontal; **j**, jugal; **l**, lacrimal; **mx**, maxilla; **n**, nasal; **na**, naris; **or**, orbit; **pa**, parietal; **pfr**, prefrontal; **pmx**, premaxilla; **po**, postorbital; **pt**, pterygoid; **q**, quadrate; **qj**, quadratojugal; **san**, surangular; **soc**, supraoccipital; **stf**, supratemporal fenestra; **sq**, squamosal).

Abb. 2: Hypothetische Rekonstruktion eines diplocynodontiden Schädels. a) Dorsalansicht. b) Lateralansicht von rechts (**an**, Angulare; **den**, Dentale; **ec**, Ectopterygoid; **emf**, Externes Mandibelfenster; **exo**, Exoccipitale; **f**, Frontale; **j**, Jugale; **l**, Lacrimale; **mx**, Maxillare; **n**, Nasale; **na**, Naris anterior externum; **or**, Orbita; **pa**, Parietale; **pfr**, Präfrontale; **pmx**, Prämaxillare; **po**, Postfrontale; **pt**, Pterygoid; **q**, Quadratum; **qj**, Quadratojugale; **san**, Supraangulare; **soc**, Supraoccipitale; **stf**, Supratemporalfenster; **sq**, Squamosum).

2.2. Remarks on the geology and stratigraphy of the Wies-Eibiswald coal-mining district

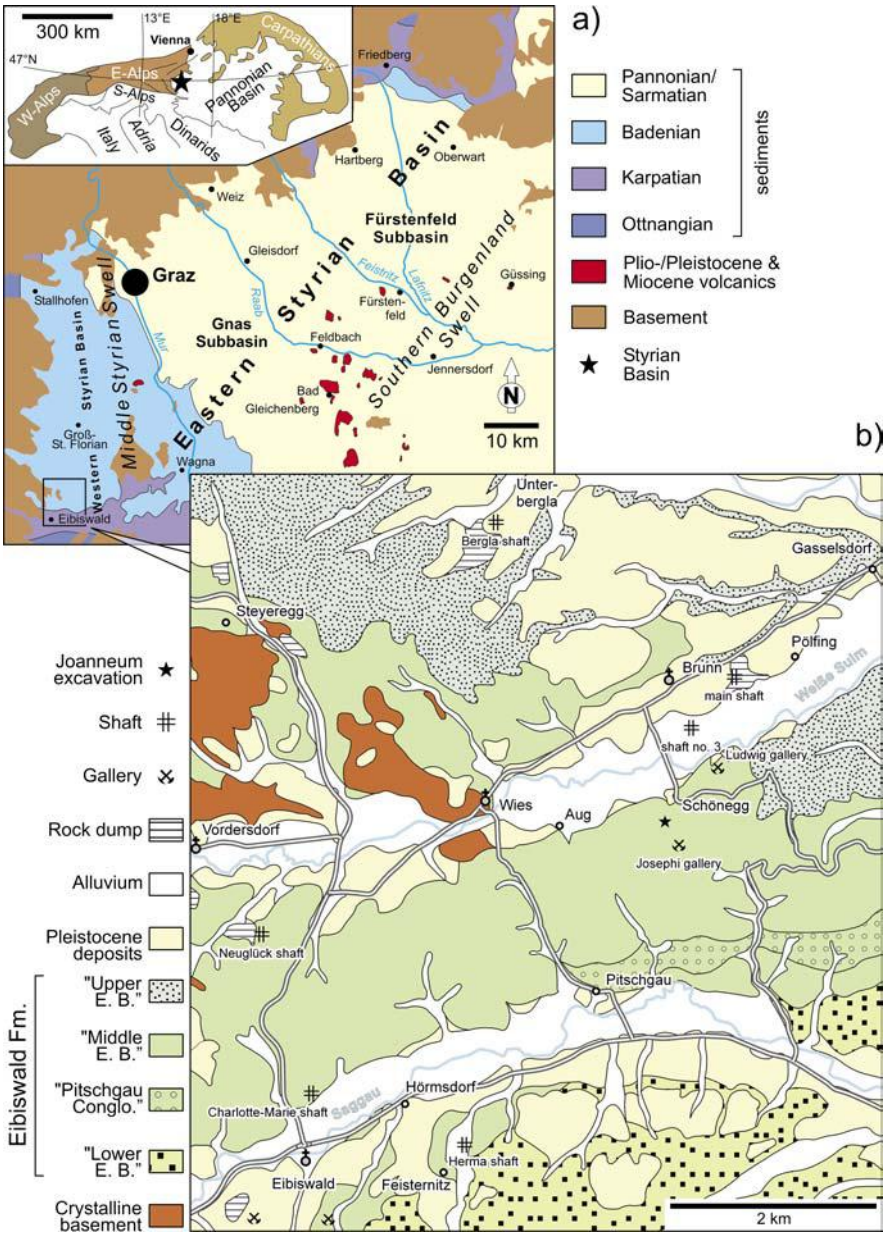
The Wies-Eibiswald mining area is located in the Styrian Neogene Basin, which is the westernmost subbasin of the Pannonian Basin (EBNER & SACHSENHOFER 1991, see GROSS et al. 2007 for a recent compilation; Fig. 3a). Palaeogeographically the Styrian Basin belongs to the Central Paratethys for which regional chronostratigraphical stages are in use (see recent review in PILLER et al. 2007).

Detached by a Paleozoic basement high (Middle Styrian Swell) from the Eastern Styrian Basin the Western Styrian Basin comprises three main depocentres (embayments of Stallhofen, Groß-St. Florian, Eibiswald). Siliciclastic sediments of the Radl and Eibiswald Formation, about 1000 m thick and ranging in age from Early to Middle Miocene, constitute the filling of the embayment of Eibiswald (WINKLER 1927; STINGL 1994; GRUBER et al. 2003; Fig. 3b). Mainly coarse-grained, alluvial fan (Radl Fm.) and fan-delta deposits ("Lower Eibiswald Beds"; the more distal complement of the Radl Fm.) are developed at the base. Due to the formation of two main coal seams (Eibiswald/Vordersdorf and Wies coal seam) the overlying part of the Eibiswald Fm. is divided informally into the "Middle Eibiswald Beds" and the "Upper Eibiswald Beds" (Fig. 4). During the era of coal mining, ranging from the 18th to the 20th century (WEBER & WEISS 1983), many vertebrate (for a compilation see MOTTL 1970) and plant remains (ETTINGSHAUSEN 1890, 1891) were found. Nevertheless, a modern revision of those fossils is lacking up to now.

Recent radiometric dating of tuffitic layers just above the Eibiswald/Vordersdorf coal seam indicates an age of 15.22 (+/-0.17) Ma (Early Badenian, MN5; HANDLER et al. 2006), which is in contrast to the earlier proposed Karpatian age based on mammal faunas (MOTTL 1961; KOLLMANN 1965; DAXNER-HÖCK 2003a; Fig. 4).

Up section the low-lying, freshwater mire facies of the Eibiswald/Vordersdorf coal seam turns into a limnic-deltaic sedimentary environment (NEBERT 1983; GRUBER et al. 2003), which is possibly linked with the eustatic sea level rise in Early Badenian times (FRIEBE 1990; KOVAC et al. 2004, 2007). The following regressive period is marked by the deposition of coarse gravels of a braided river system ("Pitschgau Conglomerate").

Fig. 3: a) Position and simplified geological map of the Styrian Basin. b) Geological map of the Wies-Eibiswald coal-mining area (E. B. = Eibiswald Beds; after BECK-MANNAGETTA & STINGL 2002) and position of some relevant localities (data from RADIMSKY 1875; WEBER & WEISS 1983 and unpublished reports, archive provincial museum Joanneum).
Abb. 3: a) Lage und vereinfachte geologische Karte des Steirischen Beckens. b) Geologische Karte des Wies-Eibiswalder Kohlereviers (E. B. = Eibiswalder Schichten; nach BECK-MANNAGETTA & STINGL 2002) und Lage einiger wichtiger Fundlokalitäten (Daten aus RADIMSKY 1875; WEBER & WEISS 1983 und unpublizierten Berichten, Archiv Landesmuseum Joanneum).


a)
300 km
13°E
18°E
47°N
Vienna
E-Alps
S-Alps
W-Alps
Italy
Adria
Dinarids
Pannonian Basin
Carpathians
Pannonian/ Sarmatian
Badenian
Karpatian
Ottnangian
sediments
Plio-/Pleistocene & Miocene volcanics
Basement
Styrian Basin
Friedberg
Hartberg
Oberwart
Weiz
Fürstenfeld Subbasin
Styrian Basin
Gleisdorf
Graz
Stallhofen
Styrian Basin
Middle Styrian Swell
Gnas Subbasin
Mur
Raab
Feistritz
Lafnitz
Fürsten-feld
Güssing
Feldbach
Jennersdorf
Southern Burgenland Swell
Eastern
Bad Gleichenberg
N
10 km
Groß-St. Florian
Wagna
Western
Eibiswald
b)
Joanneum excavation
Shaft
Gallery
Rock dump
Alluvium
Pleistocene deposits
Eibiswald Fm.
"Upper E. B."
"Middle E. B."
"Pitschgau Conglo."
"Lower E. B."
Crystalline basement
Unter-bergla
Bergla shaft
Gasselsdorf
Steyeregg
Polfing
Brunn
main shaft
Weiße Sulm
shaft no. 3
Ludwig gallery
Wies
Aug
Schönegg
Josephi gallery
Vordersdorf
Neuglück shaft
Pitschgau
Hörmsdorf
Charlotte-Marie shaft
Saggau
Herma shaft
Eibiswald
Feisternitz
2 km

