

## Type Specimens of ETTINGSHAUSEN's Tertiary Flora in the Surroundings of Vienna (1851) in the Collections of the Geological Survey of Austria

BARBARA MELLER<sup>\*)</sup>

2 Tables, 7 Plates

*Paleobotany*  
*Type Specimens*  
*Vienna Basin*  
*Miocene*  
*Paleontological collection*

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### Typusexemplare von ETTINGSHAUSEN'S „Tertiärer Flora der Umgebungen von Wien“ (1851) in den Sammlungen der Geologischen Bundesanstalt

#### Zusammenfassung

Die Geologische Bundesanstalt in Wien verwahrt in ihren Sammlungen viele der Typus-Exemplare fossiler Pflanzenarten, die von Constantin Freiherr von ETTINGSHAUSEN (1826–1897) in seiner „Tertiären Flora der Umgebungen von Wien“ (1851) beschrieben worden waren. Die 14 Holotypen und mehrere Syntypen von vier weiteren Taxa werden in der vorliegenden Arbeit ausführlich dokumentiert, und morphologische Details sowie systematisch-taxonomische Revisionen soweit wie möglich erwähnt.

#### Abstract

The collection of the Geological Survey of Austria in Vienna hosts most of the type-specimens of fossil plant taxa described by Constantin von ETTINGSHAUSEN (1826–1897) in his “Tertiary Flora in the Surroundings of Vienna” (1851). The 14 holotypes and several syntypes of four other new taxa are newly documented here in detail. Morphological details and systematic-taxonomic revisions have also been mentioned when possible.

### Introduction

The “Tertiary Flora in the Surroundings of Vienna” represents the first publication of a series called “The Tertiary Floras from the Austrian Monarchy”, started by Constantin von ETTINGSHAUSEN (1826–1897) in 1851. In the preamble, W. HAIDINGER, the director of the k.k. Geologische Reichsanstalt (= Geological Survey), highlighted the geological conclusions based on the fossil floras and added that the Geological Survey would continue intensively with such studies. He also mentioned that the plant re-

mains from Vienna had been preferred to other Austrian fossil floras, because at that time data on the fossil flora of the Vienna Basin were limited in comparison to its fauna. The flora comprises about 150 plant remains, mainly leaf impressions, from Middle and Late Miocene sandstone concretions and marls from Vienna, together with a few specimens from other areas. The majority of samples were collected during the construction of the new imperial “Arsenal” in Vienna (3<sup>rd</sup> district); the others derive from a brickyard in Hernals (17<sup>th</sup> district). Although it was then thought that these localities were of the same

<sup>\*)</sup> BARBARA MELLER, Geologische Bundesanstalt, Neulinggasse 38, A-1030 Vienna & University of Vienna, Institute of Palaeontology, Althanstr. 14, A-1090 Vienna. barbara.meller@univie.ac.at

age, they were recognized to be separate units, of different ages, shortly afterwards (e.g. STUR, 1867; SCHAFFER, 1904–1906). The plant-bearing sediments in Hernals belong to the Sarmatian (Late Middle Miocene) and those from the Arsenal to the Pannonian (Early Late Miocene). Co-occurring molluscs and vertebrates are of biostratigraphic significance. Additionally, some leaf remains from other districts in Vienna (Simmering, Laaerberg, Inzersdorf; all of Pannonian age), from Parschlug (Styria; Miocene) and from Zagorje (Sagor, Slovenia; Oligocene) and Bilina (North Bohemia, Czech Republic; Miocene) were also included by ETTINGSHAUSEN (1851). Currently, most of the specimens are stored in the Geological Survey; others are stored in the “Hof-Mineralien-Cabinet” (now the Natural History Museum, Vienna) according to the plate explanations in ETTINGSHAUSEN (1851).

ETTINGSHAUSEN (1851) described 36 taxa (Tab.1), 28 as new species. 21 types of these are stored at the Geological Survey but four types are still missing. One type, that should be stored at the Natural History Museum, Vienna, according to the plate explanations, is deposited at the survey. Some types were re-found in the course of this work. In the past, many of the type specimens were coated with a layer of lacquer: this hides some structures so that not all the correct morphology can be seen, especially at the leaf margin. No attempt has been made as yet to remove the lacquer. Other type specimens, on the same

sediment sample, are not lacquered, suggesting they were not recognized or studied at the time of lacquering. A few samples, which have been marked as typespecimens, do not represent the figured type-specimens unambiguously.

During much of the last century the material was not available and comparative studies were based only on the drawings and descriptions of ETTINGSHAUSEN (1851) (e.g. BERGER, 1955). In the 1970s, work on a new inventory of the Geological Survey collection was started; in 1991, HUMMEL published the first paper documenting the results of her re-investigation of the Betulaceae of the Viennese Tertiary flora.

The holotypes, isotypes and syntypes of 18 taxa have been fully documented in this paper, with some remarks about their morphological features and their taxonomic position, when possible. Five holotypes are represented with their counterparts, which here have been classified as isotypes, because the International Code of Botanical Nomenclature (MCNEILL et al., 2006) defines an isotype as a duplicate of the holotype, covering any additional herbarium specimen(s) collected from the same plant. Although fossil leaves and their counterparts could be regarded as one broken specimen, this would result in a holotype consisting of at least two specimens: this is contrary to the rules of the Code, which state that the holotype must be only one specimen.

List of taxa	Type	Type storage according to the plate explanations	Type storage x=present ?= no information
<i>Culmites arundinaceus</i> UNGER	F	GBA	x
<i>Culmites ambiguus</i> n.sp.	S	NHM	?
<i>Cyperites tertiaris</i> UNGER	F	GBA	x
<i>Potamogeton ungeri</i> n.sp.	H	GBA	x
Cupressineae	F	GBA	?
<i>Pinites partschii</i> n.sp.	S	NHM	?
	S	GBA	?
<i>Betula prisca</i> n.sp.	S	GBA	x
<i>Betula brongniartii</i> n.sp.	H	GBA	x
<i>Alnus kefersteinii</i> UNGER	F	GBA	x
<i>Fagus castaneaefolia</i> UNGER	F	GBA	x
<i>Quercus haidingeri</i> n.sp.	S	NHM	?
	S	GBA	?
<i>Planera ungeri</i> n.sp.	S	GBA	x, ?
	S	NHM	?
<i>Artocarpidium cecropiaefolium</i> n.sp.	H	GBA	x
<i>Liquidambar europaeum</i> A.BRAUN	F	GBA	x
<i>Daphnogene polymorpha</i> n.sp.	F	GBA	x
<i>Laurus swosowicziana</i> UNGER	F	GBA	x
<i>Laurus ocoteaefolia</i> n.sp.	H,IT	GBA	x
<i>Laurus phoeboides</i> n.sp.	H	GBA	?
<i>Hakea pseudonitida</i> n.sp.	H,IT	GBA	x
<i>Dryandra vindobonensis</i> n.sp.	H	NHM	?
<i>Bumelia ambigua</i> n.sp.	H	NHM	?
<i>Diospyros pannonica</i> n.sp.	H,IT	GBA	x
<i>Styrax pristinum</i> n.sp.	H	GBA	?

