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From the Palaeontological Collection of the Universalmuseum Joanneum – The Cenozoic Decapod Crustaceans (Crustacea: Malacostraca: Decapoda)

Aus der paläontologischen Sammlung des Universalmuseums Joanneum – Die känozoischen Zehnfußkrebse (Crustacea: Malacostraca: Decapoda)

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16 Figures

Abstract: Cenozoic decapod crustaceans housed in the collections of the Universalmuseum Joanneum (Graz, Austria) are reviewed. Previous descriptions, geographic and stratigraphic provenance and collection history are discussed. Altogether 72 specimens are figured, including five holotypes. Taxonomic affinity of previously unpublished material is addressed. *Gebiacantha* sp. from the middle Miocene of Wetzelsdorf is the first fossil record of the genus from the Paratethys.

Zusammenfassung: Vorliegender Katalog umfasst die am Universalmuseum Joanneum verwahrten känozoische Dekapoden. Frühere Bearbeitungen, geographische und stratigraphische Position sowie die Sammlungsgeschichte der Exemplare werden dargestellt. Insgesamt werden 72 Stücke, darunter fünf Holotypen, abgebildet und bisher unpubliziertes Material taxonomisch evaluiert. *Gebiacantha* sp. aus dem Mittelmiozän von Wetzelsdorf i.d. Weststeiermark ist der erste Fossilnachweis dieser Gattung aus dem Bereich der Paratethys.

Key Words: Axiidea; Gebiidea; Anomura; Brachyura; Styria/Austria; Slovenia.

Schlüsselworte: Axiidea; Gebiidea; Anomura; Brachyura; Steiermark/Österreich; Slowenien.

1. Introduction

This catalogue documents the Cenozoic decapod crustaceans deposited in the Universalmuseum Joanneum, department for Geology & Palaeontology (compare Gross 2002; Gross & Martin 2008). The collection includes fossil decapods from several stratigraphic levels spanning from the Upper Jurassic to the Neogene. Jurassic material is limited to specimens coming from the Solnhofen-type lithographic limestones of Bavaria (Germany). Specimens from the Cretaceous period comprise a handful of specimens from different localities of Austria and the Czech Republic. All these lots are either poorly documented or insufficiently preserved. In some cases, the specimens represent well-known taxa and the samples were actually used for educational purposes in the past.

The main body of the decapod collection at the Joanneum originates from Miocene strata of Styria (Austria) and Slovenia. The present work brings together all relevant information on this part of the collection. Only a portion of the specimens was mentioned in earlier publications (Hilber 1877; Glaessner 1928; Flügel & Heritsch 1968; Flügel 1986; Friebe 1987; Klaus & Gross 2010) and some of them were insufficiently documented (according to current standards). Thus, the opportunity is taken here to provide an updated stratigraphic and taxonomic background of the material as well as a detailed photographic documentation. This aims to make the material available for scientific purposes (e. g. palaeobiodiversity or biogeographic analyses) and may stimulate further sampling activities as well.

2. The fossil decapod crustaceans at the Joanneum

2.1. Decapoda – Some background information

Decapods are highly organized malacostracan crustaceans with a carapace fused to all thoracic segments. They are distinguished from other eucaridans by the presence of three pairs of maxillipeds (behind the mandibles, maxillules, and maxillae) and five pairs of walking legs. In many decapod taxa, the first pair is characteristically chelate ("claws"). An important part of the exoskeleton is the (dorsal) carapace, typically divided by grooves and sometimes "lineae" into specific regions which are considered of taxonomic importance (e. g. Glaessner 1969; Fig. 1). While systematics of recent brachyuran crabs are largely based on weakly sclerotised parts (e. g. eyes, antennae, mouthparts, gonopores), in the fossil record only carapaces and chelipeds (claw bearing legs) are commonly preserved, which are, hence, used as proxy characters in palaeontology (e. g. Schweitzer 2003).