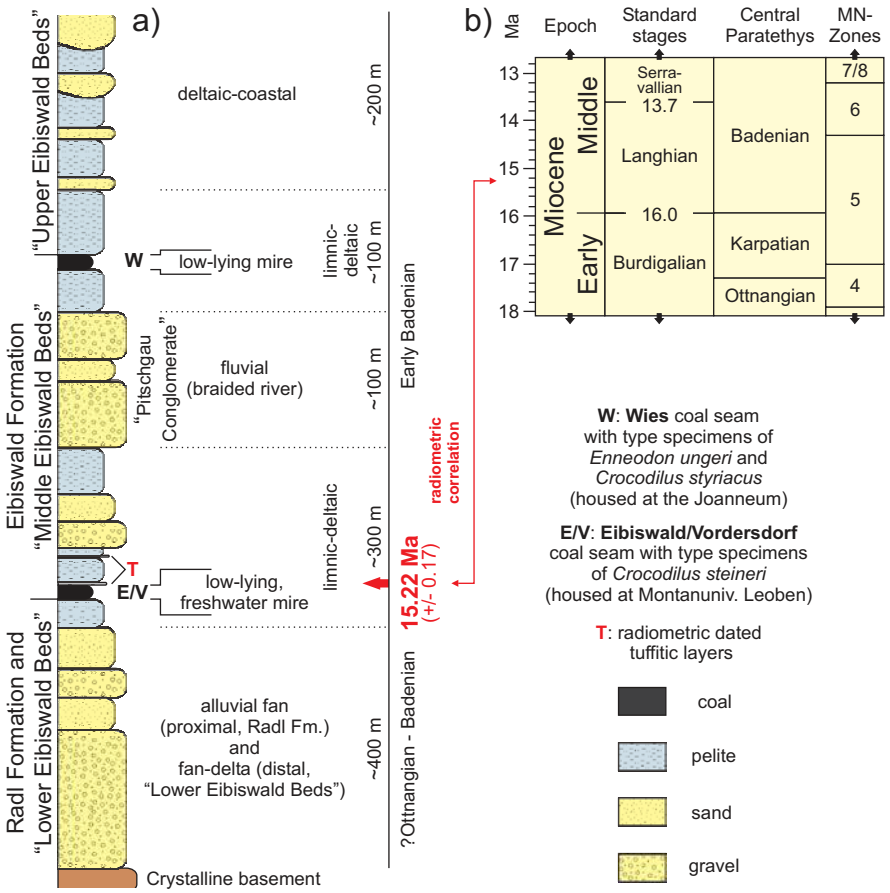


Fig. 4: a) Lithostratigraphy, facies interpretation and position of the Wies and Eibiswald/Vordersdorf coal seams (after NEBERT 1983; GRUBER et al. 2003; HANDLER et al. 2006). b) Correlation with Standard stages, Central Paratethys stages and Neogene Mammal-Zones.
Abb. 4: a) Lithostratigraphie, Faziesinterpretation und Position der Kohleflöze von Wies und Eibiswald/Vordersdorf (nach NEBERT 1983; GRUBER et al. 2003; HANDLER et al. 2006). b) Korrelation mit Standard Stufen, Stufen der Zentralen Paratethys und Neogenen Säugetier-Zonen.

Limnic-deltaic sediments of the overlying beds and again the growth of a low-lying mire (Wies coal seam) with rather high sulphur contents point to a subsequent transgressive phase. HIDEN & STINGL (1998) and GRUBER et al. (2003) discuss some influence of brackish waters from the nearby lagoonal area in the northern Groß-St. Florian embayment.

The type specimens of PRANGNER (1845; *Enneodon ungeri*) and HOFMANN (1887a; *Crocodilus* (*Alligator*) *styriacus*) and most of the other crocodylian remains housed at the Joanneum were found in the hanging wall of the Wies coal seam, which might be about less than 1 Ma younger than the Eibiswald/Vordersdorf coal seam according to the calculations of NEBERT (1983).

3. Catalogue of fossil crocodylians at the Joanneum

Abbreviations: Acqu.-B. Univ. Graz = ACQUISITION BOOK University of Graz, Inv.B. = Inventory book Joanneum, Inv.No. = Inventory number Joanneum, Inv.slip = Inventory slip Joanneum, Jb. Landesmus. Joanneum = JAHRESBERICHTE des steiermärkisch-landschaftlichen Joanneums zu Graz resp. des steiermärkischen Landesmuseums Joanneum, A = Austria, SLO = Slovenia, Stmk. = Styria.

Ordo Crocodylia GMELIN, 1789
Subordo Eusuchia HUXLEY, 1875
Suprafamilia Alligatoroidea GRAY, 1844
Familia Diplocynodontidae (BROCHU, 1999)
Genus *Diplocynodon* POMEL, 1847

Taxonomical remarks

In Austria, the first fossil crocodylian was recovered at Schönegg. PRANGNER (1845) described and figured this material under the name *Enneodon ungeri*, consisting of a rostrum in ventral view (Inv.No. 1774; Fig. 5). This material was latter renamed *Crocodilus ungeri* by FITZINGER (1846). HOFMANN (1887a) erected two new species: *Crocodilus steineri* from Vordersdorf (level of the Eibiswald/Vordersdorf coal seam; see Fig. 4), whose holotype consists of a complete skull and jaw in connection (material housed at the Montanuniversität Leoben) and *Crocodilus* (*Alligator*) *styriacus* from Schönegg (level of the Wies coal seam). This distinction was made on the basis of some divergences in tooth morphology, tooth count and shapes of the mandible. Later HOFMANN (1887b) reported about *C. steineri* fossils from Schönegg and Brunn (level of the Wies coal seam).

The genus *Diplocynodon* POMEL, 1847 was applied by ROGER (1898a) to these crocodylian remains from Austria for the first time and he used the name *Diplocynodon* cf. *steineri* and *Diplocynodon steineri* (Roger 1898a, b) for disarticulated cranial and postcranial elements from Stätzling (Germany, Bavaria, Early Badenian). ROGER (1902) continued to use the name *D. steineri*, just mentioning that HOFMANN (1887a) described two species of *Diplocynodon* but he did not explain why he used the name *D. steineri* and not *D. styriacus*.

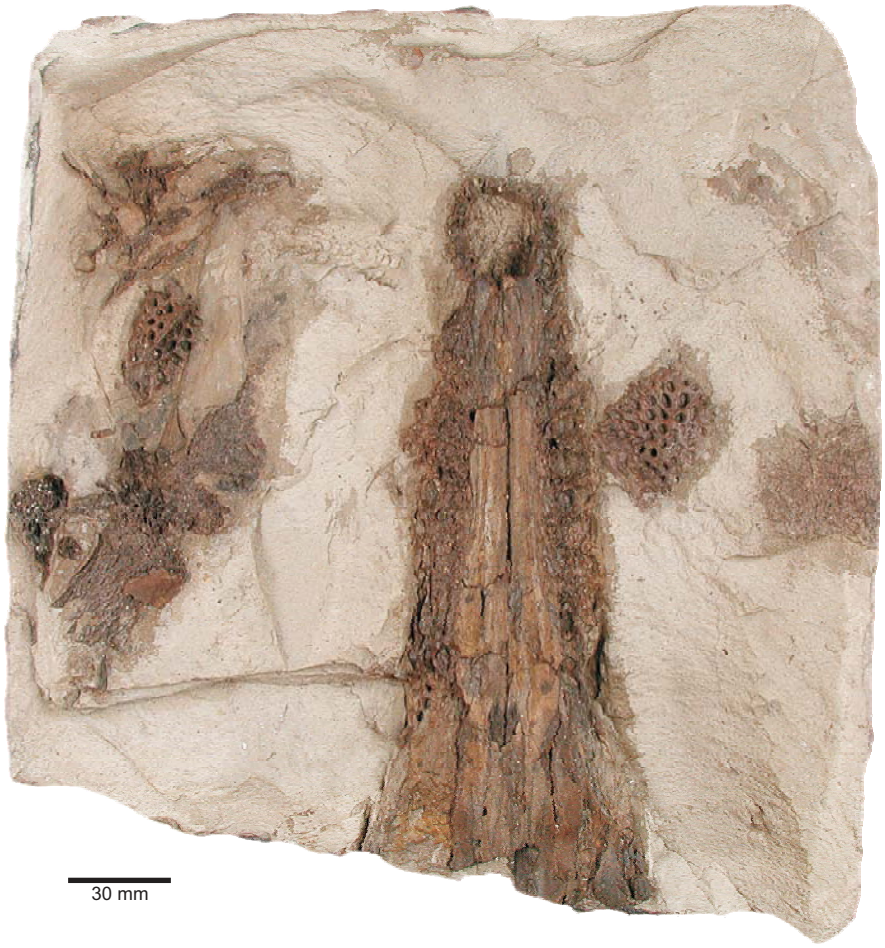


Fig. 5: Holotype of *Enneodon ungeri* PRANGNER, 1845 (Schönegg, Inv.No. 1774). Rostrum in ventral view, postcranial fragments and osteoderms.
Abb. 5: Holotypus von *Enneodon ungeri* PRANGNER, 1845 (Schönegg, Inv.Nr. 1774). Rostrum in Ventralansicht, postcraniale Reste und Osteoderme.