List of taxa	Type	Type storage according to the plate explanations	Type storage x=present ?= no information
<i>Andromedites paradoxus</i> n.sp.	H,IT	GBA	x
<i>Cissus platanifolia</i> n.sp.	H	NHM	?
<i>Sterculia vindobonensis</i> n.sp.	H	GBA	x
<i>Bombax sagorianus</i> n.sp.	H ?	GBA	x
<i>Pterospermum ferox</i> n.sp.	S	GBA	?
<i>Pterospermum dubium</i> n.sp.	H	NHM	x GBA
<i>Acer pseudocreticum</i> n.sp.	H	GBA	?
<i>Cupanoides miocenicus</i> n.sp.	H	NHM	?
<i>Rhamnus augustinii</i> n.sp.	H	GBA	x
<i>Pterocarya haidingeri</i> n.sp.	H,IT	GBA	x
<i>Myrtus austriaca</i> n.sp.	S	GBA	x, ?
<i>Leguminosites machaeriodes</i> n.sp.	H	GBA	x
<i>Leguminosites ingaefolius</i> n.sp.	H	GBA	x
<i>Cassia ambigua</i> UNGER	F	GBA	x, ?

Table 1.

List of taxa described by ETTINGSHAUSEN 1851.

F = figured specimens, HT = Holotype, IT = Isotype, ST = Syntype, GBA = Geological Survey of Austria, NHM = Natural History Museum, Vienna.

## List of Type Specimens

The specimens are listed according to their inventory numbers.

### *Potamogeton ungeri* ETTINGSHAUSEN, 1851

(Pl. 7, Fig. 2a–d)

Coll. no.: GBA 1851/002/0002b.

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 10, Pl. 1, Fig. 3.

Revised: *Panicum ungeri* (ETTINGSHAUSEN, 1851) STUR, 1867.

Remarks: The leaf impression is about 2.6 cm long and 0.5 mm wide, the base is acute, the apex might be recurved, which differs from the original figure (Pl. 7, Fig. 2c). Traces of preparation tools indicate that the apical part was exposed later (see the white scratches in Fig. 2b on Plate 7). One distinct primary vein is accompanied by three parallel running secondaries on each side; between these secondaries are 4–5 very thin parallel veins (Pl. 7, Fig. 2d). All veins derive from the base. STUR (1867) revised it as a *Panicum* species because of the lack of veins perpendicular to the parallel secondary veins.

Remarks: ETTINGSHAUSEN described one cone, cone impressions and twigs without needles with the same species name. A comparison of the cone compression in the collection (Pl. 4, Fig. 1b–c), which is labelled as a syntype, differs from the figured specimen in some features. The cone is smaller (9 cm long in contrast to the figured specimen, which is 10 cm) and recurved. The specimen (Pl. 4, Fig. 1a) differs also by the slightly oblique shape and the exposed base. There are old labels in the box, that mention “Gumpendorf Quergasse No. 361” as the locality, not Laaerberg, as in the plate explanation of ETTINGSHAUSEN. According to the plate explanation, the figured specimen should be stored in the Natural History Museum Vienna. Figs. 11–12 on Plate 1 in ETTINGSHAUSEN’s paper show fragmentary cone impressions from Laaerberg; these are missing in the Geological Survey collection. There are some small yellow woody fragments in a separate box, which are too fragmentary for any reconstruction. The twigs without needles (ETTINGSHAUSEN, 1851, Pl. 1, Figs. 13–14) from the Arsenal are also missing. STUR (1867: 148), however, mentioned a cone from Gumpendorf, and the cone in the collection is therefore reference material to that work.

### *Pinites partschii* ETTINGSHAUSEN, 1851

(Pl. 4, Fig. 1a–c)

Coll. no.: GBA 1851/002/0004.

Type: Syntype ?

Type level: Miocene, Pannonian.

Type locality: Gumpendorf, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 11, Pl. 1, Fig. 10

### *Betula prisca* ETTINGSHAUSEN, 1851

(Pl. 6, Figs. 1–3)

Coll. no.: GBA 1851/002/0005/1.

Type: Syntype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 11, Pl. 1, Fig. 15.

Revised: *Betula* aff. *subpubescens* GÖPPERT 1855.

Remarks: Despite some morphological differences between the specimen and the type figure (Pl. 6, Fig. 1a–b), the general shape and the old label stuck on the specimen prove the identity of the specimen as the figured specimen. It is a fragment of a leaf with neither base nor apex. The margin is only indistinctly preserved, showing a double serrate margin type.

Coll. no.: GBA 1851/002/0005/2.

Type: Syntype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 11, Pl. 1, Fig. 16.

Revised: *Betula* aff. *subpubescens* GÖPPERT 1855.

Remarks: The specimen shows some differences to the figure (Pl. 6, Fig. 2a–b). The lamina is slightly narrower and longer and the number of secondary veins on the right side is 8, not 7, as in the figure. It is possible that this vein was regarded as the margin of the lamina. The lacquer might have caused the wrong view of the margin. The counterpart of this syntype (coll. no.: GBA 1851/002/0005/3 = Pl. 6, Fig. 3a–b) also has a well preserved petiole.

This species and the type material have been discussed in detail by HUMMEL (1991), who suggested that the type material is too fragmentary (Arsenal) and partly missing (Bilina) and, in any event, belongs to two species. The specimens from the Arsenal are very similar – so far it is possible to determine from the poor preservation – to *B. subpubescens* GÖPPERT 1855 (see HUMMEL, 1991: 66) and the leaves from Bilina are different from the leaves from the Arsenal site and might belong to *Alnus*. BUDANTSEV (1982) chose the figured specimen from Bilina as Lectotype, but this specimen has not been found as yet. The conclusions of HUMMEL (1991) concerning *B. prisca* are that these are mainly remains of *Carpinus* because of the cordate base, and that all the material that has been described as *B. prisca*, should be re-investigated.

More specimens from the Arsenal locality are stored in the collection with the same collection number, but they were not mentioned by ETTINGSHAUSEN. Table 2 gives an overview of the specimens and numbers.

### *Betula brongniartii* ETTINGSHAUSEN, 1851

(Pl. 1, Fig. 1a–d)

Coll. no.: GBA 1851/002/0006.

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 12, Pl. 1, Fig. 18.

Remarks: The leaf impression is about 37 mm long and the width, measured and calculated from the half part is about 40 mm. The apex is not preserved, the base rounded. Since the lacquer does not cover all parts of the impression and covers part of the matrix, this might have led to false ideas about the specimen. The venation is pinnate and craspedodromous; distances between the secondary veins are uniform to smoothly decreasing to the base, their course is slightly sinusoidal-like. The margin is double serrate. Veins of the 3<sup>rd</sup> category are distinct and very dense (Pl. 1, Fig. 1d). Near the margin, veins (at least once) derive from the lower side of the secondaries and terminate in the smaller teeth between the main teeth.