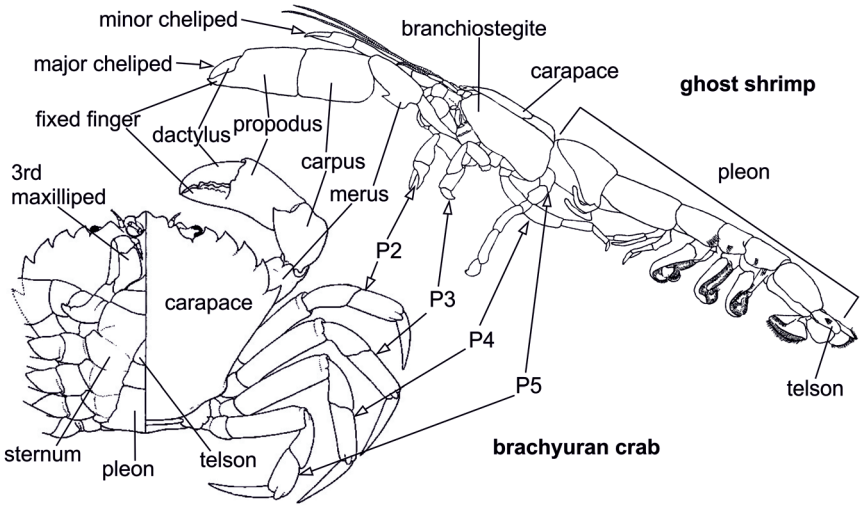


Fig. 1: Scheme of the body plan of a brachyuran crab and a callianassid ghost shrimp with terms used in the text. Left half of the crab scheme is in ventral view, whereas right half represents dorsal view. P1–P5 = pereiopod 1–pereiopod 5. Modified after Biffar (1971) and Williams (1974).
Abb. 1: Schematischer Bauplan einer Krabbe (Brachyura) und einer Geistergarnele (Axiidea) mit den im Text benutzten Bezeichnungen. Linke Hälfte der Krabbe in Ventralansicht, rechte Hälfte in Dorsalansicht. P1–P5 = Pereiopoden 1–5. Verändert nach Biffar (1971) und Williams (1974).

According to the latest census, decapod crustaceans include almost 18,000 species arranged in 2,700 genera and 233 families (De Grave et al. 2009) of which almost 3,300 species are known exclusively as fossils (Schweitzer et al. 2010). The taxonomy of decapod crustaceans underwent major changes in the last fifty years (see Glaessner 1969; Bowman & Abele 1982; Martin & Davis 2001; De Grave et al. 2009; Schweitzer et al. 2010; Ahyong et al. 2011). Four (Axiidea, Gebiidea, Anomura, Brachyura) out of 12 currently recognized infraorders (Ahyong et al. 2011; Karasawa et al. 2013) are represented in the collections of the Joanneum.

2.2. Remarks on the locations of the fossil decapods of the Joanneum

The oldest brachyuran fossil discussed herein stems from the upper Oligocene of Trbovlje (Trifail) in the Sava folds, Slovenia (Laško syncline; e. g. Placer 1999; Bechtel et al. 2004; Fig. 2). Actually, this specimen (Inv.No. 56664) is a counterpart of the individual stored at the Geological Survey in Vienna (GBA 2007/024/0005).

A significant portion of the decapod collection comprises material from northern Slovenia, mainly from the area around Jarenina (Jahring; Fig. 2). The fossils derive from


N
0
20 km
Gratkorn
Andritz
Graz
Voitsberg
Waldhof
47°N
Kainach
Raab
Kirchbach
St. Josef
Weiten-
dorf
Wurzing
Gnas
Carinthia
Wetzelsdorf
Lamberg
Pöls
Wildon
Styria
Zehndorf
Wolfsberg
Lavant
Groß
St. Florian
Koralpe
Sausal
Leibnitz
Retznei
Schönweg
Wies
Gamlitz
Spielfeld
Mureck
Mur
Šentilj
[St. Egidi]
Eibiswald
Arnfels
Jarenina
[Jahring]
Drau
Dravograd
[Unterdrauburg]
Kozjak
Lenart
[St. Leonhard]
Pesnica
Prevalje
[Prävali]
Maribor
Nebova
[Ebenkreuz]
Pohorje
46°30'N
Ptujsko polje
Drava
Slovenia
Šoštanj
[Schönstein]
Slovenske Konjice
[Gonobitz]
Velenje
[Wöllan]
Socka
[Sotzka]
Dravinja
Savinja
Celje [Cilli]
Rogaška Slatina
[Rohitsch-Sauerbrunn]
Sotla
Posavsko
Trbovlje
[Trifail]
Laško
[Tüffer]
Zagorje ob Savi
[Sagor]
Sava
Hribovje
33°E
D
Vienna
SK
A
Graz
H
I
SLO
100 km
Cenozoic
sediments
pre-Cenozoic
rocks & volcanics
nation boundary
province boundary

the Karpatian–lower Badenian Haloze Formation, which is probably an equivalent of the "Styrian Schlier" and "Kreuzkrumpl Formation" in Styria respectively (e. g. Kollmann 1965; Schell 1994; Hohenegger et al. 2009; Jelen & Rifelj 2011). Unfortunately, the exact location of the various sampling sites could not be established (compare Meznerics 1936; Mikuž & Gašparič 2014).

Except for three specimens from the southern Styrian/northern Slovenian borderland (Šentilj/St. Egidi), much decapod material originates from the middle Miocene (Badenian) "Florian Beds" and the Weissenegg Formation of the Styrian Basin (e. g. Kopetzky 1957; Friebe 1990; Hohenegger et al. 2009, 2014). Especially in the region of Wetzelsdorf in der Weststeiermark, several sites furnished a quite diverse brachyuran fauna (13 taxa; Fig. 3). The position of these localities was originally indicated in an unpublished map kept in the Joanneum (JB 1898; JB = Jahresbericht), which is, however, no longer available. For some sites, the sketch map in Holler (1900) enabled a geographic approximation.