Later on KUHN (1936) regrouped the species *ungeri*, *steineri* and *styriacus* under the genus *Crocodilus*. But THENIUS (1955) replaced the generic name *Crocodilus* by *Diplocynodon* once again, based on dentition, mandible morphology and ventral osteoderms. THENIUS believed *D. steineri* and *D. styriacus* to be two valid species. However, he did not provide an extensive comparison, nor did he explain the status of *D. steineri*. He also noted differences between *D. ungeri* and *D. styriacus* but the original material of *ungeri* was inaccessible at that time (see KÜHN 1952).

In the last re-evaluation of the crocodylian remains from Styria, BERG (1966) favoured the species name *styriacus* because the jaw related with that name offers a better diagnosis. Therefore *D. steineri* was considered as a junior synonym of *D. styriacus*. Furthermore BERG (1966) discussed a possible synonymy of *E. ungeri* with *D. styriacus*.

Given that *E. ungeri* comes from the same site as the remains attributed to *D. steineri* and *D. styriacus*, a careful examination of the type material is in progress by J.M. & M.G. If it could be proved that all specimens from the Wies-Eibiswald coal-mining district belong to the same species and could be placed within the genus *Diplocynodon*, the species *ungeri* has priority. Ongoing investigations should clarify the question whether the material should be renamed *Diplocynodon ungeri* or not and whether the genus *Enneodon* PRANGNER, 1845 has priority over *Diplocynodon* POMEL, 1847. Pending such revision, the material in question will be catalogued under the name *Enneodon ungeri* PRANGNER, 1845 and other remains from Eibiswald and Schönegg will preliminary be identified as *Diplocynodon styriacus* (HOFMANN, 1887a) in this work.

Type specimens of PRANGNER (1845)

***Enneodon ungeri* PRANGNER, 1845**, Inv.No. 1774, Fig. 5
Enneodon Ungeri – PRANGNER 1845: 114-139, pl. 1, figs. a-r. [holotype]
[*Crocodilus*] *Enneodon ungeri* – FITZINGER 1846: 190. [reference material]
Crocodilus Ungeri Prangn. – HOFMANN 1887a: 35. [reference material]
?*D. styriacus* – BERG 1966: 38. [reference material]

Description: Block containing the anterior portion of a rostrum (premaxillae and maxillae) in ventral view. Postcranial elements associated with two osteoderms and a fragmentary neural arch; length of the specimen = 237 mm, width = 216 mm.
Locality: A, Stmk., Wies; "... zu Wies, eine Viertelstunde von Schöneck entfernt, [...] aus verhärtetem Thone bestehenden Dachgesteines ..." [Wies/Schöneck, from the overlying indurated pelites] (PRANGNER 1845: 114); ÖK 50 sheet Eibiswald 206; WGS84 15°18'E/46°43'N [3].
Stratigraphy: "Mittlere Eibiswalder Schichten" resp. "Middle Eibiswald Beds", level of the Wies coal seam (WINKLER 1924: 94, 1927: 103, 106-107; NEBERT 1983: 272-273; HANDLER et al. 2006: 489); MN5 (see MOTTL 1970: 5, 11-12; DAXNER-HÖCK 2003b: 280; HANDLER et al. 2006: 489); Lower Badenian resp. Lower Langhian (GRUBER et al. 2003: 16; HANDLER et al. 2006: 491).
Acquisition: 1) "[...] in den Besitz des hiesigen k. k. Aerarial-Schurf-Commissärs Herrn Spiske kam. [...] Professor Franz Unger, dem dieses Petrefact von dem Eigenthümer mitgetheilt wurde, [...] übergab mir diese Platte" [acquired by the local mining commissioner Mr. Spiske [...] Professor Franz Unger, which gained this fossil from the owner [...] committed this slab to me] (PRANGNER 1845: 114); 2) "1884 Tausch mit

Hüttenverwalter Spieske" [exchange with worksmanager Spieske] (Inv.slip; see Jb. Landesmus. Joanneum 1885: 4).
Remarks: Specimen rediscovered by M. Mottl in the collection of the Joanneum (see Kühn 1952: 11; Thenius 1955: 188; Berg 1966: 38).

***Enneodon ungeri* Prangner, 1845**, Inv.No. 1775, Fig. 6
Description: Slab with mixed osteoderms, broken postcranial elements and possible gastralia; length of the specimen = 470 mm, width = 380 mm.
Locality: A, Stmk., Wies; "Wies" (Inv.slip; see Inv.No. 1774); WGS84 15°18'E/ 46°43'N [3].
Stratigraphy: See Inv.No. 1774.
Acquisition: "1884 Tausch mit Hüttenverwalter Spiesky" [exchange with worksmanager Spieske] (Inv.slip; see Jb. Landesmus. Joanneum 1885: 4).
Remarks: Certainly the same finding as Inv.No. 1774.

Type specimens of Hofmann (1887a)

The subsequent specimens (all figured in Hofmann 1887a: pls. 14 and 15) belong to one individual Hofmann (1887a: 33). The arrangement of these fossils in figures 7-8 follows Hofmann (1887a).

***Diplocynodon styriacus* (Hofmann, 1887a)**, Inv.No. 203838, Fig. 7a
Crocodilus (*Alligator*) *styriacus* nov. spec. – Hofmann 1887a: 33, pl. 14, fig. 1. [holotype]
Crocodilus styriacus Hofmann 1886 – Kuhn 1936: 129 [reference material]
Diplocynodon styriacus (Hofmann) – Thenius 1955: 187. [reference material]
D. styriacus (Hofmann 1885) – Berg 1966: 38, pl. 3, fig. 18. [figured specimen]

Description: Left and right dentary in connection; length of the specimen = 380 mm, width = 180 mm.
Locality: A, Stmk., Pölfing-Brunn; "... aus dem zweiten Flötze des Ludwig-Stollens, 0.2 m über d. Kohle, Schönegg b. Wies" [from the second coal seam of the Ludwig-gallery, 0.2 m above the coal] (Acqu.-B. Univ. Graz 1886: 19, see Hofmann 1887a: 27, 33; Weber & Weiss 1983: 7); ÖK 50 sheet Eibiswald 206; WGS84 15°18'07" E/ 46°43'16" N [1].
Stratigraphy: See Inv.No. 1774.
Acquisition: 1) "Geschenk von Herrn Direktor Rochlitzer" [present of Mr. director Rochlitzer] (Acqu.-B. Univ. Graz 1886: 19; see Hofmann 1887a: 27); 2) donation (01.02.2007) of the Institute for Earth Sciences (University of Graz) to the Landesmuseum Joanneum (Geology & Palaeontology).
Remarks: Original to cast Inv.No. 5776.