A second specimen of this species, from the same locality, was mentioned but not figured by STUR (1867: 151), who concluded that the cordate (“herzförmig bis ausgerandet”) base of this species will often complicate distinction from *Carpinus grandis* UNGER, 1850.

### *Rhamnus augustinii* ETTINGSHAUSEN, 1851

(Pl. 7, Fig. 1a–d)

Coll. no.: GBA 1851/002/0007Ac.

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 23, Pl. 5, Fig. 3d,

Remarks: The type specimen is 4.5 cm long, but the apical part is missing; the width is about 2.1 cm, the venation is craspedodromous. The primary vein is straight and the angle of the secondary veins acute. Six pairs of secondary veins are preserved, the lower ones are nearly opposite, the upper ones are different. The margin is preserved in one area, with weak serrate or crenate teeth.

ETTINGSHAUSEN 1851	GBA Inventory Number	HUMMEL 1991	Remarks
Pl. 1, Fig. 15	1851/002/0005/1	Pl. 1, Fig. 1	Syntype
Pl. 1, Fig. 16	1851/002/0005/2	Pl. 1, Fig. 2	Syntype
-	1851/002/0005/3	Pl. 1, Fig. 3	Counterpart of 5/2
Pl. 1, Fig. 17	Not found	-	Lectotype in: TAKHTAJAN, A. & ZHILIN, S. 1982 (Eds.), refigured on Pl. 82, Fig.3
-	1851/002/0005/4	Pl. 1, Fig. 4	
-	1851/002/0005/5	-	
-	1851/002/0005/6	-	Counterpart of 5/5

Table 2.  
Overview of the specimens of *Betula prisca* ETTINGSHAUSEN in the collection.

The specimen is associated with leaves that were initially identified as *Alnus kefersteinii* UNGER. Later they were identified as a different species, *Alnus hörnesii* STUR, 1867, which has been recognized as a synonym of *Alnus ducalis* GAUDIN in GAUDIN & STROZZI, 1858 emend. KNOBLOCH, 1968.

***Planera ungeri* ETTINGSHAUSEN, 1851**

(Pl. 5, Fig. 2a–c)

Coll. no.: GBA 1851/002/0010A.

Type: Syntype.

Type level: Miocene, Sarmatian.

Type locality: Hernals, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 14, Pl. 2, Fig. 9.

Coll. no.: GBA 1851/002/0010B.

Type: Counterpart of this syntype.

Remarks: This species is a synonym of *Zelkova zelkovifolia* (UNGER, 1841) BUZEK & KOTLABA in KOTLABA, 1963. The other specimens (syntypes), figured by ETTINGSHAUSEN, derive from Inzersdorf, Bilina and Parschlug and have not been found in the collection of the Geological Survey up to now.

***Artocarpidium cecropiaefolium* ETTINGSHAUSEN, 1851**

(Pl. 5, Fig. 3a–b)

Coll. no.: GBA 1851/002/0011.

Type: Syntype.

Type level: Miocene, Pannonian.

Type locality: Simmering, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 15, Pl. 2, Fig. 4.

Remarks: STUR (1867: 157) identified the specimen as *Carpinus grandis* UNGER and included ETTINGSHAUSEN's two specimens in the synonym list (but listed Figs. 2–3, instead of 3–4). The second syntype (Pl. 2, Fig. 3) is stored in the collection of the Natural History Museum Vienna according to ETTINGSHAUSEN's plate explanation.

***Leguminosites ingaefolius* ETTINGSHAUSEN, 1851**

(Pl. 7, Fig. 3a–c)

Coll. no.: GBA 1851/002/0012/1b.

Type: Holotype ?

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 26, Pl. 5, Fig. 8 (not 24, as mentioned in the text).

Remarks: The specimen is 5.6 cm long and 2.3 cm wide (Pl. 7, Fig. 3a–b). There are not many other features to observe, making comparison with the drawing more difficult. The oldest label mentions *Leguminosites ingaefolius* and also that it is identical with *Juglans vetusta* HEER, 1859 (mentioned also in STUR, 1867: 181 with a question mark). It is associated with *Liquidambar europaeum* A. BRAUN, 1836 (ETTINGSHAUSEN, 1851: Pl. 2, Fig. 21) on the same sediment sample.

***Laurus ocoteaefolia* ETTINGSHAUSEN, 1851**

(Pl. 1, Fig. 2a–d)

Coll. no.: GBA 1851/002/0015A.

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 17, Pl. 3, Fig. 4.

Coll. no.: GBA 1851/002/0015B.

Type: Isotype.

Revised: *Salix ocoteaefolia* (ETTINGSHAUSEN, 1851) STUR, 1867.

Remarks: The leaf impression shows an elongate, narrow ovate to lanceolate shape, with neither base nor apex. The fragment is 9 cm long and 1.7 cm wide. The measurements, mentioned in ETTINGSHAUSEN (1851: 17: 12–14 cm long and 2 cm wide) are different and probably represent the sizes of the specimens from other localities, which he had already started to investigate (e.g. Zagorje, see below). The 6–11 secondary veins described by ETTINGSHAUSEN are probably also related to that material, because the holotype and isotype show about 10 on each side. The venation seems to be brochidodromous. The margin type is not mentioned by ETTINGSHAUSEN and is mainly not preserved. The isotype seems to be entire-margined near the base and shows at least two small teeth at one side in the middle part of the leaf. STUR (1867: 92) recombined the specimens to *Salix ocoteaefolia* (ETTINGSHAUSEN, 1851) STUR, 1867, which is also noted on the old label. However, STUR regarded the species as entire-margined and mentioned this feature as one of the differences to *Salix varians* GOEP- PERT, 1855. He also mentioned the larger distances between the secondary veins as another distinguishing feature. *Salix lavateri* A. BRAUN, 1851 emend. HANTKE, 1954 from Miocene sediments in Switzerland is also very similar. HANTKE (1954) has distinguished *S. varians* and *S. lavateri* by their different width.

Other records have been described, such as those from the Early Oligocene (e.g. Häring, Austria; Sagor [= Zagorje], Slovenia) (ETTINGSHAUSEN, 1853, 1872, 1877) and Early/Middle Miocene (Styria; e.g. ETTINGSHAUSEN, 1888). ENGELHARDT (1922) described this species from Messel (Germany, Eocene) and only recently JUNGWIRTH (2004) listed it from the Paleogene of Slovenia, where he cited the species as a synonym of leaves that he identified as *Laurophyllum* cf. *acutumontanum* MAI 1963. This species was at first described from the Oligocene of Seifhennersdorf in Germany (MAI, 1963: 72), but *Laurus ocoteaefolia* has not been listed as a synonym.

***Hakea pseudonitida* ETTINGSHAUSEN, 1851**

(Pl. 2, Fig. 1a–c)

Coll. no.: GBA 1851/002/0017A.

Type: Holotype.

Type level: Miocene, Sarmatian.

Type locality: Hernals, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 17, Pl. 3, Fig. 5.

Coll. no.: GBA 1851/002/0017B.