The upper middle Miocene decapod material is limited. While 20 species are documented from Badenian deposits, two taxa represent the Sarmatian decapod fauna in Styria (Fig. 3). At Waldhof (W Graz; lower Sarmatian; Rollsdorf Formation; Gross 2015, cum Lit.) solely the species *Mioplax socialis* Bittner, 1884 has been found. Two clay pits in the north of Graz (Graz/Andritz, Gratkorn; upper Sarmatian; Gleisdorf Formation) contained exclusively remains of the freshwater crab *Potamon*, which is otherwise documented in the collection with just one claw-fragment from the Karpatian–lower Badenian site Schönweg ("Brüchl") in the Lavanttal Basin (Carinthia; Klaus & Gross 2010).

3. Catalogue of Cenozoic decapod crustaceans at the Joanneum

The higher classification used in this catalogue follows that of De Grave et al. (2009). Subfamilies are not recognized here. Fossil decapods once deposited at the University of Graz have been transferred to the Universalmuseum Joanneum in the year 2002 and received new repository numbers (original numbers mentioned in publications prior to the transfer are also indicated).

Abbreviations: Inv.No. = inventory number of the Universalmuseum Joanneum (department for Geology & Palaeontology), GBA = inventory number of the Geological Survey of Austria in Vienna, NHMW = inventory number of the Natural History Museum Vienna (Geological-Palaeontological department), UGP = former inventory number of the University of Graz (institute of Earth Sciences); A = Austria, SLO = Slovenia, Stmk. = Styria; R = right, L = left, ♀ = female, ♂ = male; JB = Jahresbericht Joanneum.

Fig. 2: Overview of locations (= star) of fossil decapods deposited at the Joanneum.
Abb. 2: Überblick der Fundpunkte (= Stern) der am Joanneum befindlichen fossilen Zehnfußkrebse.

stage		locality	taxon	*Callianassa* (s.l.) sp.	*Balsscallichirus florianus*	*Balsscallichirus* sp.	*Calliax michelottii*	*Glypturus munieri*	*Callianopsis jahringensis*	*Gebiacantha* sp.	*?Petrochirus* sp.	*Dynomene emiliae*	*Calappa* sp.	*Eocarpilius antiquus*
Sarmatian	upper	**Gratkorn** (St. Stefan clay pit); 15°20'56" E/47°08'14" N												
		Graz/Andritz (Wolf clay pit); 15°26'11" E/47°05'55" N												
	lower	**Waldhof**; 15°21'22" E/47°02'45" N [2]												
Badenian	upper-middle	**Wildon** (Schloßberg); 15°30'49 E/46°53'04" N [2]												
		Wurzing; 15°31'09" E/46°53'58" N										●		
	lower	**Gamlitz**; 15°33'10" E/46°43'15" N [3]												
		Groß St. Florian; 15°16'51" E/46°49'25" N [4]			●									
		Grubtal bei Gamlitz; 15°32'56" E/46°43'30" N [1]												
		Lamberg; 15°25'27" E/46°53'08" N [2]												
		Pöls an der Wieserbahn; 15°24'39" E/46°53'40" N [1]												
		Retznei quarry; 15°33'33" E/46°44'21" N [2]												●
		Spielfeld; 15°37'53" E/46°42'24" N [3]												
		St. Josef in der Weststeiermark; 15°20'13" E/46°54'21" N			●									
		Weitendorf quarry; 15°26'43" E/46°53'44" N [1]												
		Wetzelsdorf in der Weststeiermark,												
		"excavation cesspit Schmidtoni"; 15°21'24" E/46°52'40" N												
		"1 Oisnitz W"; 15°21'40" E/46°53'46" N [2]												
		"2 Winkeltoni"; 15°20'59" E/46°53'46" N [4]		●				●		●	●		●	
		"6 Wippel NO"; 15°20'55" E/46°54'22" N [4]												
		"7 Simihansl"; 15°21'06" E/46°54'13" N [4]												
		"8 Kreuzschaller W"; 15°21'07" E/46°54'06" N [1]		●		●				●				
		"9 Kreuzschaller O"; 15°21'12" E/46°54'04" N [1]											●	
		"11 Tomahiaslgraben N"; 15°21'19" E/46°53'48" N [2]		●										
		"12 Tomahiaslgraben SSW"; 15°21'13" E/46°53'43" N [2]												
		"15 Schmidtbauer"; 15°21'17" E/46°52'41" N [2]		●										
		"16 Suppan vulgo Priegl"; 15°21'17" E/46°52'41" N [3]												
		"Ringgraben"; 15°21'34" E/46°53'06" [2]												
		"Wenzelsteffi-Bergweg"; 15°21'15" E/46°53'58" N [1]												
		Zehndorf; 15°24'25 E/46°50'19" N [2]			●									
		Šentilj [St. Egidi]; 15°38'58" E/46°40'52" N [2]												
lower Badenian-Karpatian		**Jarenina** [Jahring]												
		"Winzerei vulgo Ruesser"; 15°41'39" E/46°38'44" N [3]					●		●					
		"Jahringhof Ost"; 15°41'39" E/46°38'44" N [3]					●							
		"Weingarten N Jahringhof"; 15°41'37" E/46°39'03" N [2]							●					
		"Jahringhof, Straße nach St. Egidi"; 15°41'27" E/46°39'12" N [2]		●			●							
		"Pöllitschdorf [Polička vas]"; 15°41'34" E/46°39'38" N [2]									●			
		"Zell im Wolfsthal [Vukovski Dol]"; 15°42'35" E/46°37'34" N [3]					●		●					
		Nebova [Ebenkreuz]; 15°43'33" E/46°33'77" N [3]												
		Schönweg ("Brüchl"); 14°48'05" E/46°44'34"N [1]												
Chattian		**Trbovlje** [Trifail]; 15°02'42 E/49°09'00" N [4]												