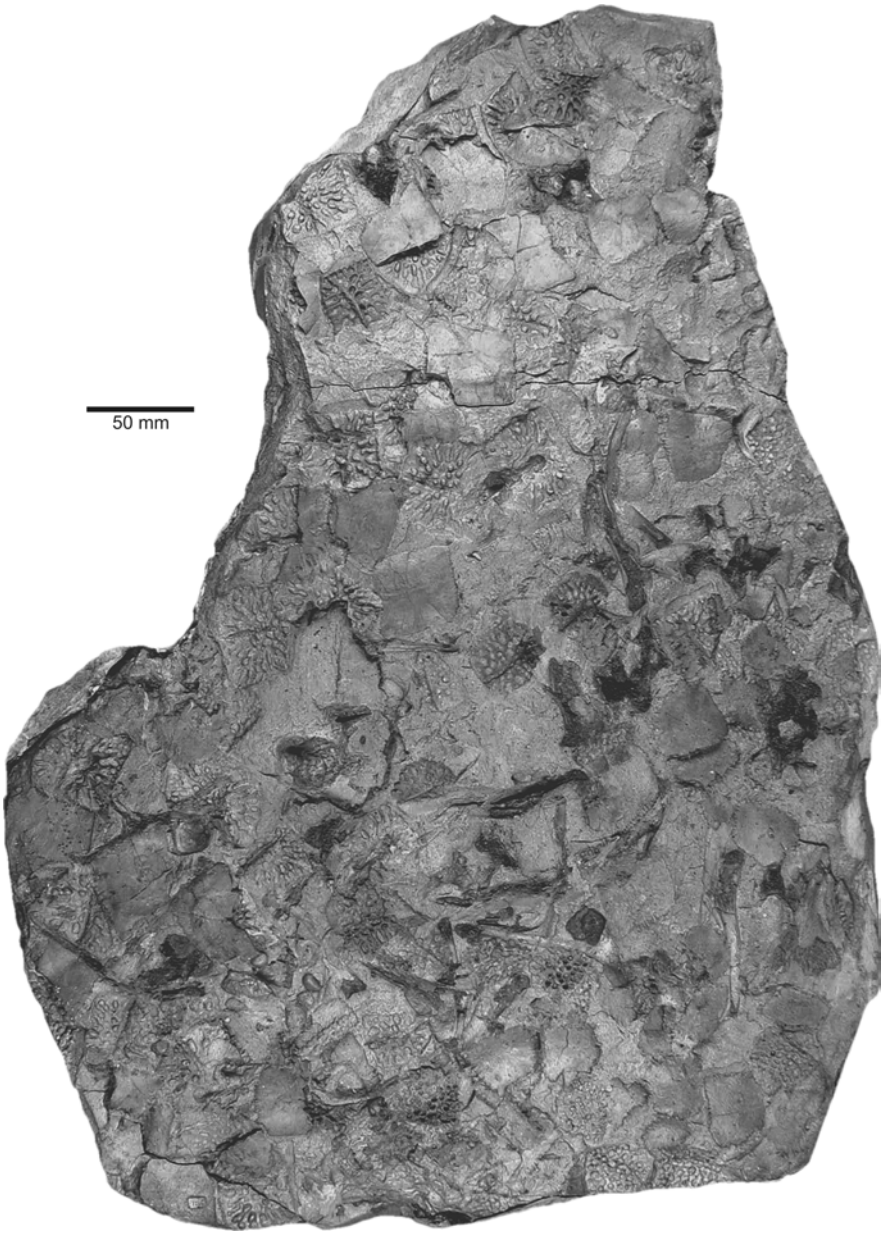


Fig. 6: Paratype of *Enneodon ungeri* PRANGNER, 1845 (Schönegg, Inv.No. 1775). Osteoderms and some postcranial elements.
Abb. 6: Paratypus zu *Enneodon ungeri* PRANGNER, 1845 (Schönegg, Inv.Nr. 1775). Osteoderme und einige postcraniale Elemente.

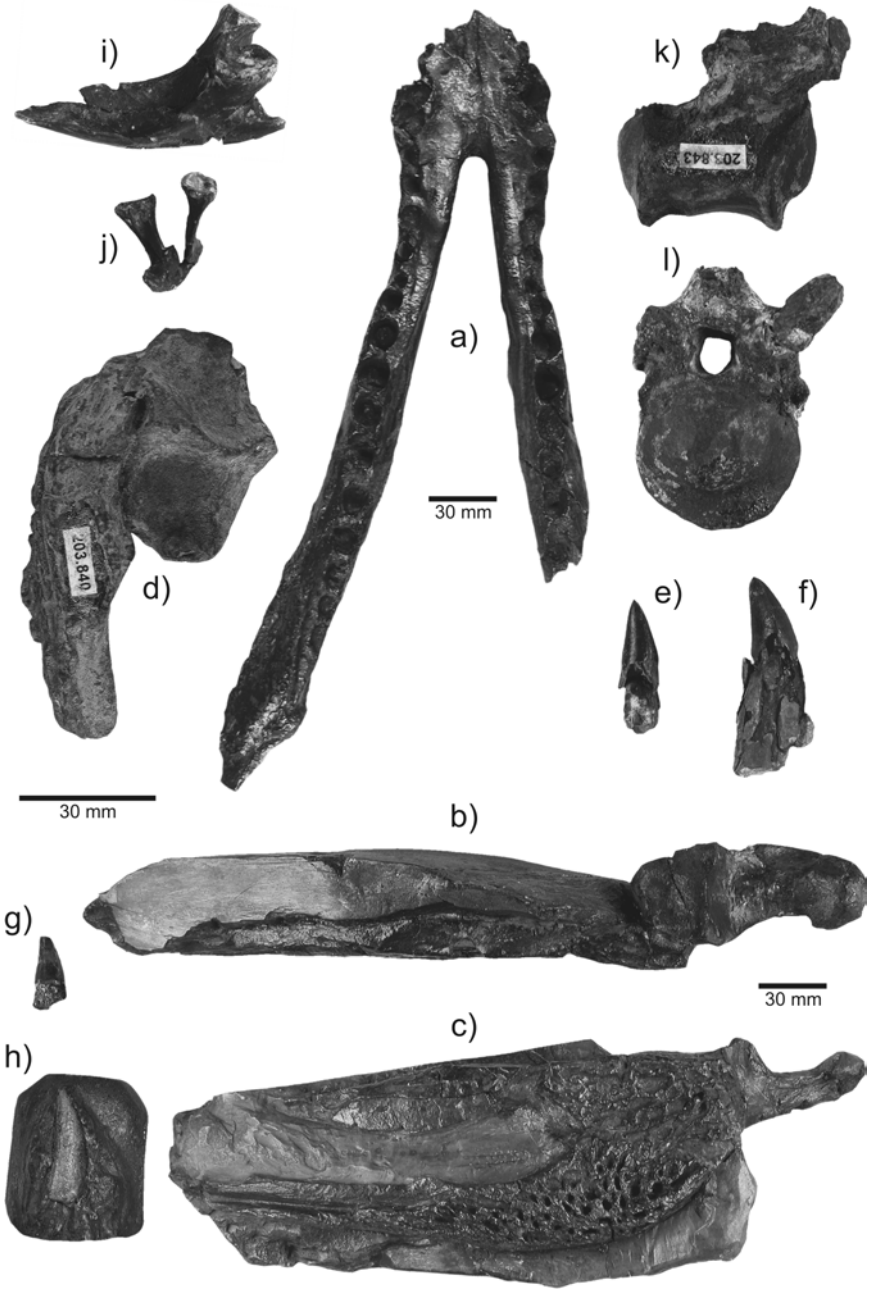
***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5776
Description: Cast of Inv.No. 203838; length of the specimen = 370 mm, width = 195 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: "Tausch [...] vom Vorstande des geologischen Institutes der Universität in Graz, Herrn Professor Dr. Rudolf Hoernes" [exchange with the head of the Geological Institute (University of Graz) Mr. Prof. Dr. Rudolf Hoernes] (Jb. Landesmus. Joanneum 1895: 22).

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203839, Figs. 7b-c
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33, pl. 14, figs. 2a, b. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129 [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]
D. styriacus (HOFMANN 1885) – BERG 1966: 38. [reference material]

Description: Left posterior part of a mandible. Connected surangular, angular and articular are presented in lateral view. Medial view is obscured by sediment; length of the specimen = 280 mm, width = 95 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to cast Inv.No. 5778.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5778
Description: Cast of Inv.No. 203853; length of the specimen = 280 mm, width = 90 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

Fig. 7: Type specimens of *Diplocynodon styriacus* (HOFMANN, 1887a) (Schönegg). a) Mandible (Inv.No. 203838). b-c) Posterior part of a left mandible (Inv.No. 203839; b) in dorsal and c) lateral view). d) Right surangular and articular in dorsal view (Inv.No. 203840). e-g) isolated teeth (Inv.No. 203841). h) Cast, isolated tooth (Inv.No. 5785). i-j) Left cervical rib (Inv.No. 203842; i) medial view, j) anterior view). k-l) Caudal vertebra (Inv.No. 203843; k) left lateral view, l) anterior view). Note the different scale bars for a, b-c, d-l.
Abb. 7: Typusexemplar von *Diplocynodon styriacus* (HOFMANN, 1887a) (Schönegg). a) Unterkiefer (Inv.Nr. 203838). b-c) Posteriorer Teil des linken Unterkiefers (Inv.Nr. 203839; b) in Dorsal- und c) in Lateralansicht). d) Teil des rechten Oberkiefers und rechten Unterkiefers in Dorsalansicht (Inv.Nr. 203840). e-g) Isolierte Zähne (Inv.Nr. 203841). h) Abguss, isolierter Zahn (Inv.Nr. 5785). i-j) Linke Halsrippe (Inv.Nr. 203842; i) von innen, j) von anterior). k-l) Caudalwirbel (Inv.Nr. 203843; k) von links, l) von anterior). Unterschiedlicher Maßstab für a, b-c, d-l.


i)
j)
a)
k)
205.843
l)
d)
203.840
30 mm
e)
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30 mm
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30 mm
c)
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***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203840, Fig. 7d
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33, pl. 14, fig. 3. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129 [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Right fragmentary surangular and articular in connection; length of the specimen = 85 mm, width = 40 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to cast Inv.No. 5787.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5787
Description: Cast of 203840; length of the specimen = 85 mm, width = 40 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203841, Figs. 7e-g
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 34, pl. 14, figs. 4-6. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129 [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Three isolated teeth; length of the specimen on pl. 14, fig. 5 of HOFMANN (1887a) = 30 mm, width = 17 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to casts Inv.No. 5785. The tooth on pl. 14 (fig. 7) of HOFMANN (1887a) is missing for this reason we figure the cast on Fig. 7h.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5785, Fig. 7h
Description: Four casts of isolated teeth; casts of Inv.No. 203841; length of the specimen on pl. 14, fig. 5 of HOFMANN (1887a) = 55 mm, width = 35 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203842, Figs. 7i-j
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 34, pl. 14, figs. 8a, b. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129 [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Left cervical rib; length of the specimen = 60 mm, width = 30 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to cast Inv.No. 5784.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5784
Description: Cast of Inv.No. 203842; length of the specimen = 60 mm, width = 30 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203843, Figs. 7k-l
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33-34, pl. 14, figs. 9a, b. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129 [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Caudal vertebra with biconvex centrum and fragmentary neural arch; length of the specimen = 45 mm, width = 30 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to cast Inv.No. 5786.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5786
Description: Cast of Inv.No. 203843; length of the specimen = 45 mm, width = 30 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5790, Fig. 8a
see *Crocodilus* (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 34, pl. 15, fig. 1.
see *Crocodilus styriacus* Hofmann 1886 – KUHN 1936: 129.
see *Diplocynodon styriacus* (Hofmann) – THENIUS 1955: 187.