Type: Isotype.



Remarks: The 2.3 cm long and 0.3 cm wide leaf impression and the counterpart have an acute to attenuate base and apex, the margin is roughly serrate, with 3–4 teeth on each side. The veins of 2<sup>nd</sup> and 3<sup>rd</sup> order have not been preserved.

There is no other entry of this species in the Oetyp-database (Catalogue of Palaeontological Types in Austrian Collections) at present. It might be a small leaf of *Myrica*.

***Diospyros pannonica* ETTINGSHAUSEN, 1851**

(Pl. 2, Fig. 2a–c)

Coll. no.: GBA 1851/002/0018A.

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 19, Pl. 3, Fig. 8.

Coll. no.: GBA 1851/002/0018B.

Type: Isotype.

Remarks: The holotype is a very faint leaf impression of 6.4 cm length and 3.5 cm width. The apical part is lacking, the base acute and probably slightly asymmetric. The course of the thin secondaries (angle 10–15° first, then about 70°) (Pl. 2, Fig. 2c) is different from the original drawing (Pl. 2, Fig. 2a). The isotype is very fragmentary and the impression much fainter.

***Andromedites paradoxus* ETTINGSHAUSEN, 1851**

(Pl. 3, Fig. 1a–d)

Coll. no.: GBA 1851/002/0020A.

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 19, Pl. 3, Fig. 10.

Coll. no.: GBA 1851/002/0020B.

Type: Isotype.

Remarks: ETTINGSHAUSEN figured the holotype well; due to the unusual leaf shape, he regarded it as an Ericaceae.

***Sterculia vindobonensis* ETTINGSHAUSEN, 1851**

(Pl. 2, Fig. 3a–b)

Coll. no.: GBA 1851/002/0021.

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 20, Pl. 4, Fig. 2.

Revised: *Acer vindobonensis* (ETTINGSHAUSEN, 1851) BERGER, 1955 emend. STRÖBITZER-HERRMAN, 2002.

Remarks: The holotype is a fragmentary impression with 3 lobes; at least two left lobes are lacking. The lacquer on the impression does not fit perfectly with the specimen and the leaf margin. The margin has been described as entire, which has been confirmed by STRÖBITZER-HERRMAN (2002), who has also noticed that the margin is imperfectly preserved. She emended the diagnosis of the

species based on specimens from the Laaerberg locality (2002: 65). According to these descriptions, the species has mainly 7 lobes, only occasionally do the smaller leaves have just 5 lobes. The margins are entire at the base, but slightly serrate near the apex of the lobes.

***Bombax sagorianus* ETTINGSHAUSEN, 1851**

(Pl. 3, Fig. 2a–c)

Coll. no.: GBA 1851/002/0022.

Type: Holotype ?

Type level: Oligocene.

Type locality: Savine (Sagor = Zagorje), Slovenia.

Type figure: ETTINGSHAUSEN, C. v. 1851: 21, Pl. 4 Fig. 3.

Remarks: This specimen is very similar to the figured specimen, but not identical. Holotype with a question mark has been written on the label. The leaf size, 7.1 cm length and 3.1 cm width, is the same, as is the symmetrical ovate shape with the acuminate apex, and the undulate margin. A major difference is the complete left basal part of the specimen in comparison to the incomplete one in the drawing.

The collection of the Geological Survey in Vienna hosts numerous specimens from the area of Zagorje in Slovenia, which were partly published by ETTINGSHAUSEN in e.g. 1872, 1877.

***Pterospermum dubium* ETTINGSHAUSEN, 1851**

(Pl. 4, Fig. 3a–c)

Coll. no.: GBA 1851/002/0023.

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Simmering, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 21, Pl. 4, Fig. 6.

Remarks: The fragmentary specimen is 6 cm long and 7.5 cm wide. The base is asymmetrical, the apical part is missing. The secondary veins derive from the primary vein at irregular distances between 4 to 21 mm, the angle is about 80°. The margin is indistinct, but appears to be serrate near the base.

This holotype should be stored in the Natural History Museum, Vienna, according the original plate explanations, but the similarity of the drawing and the specimen in the collection of the survey is unambiguous. In contrast, the specimens of *Pterospermum ferox* ETTINGSHAUSEN, 1851, from Parschlug and Bilin, which should be in the collection of the Geological Survey, are still missing.

***Pterocarya haidingeri* ETTINGSHAUSEN, 1851**

(Pl. 4, Fig. 2a–d)

Coll. no.: GBA 1851/002/0026A

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 24, Pl. 5, Fig. 4.

Coll. no.: GBA 1851/002/0026B.

Type: Isotype.

Remarks: Holotype and isotype are both incomplete. They are at least 8 cm long without the apical part. The primary vein is distinct, the venation probably semicraspedodromous. The old label mentions it as a synonym of *Carya ungeri* ETTINGSHAUSEN and *Juglans bilinica* UNGER, 1850. KNOBLOCH (1969) included this specimen with a question mark in his list of synonyms of *Pterocarya paradisiaca* (UNGER, 1850) ILJINSKAYA, 1962 as well as *Juglans bilinica* UNGER, 1850.

***Myrtus austriaca* ETTINGSHAUSEN, 1851**

(Pl. 3, Fig. 3a–c)

Coll. no.: GBA 1851/002/0027.

Type: Syntype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 25, Pl. 5, Fig. 5d. (not Fig. 10 as mentioned there).

Remarks: The small leaf impression is 2.5 cm long and 8 mm wide; apex and base are not totally complete, the

leaf margin is entire and distinct. Apart from the distinct primary vein, other venation is slightly indicated in the upper part (Pl. 5, Fig. 3c). The second syntype (ETTINGSHAUSEN, 1851: Pl. 5, Fig. 6), also from the Arsenal, is still missing. The specimen shows similarities to *Buxus* and *Leguminosae*, which should be compared in detail.

***Leguminosites machaeroides* ETTINGSHAUSEN, 1851**

(Pl. 5, Fig. 1a–c)

Coll. no.: GBA 1851/002/0028.

Type: Holotype.

Type level: Miocene, Pannonian.

Type locality: Arsenal, in Vienna, Austria.

Type figure: ETTINGSHAUSEN, C. v. 1851: 26, Pl. 5, Fig. 7.

Remarks: The weak leaf impression shows no more details than figured by ETTINGSHAUSEN.