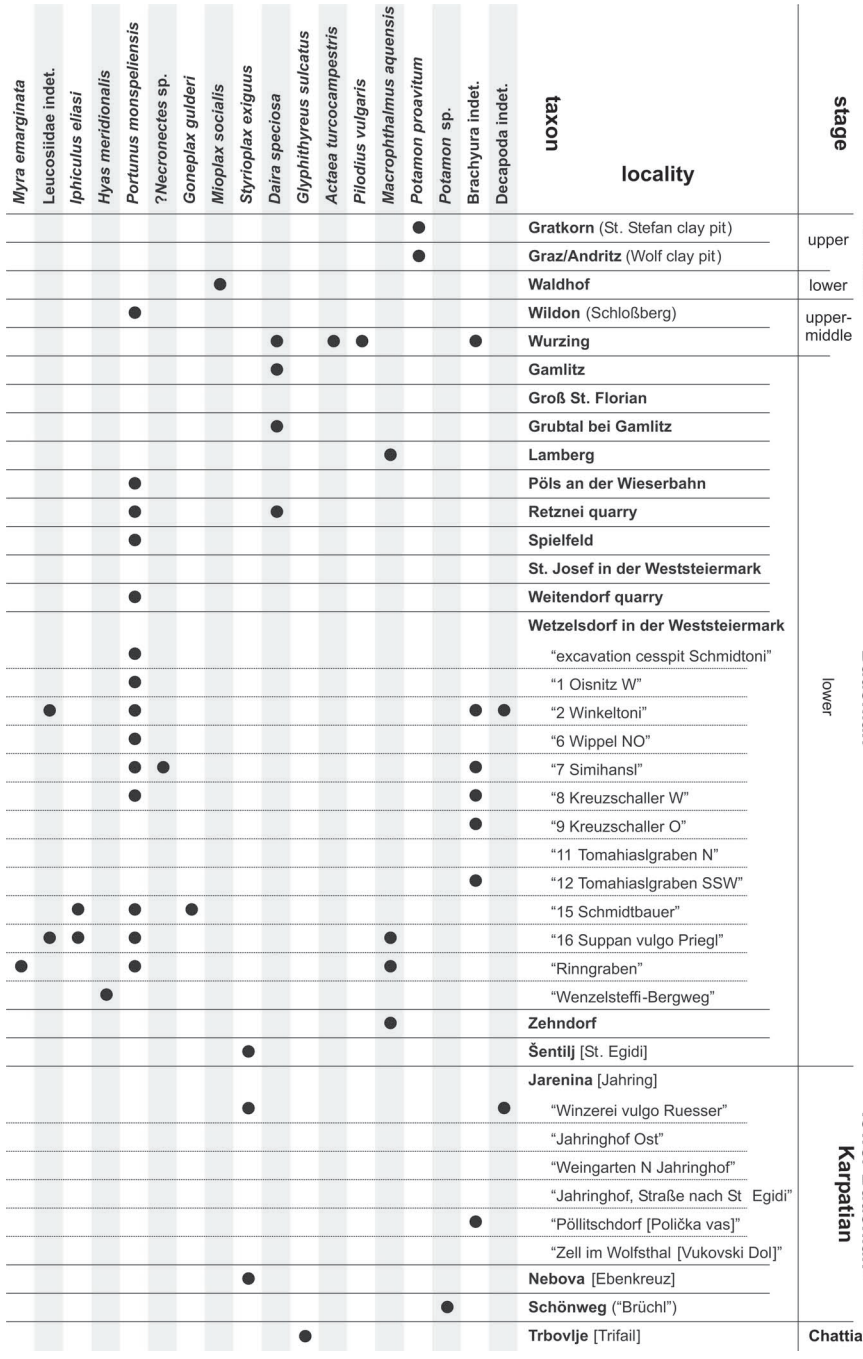

Myra emarginata
Leucosiidae indet.
Iphiculus eliasi
Hyas meridionalis
Portunus monspeliensis
?Necronectes sp.
Goneplax gulderi
Mioplax socialis
Styrioplax exiguus
Daira speciosa
Glyphithyreus sulcatus
Actaea turcocampestris
Pilodius vulgaris
Macrophthalmus aquensis
Potamon proavitum
Potamon sp.
Brachyura indet.
Decapoda indet.
taxon
locality
stage
Gratkorn (St. Stefan clay pit)
Graz/Andritz (Wolf clay pit)
Waldhof
Wildon (Schloßberg)
Wurzing
Gamlitz
Groß St. Florian
Grubtal bei Gamlitz
Lamberg
Pöls an der Wieserbahn
Retznei quarry
Spielfeld
St. Josef in der Weststeiermark
Weitendorf quarry
Wetzelsdorf in der Weststeiermark
“excavation cesspit Schmidtoni”
“1 Oisnitz W”
“2 Winkeltoni”
“6 Wippel NO”
“7 Simihansl”
“8 Kreuzschaller W”
“9 Kreuzschaller O”
“11 Tomahiaslgraben N”
“12 Tomahiaslgraben SSW”
“15 Schmidtbauer”
“16 Suppan vulgo Priegl”
“Rinngraben”
“Wenzelsteffi-Bergweg”
Zehndorf
Šentilj [St. Egidi]
Jarenina [Jahring]
“Winzerei vulgo Ruesser”
“Jahringhof Ost”
“Weingarten N Jahringhof”
“Jahringhof, Straße nach St Egidi”
“Pöllitschdorf [Polička vas]”
“Zell im Wolfsthal [Vukovski Dol]”
Nebova [Ebenkreuz]
Schönweg (“Brüchl”)
Trbovlje [Trifail]
upper
lower
upper-middle
lower
Sarmatian
Badenian
lower Badenian-Karpatian
Chattian

Fig. 3 (previous page): Geographic and stratigraphic distribution of Cenozoic decapod fossils stored at the Joanneum. Numbers in brackets following the provided coordinates (WGS84) refer to the accuracy of site location within 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.
Abb. 3 (vorherige Seite): Geographisches und stratigraphisches Vorkommen der känozoischen Dekapodenfossilen des Joanneums. Die Zahlen in eckiger Klammer geben die Genauigkeit der Fundortangabe an ([1] = 250 m, [2] = 500 m, [3] = 1000 m, [4] = 5000 m im Umkreis der Koordinate; keine Angabe = auf Zehnermeter genau).