Description: Cast of two caudal vertebrae; length of the specimen = 110 mm, width = 55 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.
Remarks: Original missing.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203844, Figs. 8b-c
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33, pl. 15, figs. 2a, b. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

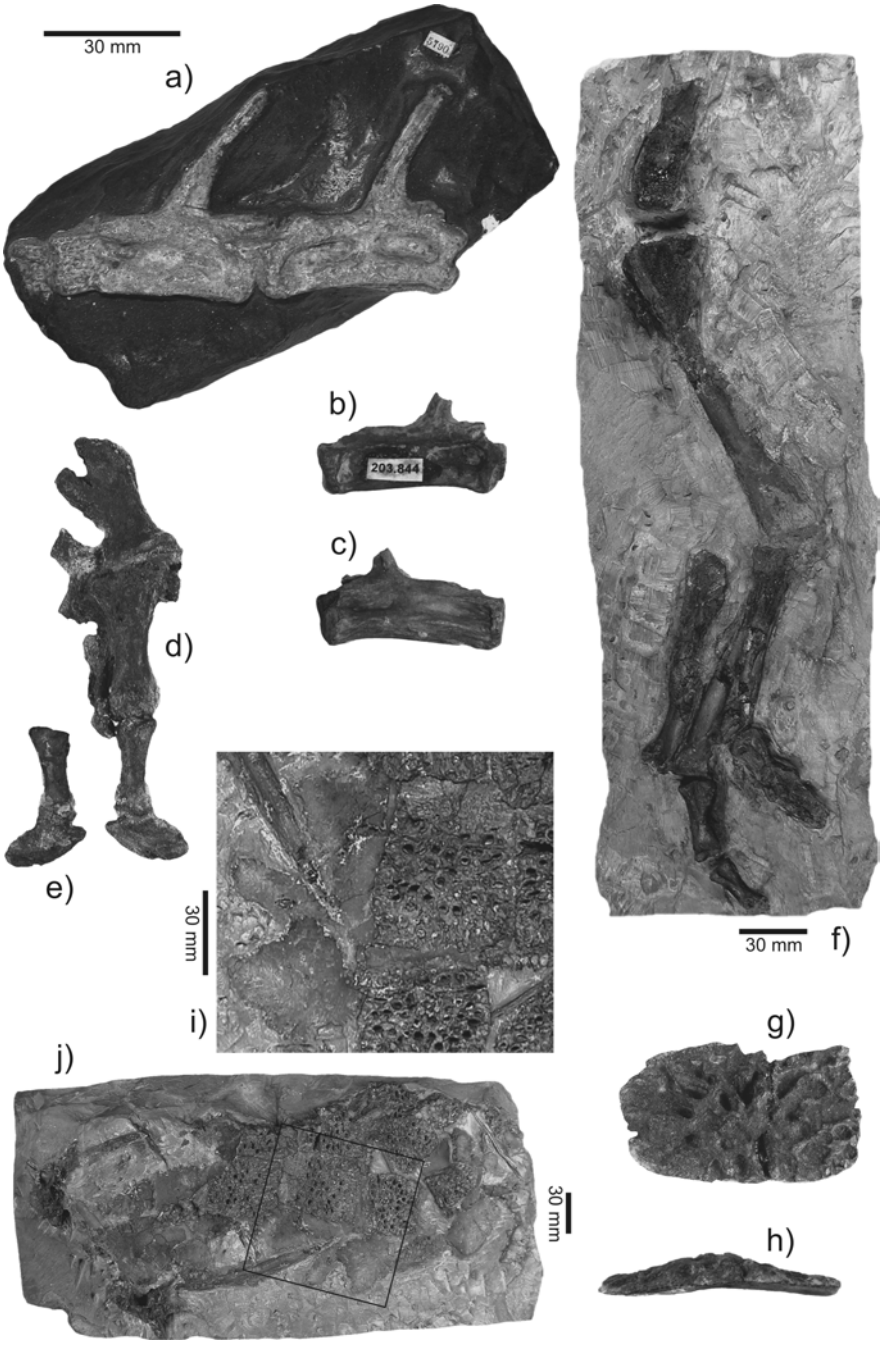
Description: Caudal vertebra; length of the specimen = 39 mm, width = 22 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to cast Inv.No. 5788.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5788
Description: Cast of Inv.No. 203844; length of the specimen = 62 mm, width = 48 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203845, Figs. 8d-e
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33, pl. 15, figs. 3a, b. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Proximal part of a front limb with radiale, metacarpal, phalanx and claw in connection; length of the specimen = 90 mm, width = 28 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to cast Inv.No. 5791.

Fig. 8: Type specimens of *Diplocynodon styriacus* (HOFMANN, 1887a) (Schönegg). a) Cast, caudal vertebrae, in left lateral view (Inv.No. 5790). b-c) Caudal vertebrae (Inv.No. 203844; b) left lateral view, c) right lateral view). d-e) Proximal part of a front limb (Inv.No. 203845; d) from dorsal, e) phalanx and claw from ventral). f) Distal elements of a left limb (Inv.No. 203846). g-h) Osteoderm (Inv.No. 203847; g), dorsal view, h) lateral view). i-j) Osteoderms and some postcranial elements (Inv.No. 203848; i) detail figured by HOFMANN, j) whole slab). Note the different scale bars for a-e/g-h, f, i and j.
Abb. 8: Typusexemplar von *Diplocynodon styriacus* (HOFMANN, 1887a) (Schönegg). a) Abguss, Caudalwirbel von links (Inv.Nr. 5790). b-c) Caudalwirbel (Inv.Nr. 203844; b) von links, c) von rechts). d-e) Vorderer Teil des Vorderfusses (Inv.Nr. 203845; d) von dorsal, e) Phalanx und Klaue von ventral). f) Distale Teile eines linken Fusses (Inv.Nr. 203846). g-h) Osteoderm (Inv.Nr. 203847; g) von dorsal, h) von lateral). i-j) Osteoderme und einige Postcranialelemente (Inv.Nr. 203848; i) Ausschnitt abgebildet von HOFMANN, j) gesamtes Stück). Unterschiedlicher Maßstab für a-e/g-h, f, i and j.


30 mm
a)
b)
203.844
c)
d)
e)
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i)
30 mm
f)
g)
j)
30 mm
h)

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5791
Description: Cast of Inv.No. 203845; length of the specimen = 100 mm, width = 55 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203846, Fig. 8f
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 34, pl. 15, fig. 4. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Block with distal limb elements connected including a distal portion of femur, proximal portion of tibia, three partial metatarsals and four phalanxes; length of the specimen = 400 mm, width = 165 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to cast Inv.No. 5779.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5779
Description: Cast of Inv.No. 203846; length of the specimen = 370 mm, width = 105 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203847, Figs. 8g-h
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 34, pl. 15, figs. 5, 5a. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Osteoderm; length of the specimen = 52 mm, width = 30 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to cast Inv.No. 5792.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5792
Description: Cast of Inv.No. 203847; length of the specimen = 63 mm, width = 46 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203848, Figs. 8i-j
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 34-35, pl. 15, fig. 6. [partim, [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: A block containing a series of flat and square osteoderms in connection overlapping a reversed series of osteoderms. Two vertebrae and some ribs are visible; length of the specimen = 370 mm, width = 180 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.
Remarks: Original to cast Inv.No. 5777. HOFMANN (1887a) figured only the central part of this slab.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5777
Description: Cast of Inv.No. 203848; length of the specimen = 360 mm, width = 200 mm.
Locality & Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5776.

Paratypes of HOFMANN (1887a)

The following specimens are not figured in HOFMANN (1887a) but belong to the above cited individual according the remark of HOFMANN (1887a: 27: "... nebst einigen unbestimmbaren Knochenfragmenten, dann lose im Schieferthon eingebettete Zähne." [beside some unidentifiable bone fragments, loosely in the shale embedded teeth]) and the description in the Acqu.-B. Univ. Graz (1886: 19).