## References

- Berger, W. (1955): Die altplozäne Flora des Laaerberges in Wien. – *Palaeontogr. B.*, **97**: 81–113, 175 Figs., 2 Tab., Stuttgart.
- BUDANTSEV, L. (1982): Betulaceae I. – In: *Iskopaemye cvetkovje rastenija SSSR (Fossil flowering plants of the USSR)*, **2**: 142–176, Leningrad.
- ENGELHARDT, H. (1922): Die alttertiäre Flora von Messel bei Darmstadt. – *Abh. hess. geol. Landesanst.*, **7**, 4: 17–128, 40 Pls., Darmstadt.
- ETTINGSHAUSEN, C. v. (1851): Die Tertiär-Floren der österreichischen Monarchie: 1. Fossile Flora der Umgebungen von Wien. – *Abh. k.k. geol. Reichsanst.*, **2/1** (1855): 36 pp., 5 Pls., Vienna (the whole volume was published in 1855, and some authors cite this year as the year of publication).
- ETTINGSHAUSEN, C. v. (1853): Die Tertiär-Floren der österreichischen Monarchie: 2. Die tertiäre Flora von Häring in Tirol. – *Abh. k.k. geol. Reichsanst.*, **2/2** (1855): 118 pp., 31 Pls., Vienna.
- ETTINGSHAUSEN, C. v. (1872): Die fossile Flora von Sagor in Krain I. – *Denkschr. math.-naturwiss. Kl. k. Akad. Wiss.*, **XXXII**: 159–216, 10 Pls., Vienna.
- ETTINGSHAUSEN, C. v. (1877): Die fossile Flora von Sagor in Krain II. – *Denkschr. math.-naturwiss. Kl. k. Akad. Wiss.*, **XXXVII**: 161–216, 17 Pls., Vienna.
- ETTINGSHAUSEN, C. v. (1888): Die fossile Flora von Leoben in Steiermark. I. Teil. – *Denkschr. math.-naturwiss. Kl. k. Akad. Wiss.*, **LIV**: 58 pp., 4 Pls., Vienna (pages from reprint).
- HANTKE, R. (1954): Die fossile Flora der obermiozänen Oehninger-Fundstelle Schrotzbürg (Schienberg, Süd-Baden). – *Denkschr. Schweiz. Naturforsch. Ges.*, **80**: 31–118, 2 Figs., 2 Tab., Zürich.
- HUMMEL, A. (1991): Revision of the oldest original specimens of *Betula prisca* ETTINGSHAUSEN. – *Acta Palaeobot.*, **31**: 1–2: 63–71, 13 Figs., 1 Pl., Kraków.
- JUNGWIRTH, E. (2004): The determination and taxonomic problems of Palaeogene fossil macroflora from Slovenia and Croatia. – *Nat. Croat.* **13**, 2: 187–196, 2 Figs., 1 Table, Zagreb.
- KNOBLOCH, E. (1969): Tertiäre Floren von Mähren. – 201 pp., 309 Figs., 78 Pls., Brno.
- MAI, D. (1963): Beiträge zur Kenntnis der Tertiärfloren von Seiffhensdorf (Sachsen). – *Jb. staatl. Mus. Min. Geol.*, **1963**: 39–114, 13 Figs., 12 Pls., Dresden.
- MCNEILL, J., BARRIE, F.F., BURDET, H.M., DEMOULIN, V., PRADO, J., NICOLSON, D.H., MARHOLD, K., HAWKSWORTH, D.L., TURLAND, N.J., WIERSEMA, J., SKOG, J.E. & SILVA, P.C. (Eds., 2006): *International Code of Botanical Nomenclature (Vienna Code 2005)*. – 568 pp. Gantner Verlag, Ruggel.
- SCHAFFER, X. (1904–1906): *Geologie von Wien*. – 3 vol., Lechner, Wien.
- STRÖBITZER-HERMANN, M. (2002): *Systematik, Variabilität, regionale und stratigraphische Verbreitung sowie Ökologie der Gattung Acer L. in Mitteleuropa vom Oligo- bis ins Pliozän*. – Dissert. Univ. Vienna, 149 pp.
- STUR, D. (1867): Beiträge zur Kenntnis der Flora der Süßwasserquarze, der Congerien- und Cerithien-Schichten im Wiener und ungarischen Becken. – *Jb. geol. Reichsanst.*, **1867**: 77–188, 3 Pls., Vienna.

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## Plate 1

Fig. 1a–d: *Betula brongniartii* ETTINGSHAUSEN, 1851.

Fig. 1a: Sediment block with the holotype and other leaf fragments.  
GBA 1851/002/0006.

Fig. 1b: Type figure of ETTINGSHAUSEN, 1851, Pl. 1, Fig. 18.

Fig. 1c: Holotype, the rectangle marks the area shown in Fig. 1d.

Fig. 1d: Detail of the tertiary venation, picture is turned around about 100° to the left in comparison to Fig. 1c; at the left margin, the thick lacquer hides the venation.  
Scale 0.1 cm.

Fig. 2a–d: *Laurus ocoteaefolia* ETTINGSHAUSEN, 1851.

Fig. 2a: Overview of the sediment block with the holotype at the right margin; the rectangle marks the area shown in Fig. 2d.  
GBA 1851/002/0015 A.

Fig. 2b: Type figure of ETTINGSHAUSEN, 1851, Pl. 3, Fig. 4.

Fig. 2c: Isotype of the species.  
GBA 1851/002/0015 B.

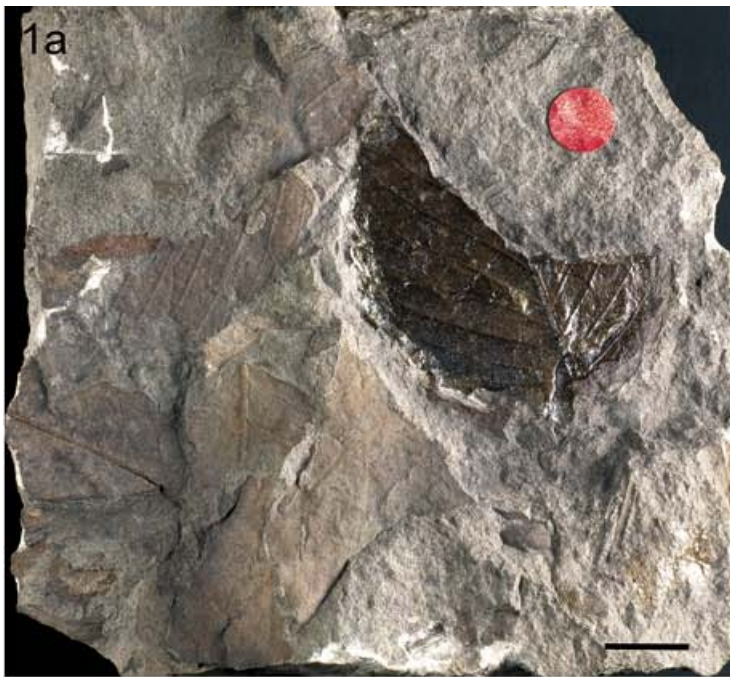
Fig. 2d: Detail of the venation of the holotype (Fig. 2a).  
Scale 0.5 cm.

Scale 1 cm, if not mentioned otherwise.