Ordo Decapoda Latreille, 1802
Infraordo Axiidea de Saint Laurent, 1979

Taxonomic remarks

Taxonomic interpretation of the fossil ghost shrimps of the families Callianassidae and Ctenochelidae is in flux, mainly because the generic assignment is hindered by their poor preservation and inconsistencies in the biological classification (Bishop & Williams 2005; Hyžný & Klompmaker 2015). Furthermore, numerous taxa are incorrectly classified within the catch-all taxon *Callianassa* (sensu lato). A revision of fossil ghost shrimps is in progress (Hyžný & Müller 2010, 2012; Hyžný 2012a, b, 2016; Hyžný & Hudáčková 2012; Hyžný & Karasawa 2012; Hyžný & Dulai 2014; Hyžný & Gašparič 2014; Hyžný & Klompmaker 2015).

Familia Callianassidae Dana, 1852
Genus *Callianassa* Leach, 1814

Callianassa (sensu lato) sp.

Figs. 4.1–4.2

Description: Inv.No. 75563: L major propodus (without fixed finger) (Fig. 4.1); Inv. No. 75564: six fragmentary isolated fingers; Inv.No. 76060: two isolated dactyli; Inv. No. 211156: L major propodus (with fixed finger) (Fig. 4.2); Inv.No. 211421: two fragmentary fingers; Inv.No. 211425: numerous isolated fingers; Inv.No. 211428: numerous isolated fragmentary fingers; Inv.No. 211429: two isolated fragmentary fingers.

Localities: A, Stmk., Wetzelsdorf in der Weststeiermark, "2 Winkeltoni" (Inv.Nos. 211428, 211429), "8 Kreuzschaller W" (Inv.Nos. 75563, 75564, 211425), "11 Tomahiaslgraben N" (Inv.No. 211421), "16 Suppan vulgo Priegl" (Inv.No. 76060); SLO, Polička vas [Pöllitschdorf], "Steinbruch Šošmann, Pöllitschdorf bei Jahring [Jarenina]" (Inv.No. 211156).