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203849, Fig. 9a
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Seven bone fragments including a phalanx, and two carpal or tarsal ends; length of the largest specimen = 45 mm, width = 15 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203850, Fig. 9b
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

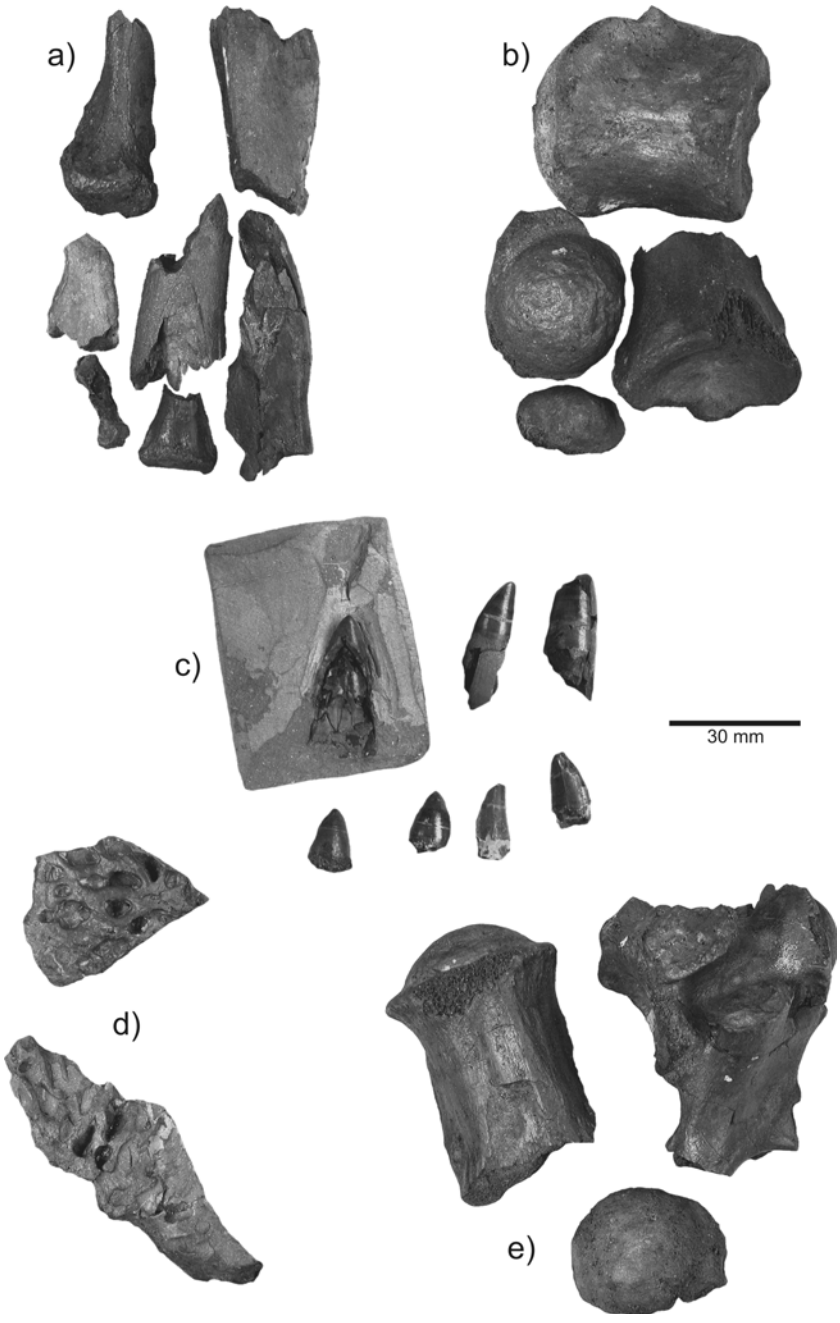

a)
b)
c)
30 mm
d)
e)

Fig. 9: Paratypes of *Diplocynodon styriacus* (HOFMANN, 1887a) (Schönegg). a) Leg fragments (Inv.No. 203849). b) Vertebrae fragments (Inv.No. 203850). c) Isolated teeth (Inv.No. 203852). d) Osteoderms (Inv.No. 203851). e) Vertebrae fragments (Inv.No. 203853).
Abb. 9: Paratypen zu *Diplocynodon styriacus* (HOFMANN, 1887a) (Schönegg). a) Fussfragmente (Inv.Nr. 203849). b) Wirbelreste (Inv.Nr. 203850). c) Isolierte Zähne (Inv.Nr. 203852). d) Osteoderme (Inv.Nr. 203851). e) Wirbelreste (Inv.Nr. 203853).

Description: An almost complete centrum and three vertebral fragments; length of the largest specimen = 36 mm, width = 35 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203851, Fig. 9d
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Two fragmentary osteoderms; length of the larger specimen = 56 mm, width = 20 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203852, Fig. 9c
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Seven isolated teeth; length of the largest specimen = 43 mm, width = 34 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.

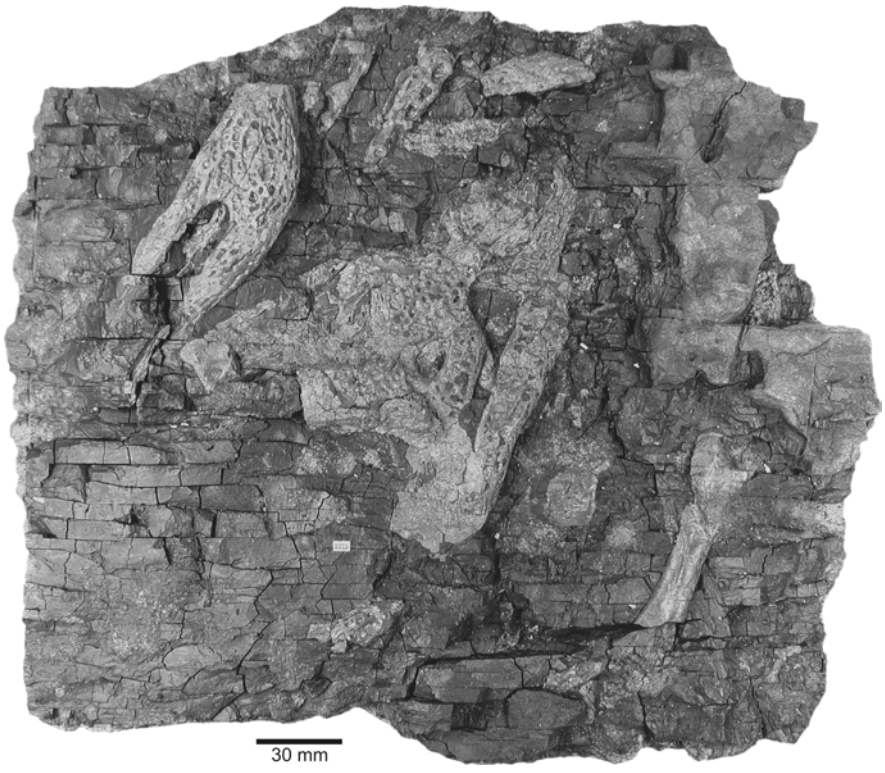
***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 203853, Fig. 9e
Crocodilus (*Alligator*) *styriacus* nov. spec. – HOFMANN 1887a: 33. [holotype]
Crocodilus styriacus Hofmann 1886 – KUHN 1936: 129. [reference material]
Diplocynodon styriacus (Hofmann) – THENIUS 1955: 187. [reference material]

Description: Three vertebral fragments including a partial cervical vertebra; length of the largest specimen = 50 mm, width = 41 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 203838.

Further crocodylian remains

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5775, Fig. 10
D. styriacus (HOFMANN 1885) – BERG 1966: 38. [reference material]

Description: Fragmentary skull table with portion of rostrum and left posterior portion of a mandible; length of the specimen = 365 mm, width = 270 mm.
Locality: A, Stmk., Eibiswald; "Eibiswald" (Inv.slip); ÖK 50 sheet Eibiswald 206; WGS84 15°14'56" E/46°41'16" N [3].
Stratigraphy: "Mittlere Eibiswalder Schichten" resp. "Middle Eibiswald Beds", level of the Eibiswald/Vordersdorf coal seam (WINKLER 1924: 94, 1927: 103, 106-107; NEBERT 1983: 272-273; HANDLER et al. 2006: 489); MN5 (see MOTTL 1970: 5, 11-12; DAXNER-HÖCK 2003b: 280; HANDLER et al. 2006: 489); Lower Badenian resp. Lower Langhian (GRUBER et al. 2003: 16; HANDLER et al. 2006: 491).
Acquisition: [donation?] "Sauer" (Inv.slip).
Remarks: Confused Inv.No. ("5757") in BERG (1966: 38).



***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5780, Fig. 11a
Description: One partial osteoderm, three fragmentary dentaries, a right portion of an angular and one block containing a posterior skull portion with two quadrate rami and the posterior most portion of a right mandible in connection. Associated with this block are osteoderms, two vertebrae, one cervical rib and a limb fragment (possibly a femur); length of the largest specimen = 140 mm, width = 70 mm.
Locality: A, Stmk., Eibiswald; "Eibiswald" (Inv.slip); WGS84 15°14'56" E/46°41'16" N [3].
Stratigraphy: See Inv.No. 5775.
Acquisition: "Alte Sammlung" [Old collection] (Inv.slip).

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5781, Fig. 11b
D. styriacus (HOFMANN 1885) – BERG 1966: 38. [reference material]

Description: Left posterior part of a mandible. Connected surangular, angular and fragmentary articular. The articular is incomplete, only the retroarticular process is preserved; length of the specimen = 125 mm, width = 65 mm.
Locality: A, Stmk., Pölfing-Brunn; "Schönegg bei Wies" (Inv.slip); ÖK 50 sheet Eibiswald 206; WGS84 15°17'53" E/46°43'14" N [3].
Stratigraphy: See Inv.No. 203838.
Acquisition: "Kauf [...] aus einer großen Privatsammlung" [purchase from a large private collection] (Jb. Landesmus. Joanneum 1897: 18).