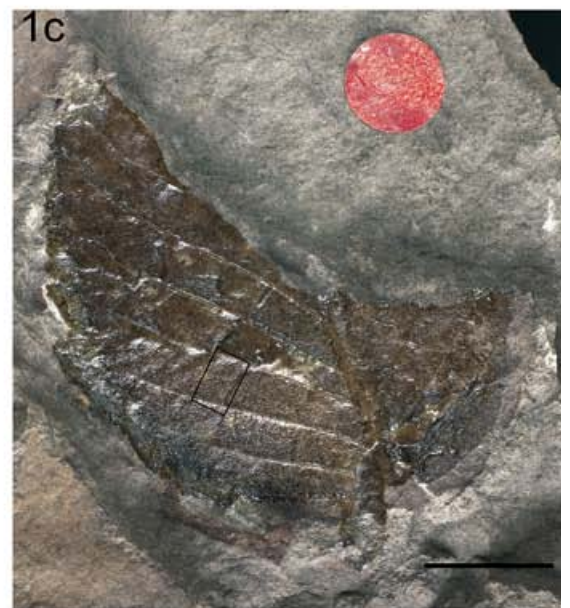
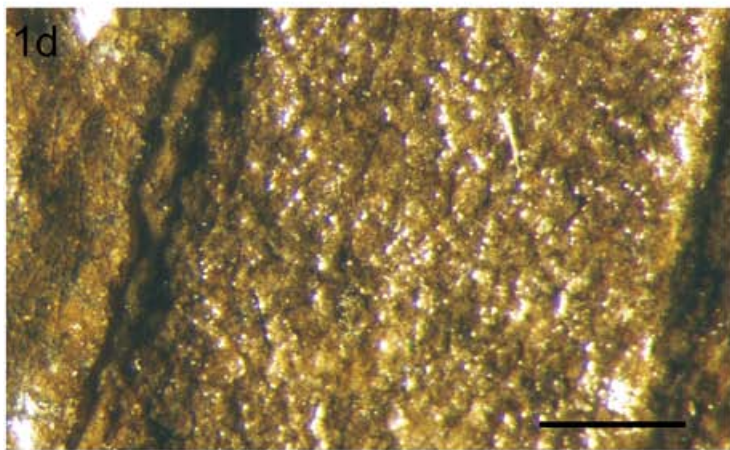
Type figures from ETTINGSHAUSEN, 1851 are shown in their original size.

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1b



2b



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## Plate 2

Fig. 1a–c: *Hakea pseudonitida* ETTINGSHAUSEN, 1851.

Fig. 1a: Type figure of ETTINGSHAUSEN, 1851, Pl. 3, Fig. 5.

Fig. 1b: Holotype associated with the cast of a bivalve.  
GBA 1851/002/0017A.

Fig. 1c: Isotype, GBA 1851/002/0017B.

Fig. 2a–c: *Diospyros pannonica* ETTINGSHAUSEN, 1851.

Fig. 2a: Type figure of ETTINGSHAUSEN, 1851, Pl. 3, Fig. 8.

Fig. 2b: Holotype, a red dot has been glued directly on the leaf impression.  
GBA 1851/002/0018A.

Fig. 2c: Detail of the middle part of the holotype (Fig. 1b), the arrows point to the base of the secondary veins.  
Scale 0.5 cm.

Fig. 3a–b: *Sterculia vindobonensis* ETTINGSHAUSEN, 1851.

Fig. 3a: Type figure of ETTINGSHAUSEN, 1851, Pl. 4, Fig. 2.

Fig. 3b: Holotype.  
GBA 1851/002/0021.

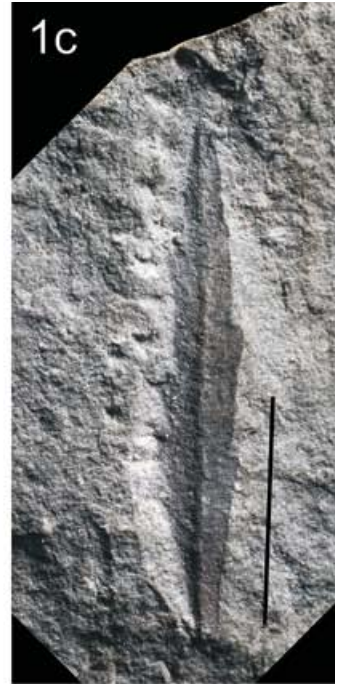
Scale 1 cm, if not mentioned otherwise.

Type figures from ETTINGSHAUSEN, 1851 are shown in their original size.

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1a



2a



3a



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## Plate 3

Fig. 1a–d: *Andromedites paradoxus* ETTINGSHAUSEN, 1851.

Fig. 1a: Type figure of ETTINGSHAUSEN, 1851, Pl. 3, Fig. 10.

Fig. 1b: Holotype.  
GBA 1851/002/0020A.

Fig. 1c: Holotype apex in detail.

Fig. 1d: Holotype base in detail.

Fig. 2a–c: *Bombax sagorianus* ETTINGSHAUSEN, 1851.

Fig. 2a: Type figure of ETTINGSHAUSEN, 1851, Pl. 4, Fig. 3.

Fig. 2b: Probable holotype.  
GBA 1851/002/0022.

Fig. 2c: Left part of the basal leaf area of the probable holotype (Fig. 2b) in detail, the picture has been turned around to the right.  
Scale 0.5 cm.

Fig. 3a–c: *Myrtus austriaca* ETTINGSHAUSEN, 1851.

Fig. 3a: Type figure of ETTINGSHAUSEN, 1851, Pl. 5, Fig. 5. ♂.

Fig. 3b: Syntype.  
GBA 1851/002/0027.

Fig. 3c: Detail of the apical part of the holotype (Fig. 3b) with weak impression of the venation.  
Scale 0.5 cm.

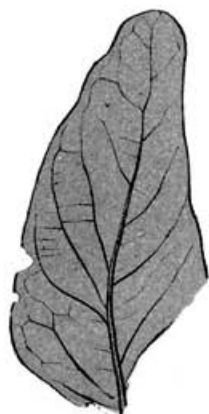
Scale 1 cm, if not mentioned otherwise.

Type figures from ETTINGSHAUSEN, 1851 are shown in their original size.

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1a



1b



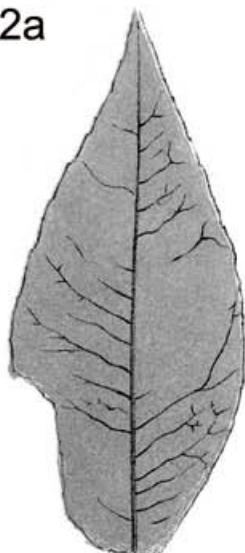
1c



1d



2a



2b



2c



3a



3b



3c



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## Plate 4

- Fig. 1a–c: *Pinites partschii* ETTINGSHAUSEN, 1851.  
Fig. 1a: Type figure of ETTINGSHAUSEN, 1851, Pl. 1, Fig. 10.  
Fig. 1b–c: Probable syntype, the cone is shown in different views.  
GBA 1851/002/0004.

- Fig. 2a–d: *Pterocarya haidingeri* ETTINGSHAUSEN, 1851.  
Fig. 2a: Type figure of ETTINGSHAUSEN, 1851, Pl. 5, Fig. 4.  
Fig. 2b: Holotype.  
GBA 1851/002/0026A.  
Fig. 2c: Isotype.  
GBA 1851/002/0026B.  
Fig. 2d: Detail of the isotype (Fig. 2c) from the left margin.