Stratigraphy: Wetzelsdorf (Florian Beds ("Florianer Schichten"); lower Badenian; Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009,

2014); Polička vas (Haloze Formation; Karpatian–lower Badenian; Jelen & Rifelj 2011).

Acquisition: Inv.Nos. 75563, 75564, 76060, 211421, 211425, 211428, 211429 (collection Herbert Lamprecht (for his vita see Widder 1971), donation 1918–1923; compare JB 1925); Inv.No. 211156 (possibly collection and donation Leopold Kühnelt; compare JB 1898).

Remarks: The material is too fragmentary to be identified more closely.

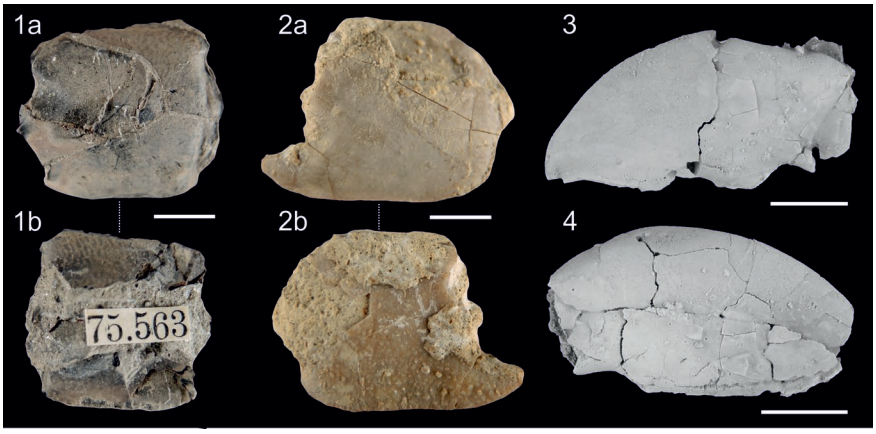


Fig. 4: Axiidea: Callianassidae. 1) *Callianassa* (s.l.) sp. (Wetzelsdorf, "8 Kreuzschaller W"; Inv. No. 75563), L major propodus in outer (1a) and inner (1b) view. 2) *Callianassa* (s.l.) sp. (Polička vas; Inv.No. 211156), L major propodus in outer (2a) and inner (2b) view. 3) *Glypturus munieri* (Wetzelsdorf, "2 Winkeltoni"; Inv.No. 211427), L major dactylus. 4) *G. munieri* (Wetzelsdorf, "2 Winkeltoni"; Inv.No. 211427), R major dactylus. Specimens in 3 and 4 were covered with ammonium chloride prior the photography. Scale bar equals 5 mm.
Abb. 4: Axiidea: Callianassidae. 1) *Callianassa* (s.l.) sp., L großer Propodus in Außen- (1a) und Innenansicht (1b). 2) *Callianassa* (s.l.) sp., L großer Propodus in Außen- (2a) und Innenansicht (2b). 3) *Glypturus munieri*, L großer Dactylus. 4) *G. munieri*, R großer Dactylus. Exemplare 3 und 4 wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm.

Genus *Balsscallichirus* Sakai, 2011

Balsscallichirus florianus (Glaessner, 1928)

Figs. 5.1–5.4, 5.6

* 1928 *Callianassa floriana* – Glaessner: 170, pl. 3, fig. 5.
1929 *Callianassa floriana* Glaessner – Glaessner: 81.
1998a *Callianassa floriana* Glaessner – Müller: 10.

1998b "*Callianassa*" aff. *sismondae* A. Milne-Edwards – Müller: 273, pl.1, figs. 1–2.

2016 *Balsscallichirus florianus* (Glaessner) – Hyžný: 46, figs. 4.1–4.7, 5.1–5.4, 6.1–6.6, 7.1–7.2, 12.1.

Description: Inv.No. 61186: two major L chelipeds consisting of carpus, propodus and dactylus (Fig. 5.6); Inv.No. 75416: L major chela consisting of merus, carpus and incomplete propodus (figured in Hyžný 2016: fig. 6.2; Fig. 5.3); Inv.No. 75662: two major chelipeds consisting of carpus, propodus and dactylus (figured in Hyžný 2016: figs. 5.1–5.2; Figs. 5.1–5.2); Inv.No. 211153: L major carpus (Fig. 5.4).

Localities: A, Stmk., Groß St. Florian, "Mülbauer" [Mühlbauer] (Inv.No. 75662; see Hilber 1878); A, Stmk., St. Josef in der Weststeiermark, "drainage of large pond" (Inv. Nos. 75416, 211153); A, Stmk., Zehndorf, "Zöhndorf bei Preding" (also spelled "Zohndorf"; Hilber 1878; Inv.No. 61186).