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5782, Fig. 11c
Description: Two specimens including an almost unrecognisable crushed maxilla. Two tooth-crowns in alveoli are present on its lateral margin. The other specimen consists of the median portion of a skull table missing the supraoccipital. Supratemporal fenestrae and posteromedian margin of the orbits are visible; length of the partial skull table = 95 mm, width = 55 mm.
Locality: A, Stmk., Pölfing-Brunn; "Brunn bei Wies" (Inv.slip); ÖK 50 sheet Eibiswald 206; WGS84 15°17'42" E/46°43'48" N [3].
Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 5781.

Fig. 10: Diplocynodon styriacus (HOFMANN, 1887a) (Eibiswald, Inv.No. 5775). Fragmentary skull table with portion of rostrum and left posterior portion of a mandible.
Abb. 10: *Diplocynodon styriacus* (HOFMANN, 1887a) (Eibiswald, Inv.Nr. 5775). Schädel- und Rostrumfragment und linker posteriorer Teil der Mandibel.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 5783, Fig. 11d
Description: Two fragmentary osteoderms; length of the larger specimen = 125 mm, width = 65 mm.
Locality, Stratigraphy & Acquisition: See Inv.No. 5781.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 58788, Fig. 11e
Crocodilus ungeri Prangn. – Acqu.-B. Univ. Graz 1881: 12.

Description: Jaw fragment; length of the specimen = 48 mm, width = 20 mm.
Locality: A, Stmk., Pölfing-Brunn; "Brunn bei Wies, Hauptschacht" (Inv.slip); ÖK 50 sheet Eibiswald 206; WGS84 15°18'06" E/46°43'48" N.
Stratigraphy: See Inv.No. 203838.
Acquisition: 1) "Geschenk von Herrn Direktor V. Radimsky in Wies" [present of Mr. director V. Radimsky] (Acqu.-B. Univ. Graz 1881: 12; see RADIMSKY 1875: 78); 2) "Geschenk des Geol. Institutes der Universität Graz. Dez. 1957" [donation of the Geological Institute (University of Graz). Dec. 1957] (Inv.slip; see MURBAN 1958: 46, 49).

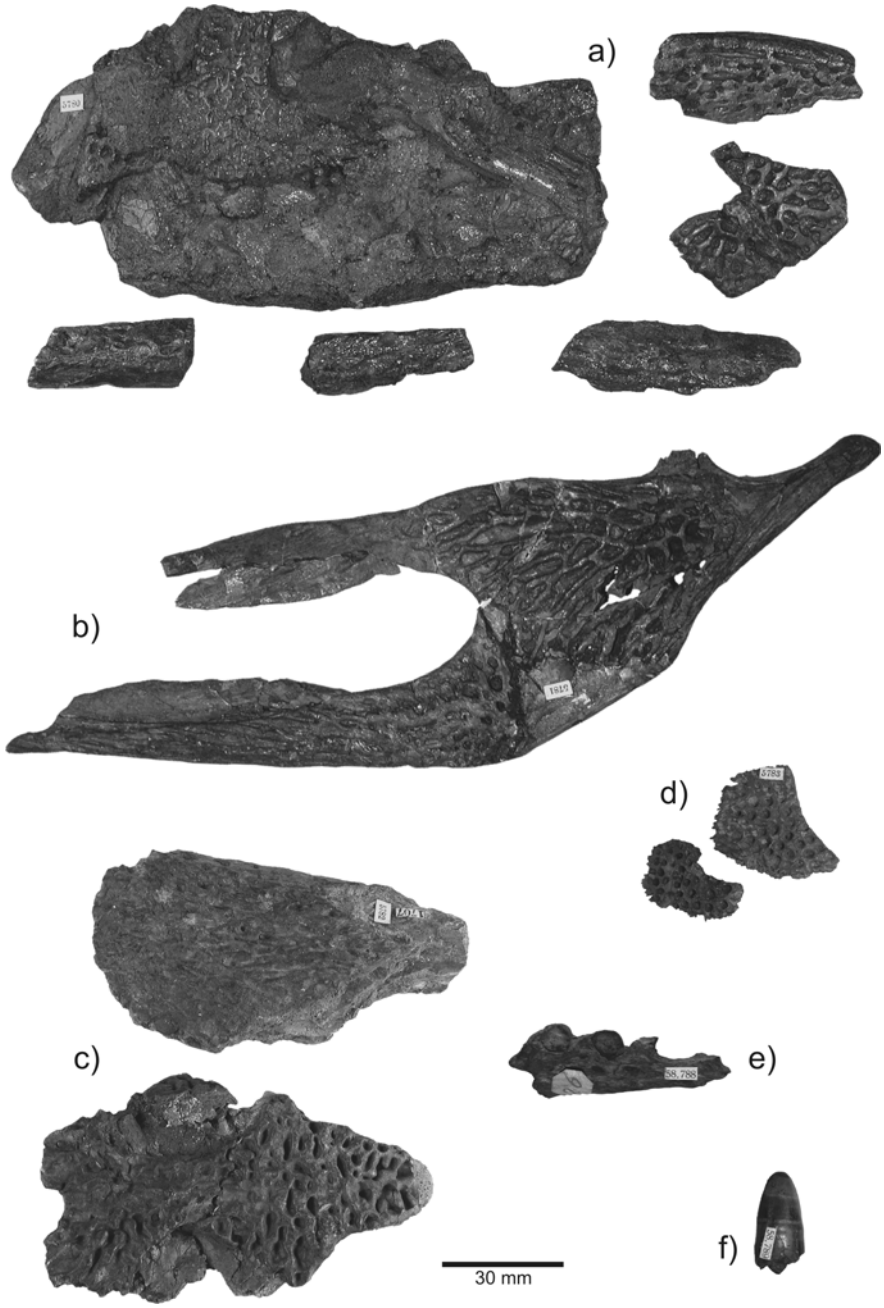
***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 58789, Fig. 11f
Crocodilus ungeri Prangn. – Acqu.-B. Univ. Graz 1881: 12.

Description: Isolated tooth; length=26 mm, width=12 mm.
Locality: A, Stmk., Pölfing-Brunn; "Schönegg" (Acqu.-B. Univ. Graz 1881: 12); ÖK 50 sheet Eibiswald 206; WGS84 15°17'53" E/46°43'14" N [3].
Stratigraphy: See Inv.No. 203838.
Acquisition: See Inv.No. 58788.

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 58790, Fig. 12a
Crocodilus ungeri Prangn. – Acqu.-B. Univ. Graz 1881: 12.

Description: Right angular missing the medioventral wall; length of the specimen = 48 mm, width = 20 mm.
Locality & Acquisition: See Inv.No. 58788.
Stratigraphy: See Inv.No. 203838.

Fig. 11: Diplocynodon styriacus (HOFMANN, 1887a). a) Osteoderm, skull, mandible and postcranial fragments (Eibiswald, Inv.No. 5780). b) Left posterior part of a mandible (Schönegg, Inv.No. 5781). c) Jaw fragments (Brunn, Inv.No. 5782). d) Osteoderms (Schönegg, Inv.No. 5783). e) Jaw fragment (Brunn, Inv.No. 58788). f) Isolated tooth (Schönegg, Inv.No. 58789).
Abb. 11: Diplocynodon styriacus (HOFMANN, 1887a). a) Osteoderm-, Schädel, Mandibel- und Postcranialfragmente (Eibiswald, Inv.Nr. 5780). b) Linker posteriorer Mandibelteil (Schönegg, Inv.Nr. 5781). c) Kieferfragmente (Brunn, Inv.Nr. 5782). d) Osteoderme (Schönegg, Inv.Nr. 5783). e) Kieferfragment (Brunn, Inv.Nr. 58788). f) Isolierter Zahn (Schönegg, Inv.Nr. 58789).


a)
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30 mm

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 58791, Fig. 12b
Crocodilus (Enneodon) ungeri – Acqu.-B. Univ. Graz 1877: 15.