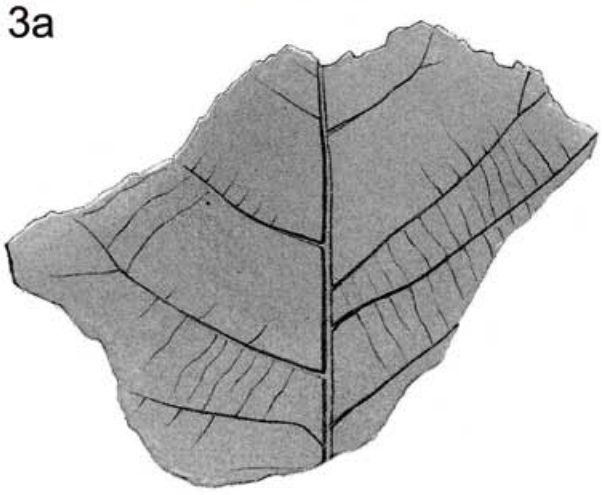
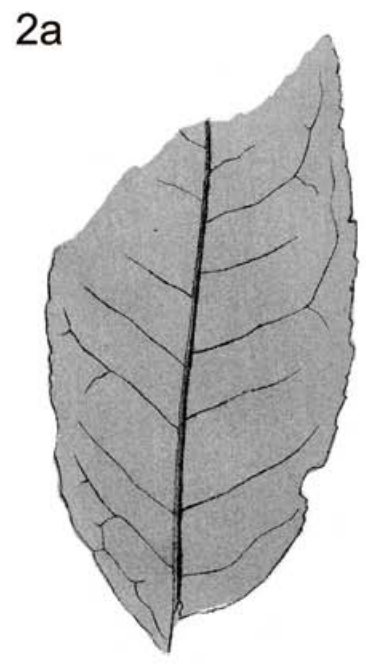
- Fig. 3a–b: *Pterospermum dubium* ETTINGSHAUSEN, 1851.  
Fig. 3a: Type figure of ETTINGSHAUSEN, 1851, Pl. 4, Fig. 6.  
Fig. 3b: Holotype.  
GBA 1851/002/0023.  
Fig. 3c: Basal part of the holotype (Fig. 3b) in detail.  
Scale 0.5 cm.

Scale 1 cm, if not mentioned otherwise.

Type figures from ETTINGSHAUSEN, 1851 are shown in their original size.

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## Plate 5

Fig. 1a–c: *Leguminosites machaerioides* ETTINGSHAUSEN, 1851.  
Fig. 1a: Type figure of ETTINGSHAUSEN, 1851, Pl. 5, Fig. 7.  
Figs. 1b–c: Holotype, in different magnifications.  
GBA 1851/002/0028.

Fig. 2a–c: *Planera ungeri* ETTINGSHAUSEN, 1851.  
Fig. 2a: Type figure of ETTINGSHAUSEN, 1851, Pl. 2, Fig. 9.  
Fig. 2b: Syntype.  
GBA 1851/002/0010A.  
Fig. 2c: Counterpart of the syntype.  
GBA 1851/002/0010B.

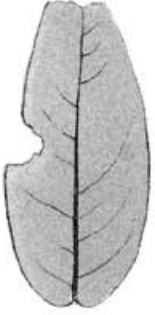
Fig. 3a–b: *Artocarpidium cecropiaefolium* ETTINGSHAUSEN, 1851.  
Fig. 3a: Type figure of ETTINGSHAUSEN, 1851, Pl. 2, Fig. 46.  
Fig. 3b: Syntype.  
GBA 1851/002/0011.

Scale 1 cm, if not mentioned otherwise.  
Type figures from ETTINGSHAUSEN, 1851 are shown in their original size.

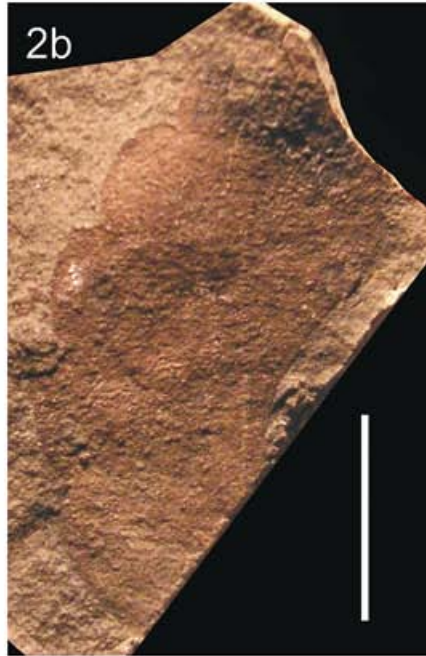
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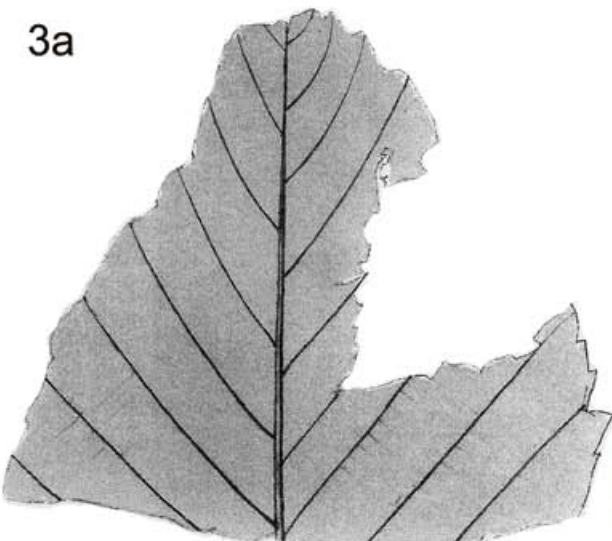
1a



2a



3a



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## Plate 6

Figs. 1–3: *Betula prisca* ETTINGSHAUSEN, 1851.

Fig. 1a: Type figure of ETTINGSHAUSEN, 1851, Pl. 1, Fig. 15.

Fig. 1b: Syntype.  
GBA 1851/002/0005/1.

Fig. 1c: Detail of the venation of Fig. 1b.  
Scale 0.5 cm.

Fig. 2a: Type figure of ETTINGSHAUSEN, 1851, Pl. 1, Fig. 16.

Fig. 2b: Syntype.  
GBA 1851/002/0005/2.

Fig. 3a: Counterpart of the syntype (Fig. 2b).  
GBA 1851/002/0005/3.

Fig. 3b: Detail of the counterpart syntype (Fig. 3a) base with the petiole.  
Scale 0.5 cm.

Scale 1 cm, if not mentioned otherwise.

Type figures from ETTINGSHAUSEN, 1851 are shown in their original size.