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Inv.No. 61186 (possibly collection Vincenz Kollar; for his vita see Schiner 1860); Inv.No. 75416, 211153 (collection of the department (Ingomar Fritz, Reinhold Niederl), 1991); Inv.No. 75662 (collection Herbert Lamprecht, donation 1918–1923; compare JB 1925).

Remarks: *Callianassa floriana* has recently been re-described and re-assigned to *Balsscallichirus* Sakai, 2011 by Hyžný (2016). The species is known from the upper Oligocene (Egerian) of Hungary, lower Miocene of the Korneuburg Basin, Austria and the middle Miocene of the Vienna and Styrian basins, Austria (Hyžný 2016).

The type material of *Callianassa floriana* from Groß St. Florian is deposited at the Natural History Museum Vienna under the following repository numbers: holotype

Fig. 5: Axiidea: Callianassidae. 1) *Balsscallichirus florianus* (Groß St. Florian, "Mühlbauer", Inv. No. 75662), major cheliped. 2) *B. florianus* (Groß St. Florian, "Mühlbauer", Inv.No. 75662), major cheliped. 3) *B. florianus* (St. Josef, Inv.No. 75416), L major cheliped (with broken fingers). 4) *B. florianus* (St. Josef, Inv.No. 211153), L major carpus. 5) *Balsscallichirus* sp. (Wetzelsdorf, "8 Kreuzschaller W", Inv.No. 211426), R major dactylus. 6) *B. florianus* (Zehndorf, Inv.No. 61186), two major L chelipeds. Specimens in 5 and 6 were covered with ammonium chloride prior the photography. Scale bar equals 5 mm. c = carpus, d = dactylus, p = propodus.

Abb. 5: Axiidea: Callianassidae. 1) *Balsscallichirus florianus*, große Schere. 2) *B. florianus*, große Schere. 3) *B. florianus*, L große Schere (mit abgebrochenen Fingern). 4) *B. florianus*, L großer Carpus. 5) *Balsscallichirus* sp., R großer Dactylus. 6) *B. florianus*, zwei große L Scheren. Exemplare 5 und 6 wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm. c = Carpus, d = Dactylus, p = Propodus.

NHMW 1846/0049/0010 (part) and 1846/0049/0009 (counterpart), and paratypes: NHMW 1846/0049/0003, 1846/0049/0007–0008, 1846/0049/0011–0013.

***Balsscallichirus* sp.**
Fig. 5.5

Description: Inv.No. 211426: two major (L and R) dactyli.

Locality: A, Stmk., Wetzelsdorf in der Weststeiermark, "8 Kreuzschaller W".

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).
Acquisition: Collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925).

Remarks: Intraspecific variation often is present in the shape of the major cheliped dactylus of *Balsscallichirus* (Hyžný 2016: 51). Thus, isolated dactyli cannot be identified at species level.

Genus *Calliax* de Saint Laurent, 1973

Calliax michelottii (A. Milne-Edwards, 1860)

Figs. 6.1–6.4

*	1860	*Callianassa Michelotti* – A. Milne-Edwards: 341, pl. 14, fig. 3.
	1929	*Callianassa Michelotti* A. Milne-Edwards – Glaessner: 84.
pars	1984	'*Callianassa*' *szobensis* n. sp. – Müller: 53, pl. 7, figs. 3–4. [non figs. 5–6]
	2014	*Calliax michelottii* (A. Milne-Edwards) – Hyžný & Gašparič: 45, figs. 5–10. [cum. syn.]

Description: Inv.No. 5755: L major cheliped consisting of ischium, merus, carpus, propodus and dactylus (Fig. 6.1); Inv.No. 77871: L major propodus; Inv.No. 77873: R major propodus (figured in Hyžný & Gašparič 2014: fig. 8B; Fig. 6.2); Inv.No. 77874: L major propodus (figured in Hyžný & Gašparič 2014: fig. 8A; Fig. 6.4); Inv.No. 211042: R major propodus (Fig. 6.3).

Localities: SLO, Jarenina [Jahring], "Winzerei vulgo Ruesser in Gromberg bei Jahringhof [Jareninski Dvor]" (Inv.No. 5755); SLO, Jareninski Dvor [Jahringhof], "10 Gehminuten oberhalb der Straße nach St. Egidi [Šentilj]" (Inv.Nos. 77871, 211042); SLO, Jarenina [Jahring], "Jahringhof [Jareninski Dvor] Ost" (Inv.No. 77874); SLO, Vukovski Dol [Wolfsthal], "Zell bei Jahring" ["Žell, Jahring SO., im Wolfsthal, rechte Thalseite; JB 1898"] (Inv.No. 77873).