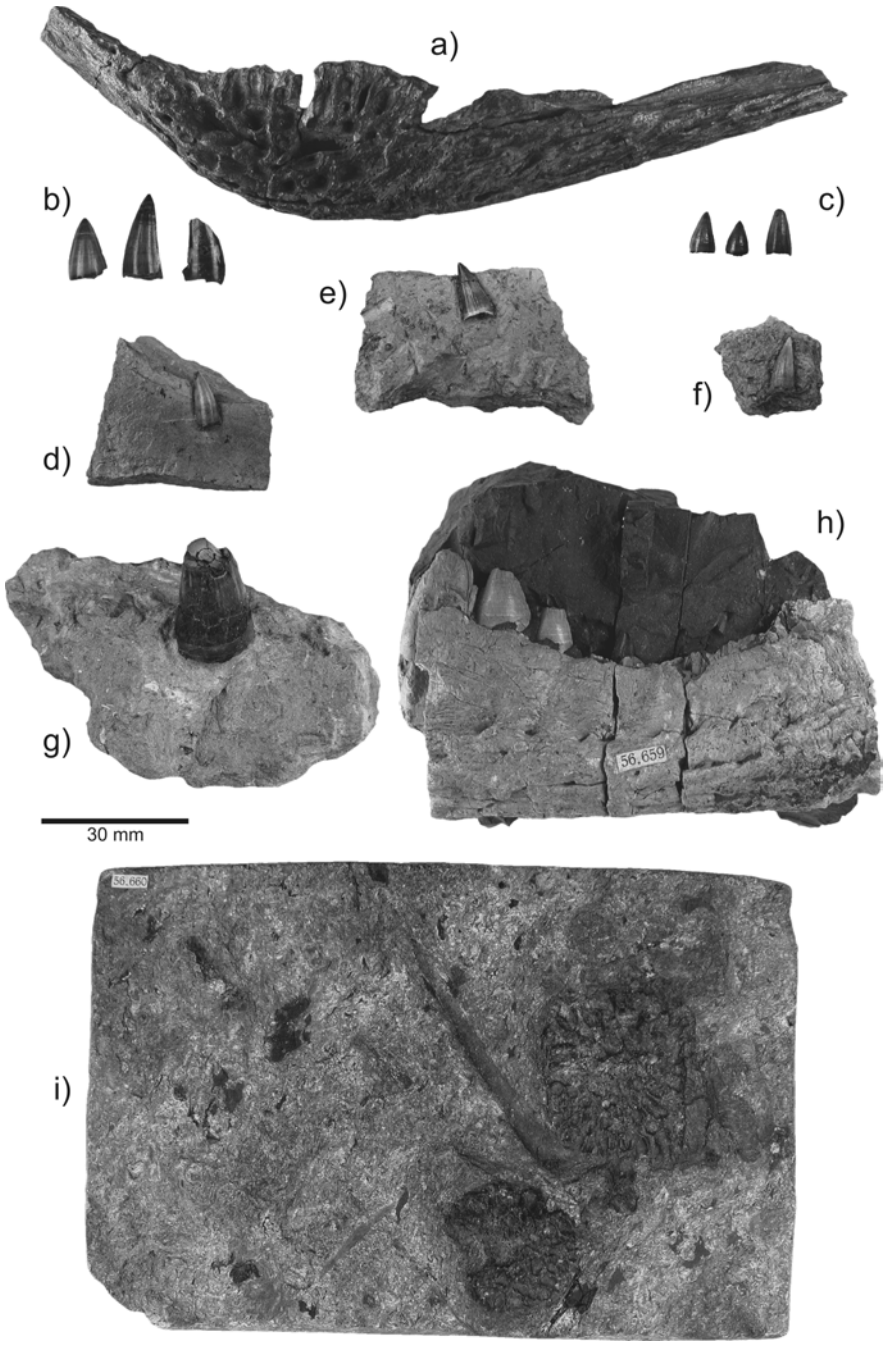
Description: Three isolated teeth; length of the largest specimen = 17 mm, width = 8 mm.
Locality: A, Stmk., Pölfing-Brunn; "Liegendes des Flötzes von Schönegg bei Wies" [footwall of the coal seam of Schönegg near Wies] (Inv.slip; see Acqu.-B. Univ. Graz 1877: 15); ÖK 50 sheet Eibiswald 206; WGS84 15°17'53" E/46°43'14" N [3].
Stratigraphy: See Inv.No. 203838.
Acquisition: 1) "Radimsky 1875" (Inv. slip; ?RADIMSKY 1875: 78); 2) "Übernommen vom mineralogischen Cabinett" [take over from the mineralogical collection] (Acqu.-B. Univ. Graz 1877: 15); 3) "Geschenk des Geol. Institutes der Universität Graz. Dez. 1957" [donation of the Geological Institute (University of Graz). Dec. 1957] (Inv.slip; see MURBAN 1958: 46, 49).

***Diplocynodon styriacus* (HOFMANN, 1887a)**, Inv.No. 58792, Fig. 12c
Crocodilus (Enneodon) ungeri – Acqu.-B. Univ. Graz 1877: 15.

Description: Three isolated teeth; length of the largest specimen = 9 mm, width = 5 mm.
Locality & Acquisition: See Inv.No. 58791.
Stratigraphy: See Inv.No. 203838.

?*Diplocynodon styriacus* (HOFMANN, 1887a), Inv.No. 80351, Fig. 12d
Description: Isolated tooth; length = 10 mm, width = 4 mm.
Locality: A, Stmk., Wies; Aug/Schönegg (see GRUBER et al. 2003: 23); ÖK 50 sheet Eibiswald 206; WGS84 15°17'40" E/46°43'04" N.
Stratigraphy: See Inv.No. 203838.

Fig. 12: a-c) *Diplocynodon styriacus* (HOFMANN, 1887a). d-f) ?*Diplocynodon styriacus* (HOFMANN, 1887a). g) *Gavialosuchus* sp. h-i) Crocodylia indet. a) Right angular fragment (Brunn, Inv.No. 58790). b) Isolated teeth (Schönegg, Inv.No. 58791). c) Isolated teeth (Schönegg, Inv.No. 58792). d) Isolated tooth (Aug/Schönegg, Inv.No. 80351). e) Isolated tooth (Aug/Schönegg, Inv.No. 80352). f) Isolated tooth (Aug/Schönegg, Inv.No. 80353). g) Isolated tooth (Wagna, Inv.No. 203822). h) Right mandible fragment (Trbovlje, Inv.No. 56659). i) Osteoderms (Trbovlje, Inv.No. 56660).
Abb. 12: a-c) *Diplocynodon styriacus* (HOFMANN, 1887a). d-f) ?*Diplocynodon styriacus* (HOFMANN, 1887a). g) *Gavialosuchus* sp. h-i) Crocodylia indet. a) Rechtes Kieferfragment (Brunn, Inv.Nr. 58790). b) Isolierte Zähne (Schönegg, Inv.Nr. 58791). c) Isolierte Zähne (Schönegg, Inv.Nr. 58792). d) Isolierter Zahn (Aug/Schönegg, Inv.Nr. 80351). e) Isolierter Zahn (Aug/Schönegg, Inv.Nr. 80352). f) Isolierter Zahn (Aug/Schönegg, Inv.Nr. 80353). g) Isolierter Zahn (Wagna, Inv.Nr. 203822). h) Rechtes Mandibelfragment (Trbovlje, Inv.Nr. 56659). i) Osteoderme (Trbovlje, Inv.Nr. 56660).


a)
b)
c)
e)
f)
d)
h)
g)
56.659
30 mm
56.660
i)

Acquisition: Excavation (1999) of the Landesmuseum Joanneum (Geology & Palaeontology).
Remarks: This tooth most probably belongs to *D. styriacus* due to its occurrence in the hanging wall of the Wies coal seam.

?*Diplocynodon styriacus* (Hofmann, 1887a), Inv.No. 80352, Fig. 12e
Description: Isolated tooth; length = 11 mm, width = 6 mm.
Locality, Stratigraphy, Acquisition & Remarks: See Inv.No. 80351

?*Diplocynodon styriacus* (Hofmann, 1887a), Inv.No. 80353, Fig, 12f
Description: Isolated tooth; length = 11 mm, width = 4 mm.
Locality, Stratigraphy, Acquisition & Remarks: See Inv.No. 80351

Familia Crocodylidae Cuvier, 1807
Genus *Gavialosuchus* Toula & Kail, 1885

***Gavialosuchus* sp.**, Inv.No. 203822, Fig, 12g
Description: Isolated tooth; length = 21 mm, width = 17 mm.
Locality: A, Stmk., Wagna; top of the abandoned brickyard at Aflenz/Sulm near Wagna; ÖK 50 sheet Leibnitz 207; WGS84 15°32'47" E/46°45'10" N.
Stratigraphy: Weissenegg Formation; Lagenidae Zone; Lower Badenian resp. Lower Langhian (see Rögl et al. 2002: 55; Latal & Piller 2003: 40).
Acquisition: Finding (20.05.2007) and present of K. Oblak (University of Ljubljana).
Remarks: Taxonomic identification according to M. Böhme (University of Munich); marginal marine "Leitha-Limestone"-facies; proofs of *Gavialosuchus*-teeth of are extremely rare in the area of the Central Paratethys (see Schlögl & Holec 2004: 293).

Familia & Genus indet.

Crocodylia indet., Inv.No. 56659, Fig. 12h
Description: Right mandibular fragment in lateral view with three teeth in alveoli and five broken teeth in alveoli; length of the specimen = 80 mm, width = 60 mm.
Locality: SLO, "Trifail" (Trbovlje; Inv.B.); WGS84 15°03'11" E/46°09'44" N [4].
Stratigraphy: Trbovlje Formation (Placer 1999: 191); Upper Oligocene (Odin et al. 1994: 202; Bechtel et al. 2004: 26).
Acquisition: "Geschenk einer Schule" [present of a school] (Inv.B.).

Crocodylia indet., Inv.No. 56660, Fig. 12i
Description: Two fragmentary osteoderms; length of the specimen = 140 mm, width 92 mm.
Locality & Stratigraphy: See Inv.No. 56659.
Acquisition: "Alte Sammlung" [Old collection] (Inv.B.).

Acknowledgements
For critical reviews the authors like to thank M. Böhme (Munich) and M. Delfino (Florence). We acknowledge M. Böhme (Munich) for taxonomical notes and G. Scharfe (Leoben) for information to the palaeontological collection at the Montanuniversität Leoben. O. Mandic (Vienna) supported us with literature. R. Tiefling and N. Winkler (both Graz) kindly provided some technical assistance. E. Buffetaut (Paris) enhanced the English spelling and grammar.

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