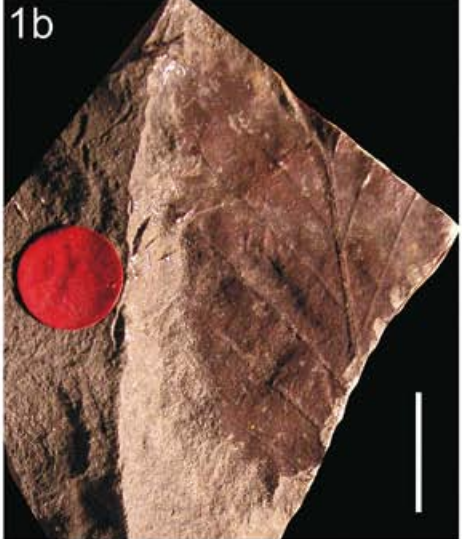
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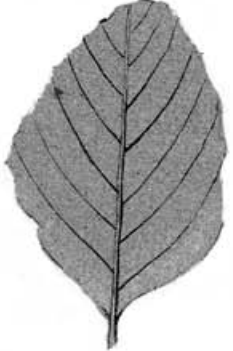
1a



1b



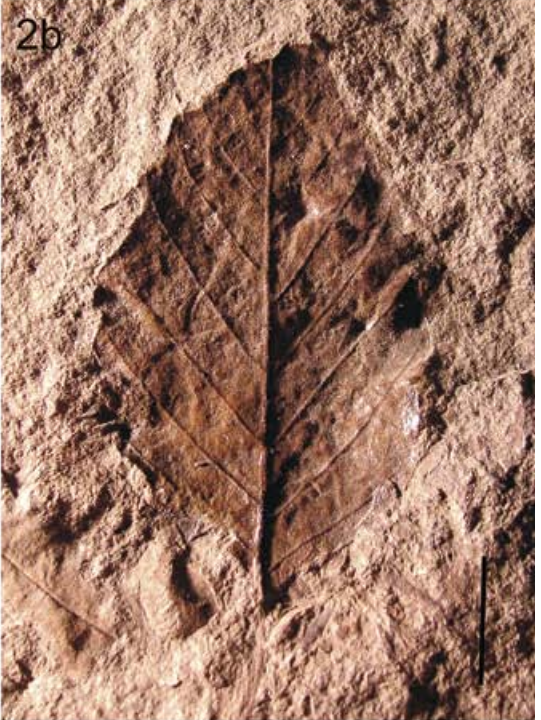
2a



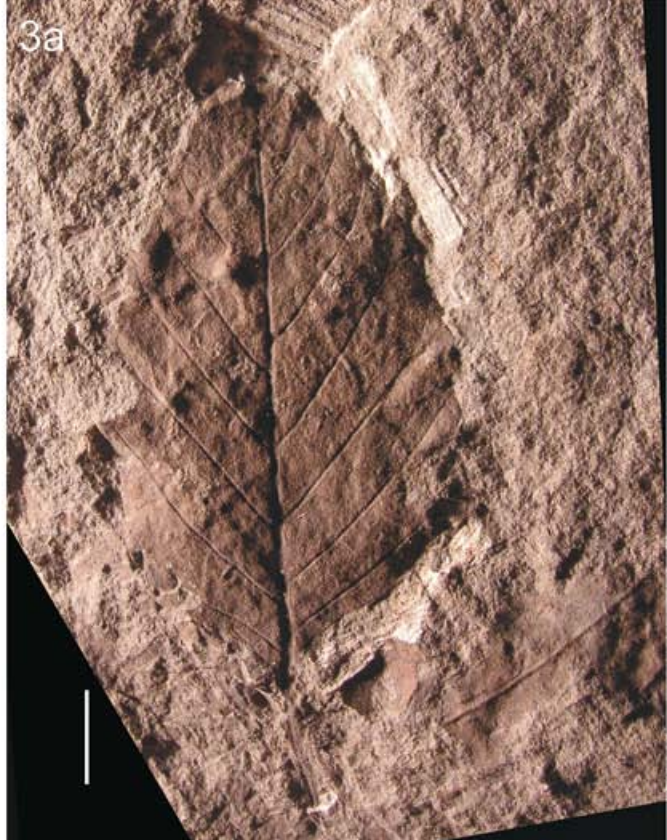
1c



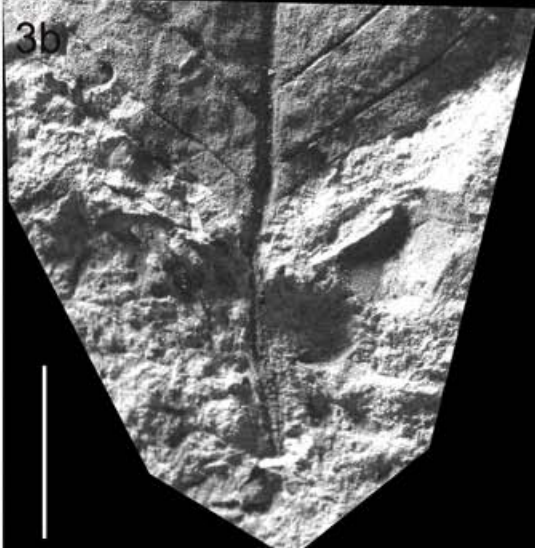
2b



3a



3b



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## Plate 7

Fig. 1a–d: *Rhamnus augustinii* ETTINGSHAUSEN, 1851.

Fig. 1a: Sediment block with the holotype at the left lower margin (arrow), associated with leaves of *Alnus ducalis* (GAUDIN in GAUDIN & STROZZI, 1858) KNOBLOCH 1968 (GBA 1851/002/0007A).  
Scale 3 cm.

Fig. 1b: Holotype.  
GBA 1851/002/0007Ac.

Fig. 1c: Type figure of ETTINGSHAUSEN, 1851, Pl. 5, Fig. 3.

Fig. 1d: Detail of the type figure of ETTINGSHAUSEN, 1851, Pl. 5, Fig. d.

Fig. 2a–d: *Potamogeton ungeri* ETTINGSHAUSEN, 1851.

Fig. 2a: Sediment block with the holotype at the left margin (arrow) (GBA 1851/002/0002b), associated with *Cyperites tertiaris* UNGER (GBA 1851/002/0002a), left of the red dot and other plant fragments.

Fig. 2b: Holotype.  
GBA 1851/002/0002b.

Fig. 2c: Type figure of ETTINGSHAUSEN, 1851, Pl. 1, Fig. 3.

Fig. 2d: Detail of the holotype (Fig. 2b) venation.  
Scale 0.1 cm.

Fig. 3a–c: *Leguminosites ingaefolius* ETTINGSHAUSEN, 1851.

Fig. 3a: Sediment block with probable the holotype (GBA 1851/002/00012b) at the right upper margin (arrow), associated with *Liquidambar europaeum* A. BRAUN, 1836 (GBA 1851/002/0012/1a).

Fig. 3b: Type figure of ETTINGSHAUSEN, 1851, Pl. 5, Fig. 8.

Fig. 3c: Holotype?  
GBA 1851/002/00012/1b.

Scale 1 cm, if not mentioned otherwise.

Type figures from ETTINGSHAUSEN, 1851 are shown in their original size.

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