Stratigraphy: Haloze Formation; Karpatian–lower Badenian (Jelen & Rifelj 2011).

Acquisition: Inv.No. 5755 (collection and donation Leopold Kühnelt; compare JB 1898); Inv.Nos. 77871, 77873, 77874, 211042 (possibly collection and donation Leopold Kühnelt; compare JB 1898, 1899).

Remarks: The species, originally described as *Callianassa*, was recently re-described and re-assigned to *Calliax* by Hyžný & Gašparič (2014). *Calliax michelottii* is a wi-

despread species known from the Oligocene (Rupelian) to the middle Miocene (Serravallian) of Europe. It has been reported from Germany, Austria, Slovenia, Slovakia and Hungary (Hyžný & Gašparič 2014: table 2).

The material of *Callianassa michelottii* from Jarenina was originally reported by Glaessner (1928), however, no figure was provided. The opportunity is taken here to figure the best-preserved specimen (Fig. 6.1).

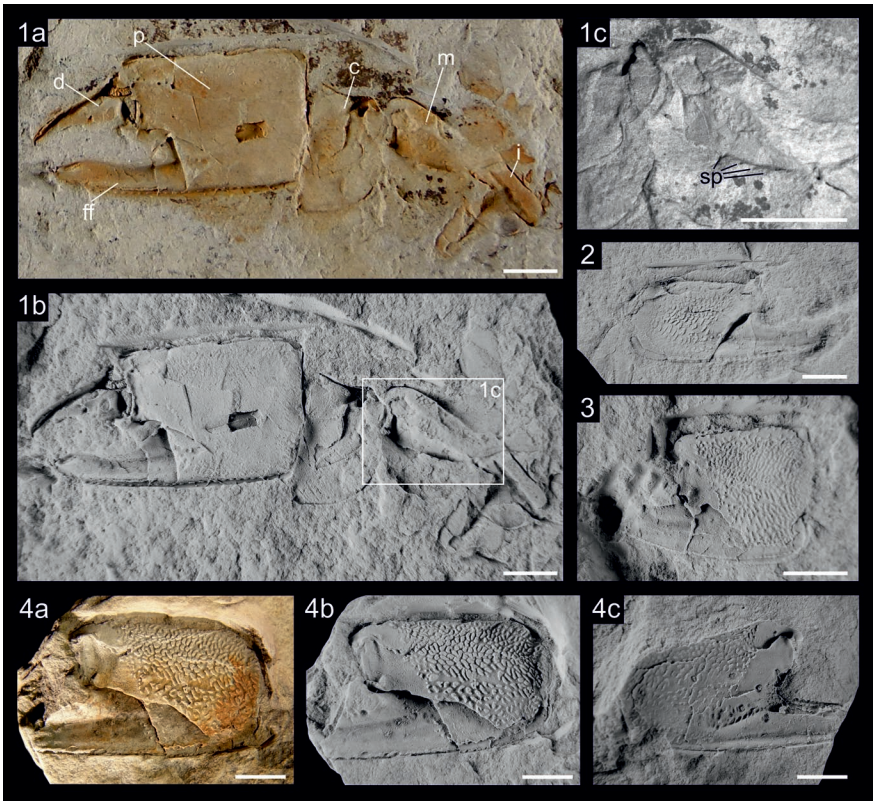


Fig. 6: Axiidea: Callianassidae: *Calliax michelottii*. 1) Inv.No. 5755, major cheliped; note spines on the lower margin of merus (1c). 2) Inv.No. 77873, R major propodus. 3) Inv.No. 211042, R major propodus. 4) Inv.No. 77874, L major propodus, part (4a, 4b) and counterpart (4c). All specimens are from the vicinity of Jarenina [Jahring]. Specimens in 1b, 2, 3, 4b and 4c were covered with ammonium chloride prior the photography. Scale bar equals 5 mm. c = carpus, d = dactylus, ff = fixed finger, m = merus, i = ischium, p = propodus, sp = spines.
Abb. 6: Axiidea: Callianassidae: *Calliax michelottii*. 1) große Schere; beachte die Stacheln am Unterrand des Merus (1c). 2) R großer Propodus. 3) R großer Propodus. 4) L großer Propodus; Druck (4a, 4b) und Gegendruck (4c). Alle Exemplare stammen aus der Umgebung von Jarenina [Jahring]. Exemplare 1b, 2, 3, 4b und 4c wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm. c = Carpus, d = Dactylus, ff = unbeweglicher Finger, m = Merus, i = Ischium, p = Propodus, sp = Stacheln.

Genus *Glypturus* Stimpson, 1866

Glypturus munieri (Brocchi, 1883)

Figs. 4.3–4.4

* 1883 *Callianassa Munieri* – Brocchi: 5, pl. 5, figs. 5–6.
1929 *Callianassa Munieri* Brocchi – Glaessner: 86.
1929 *Calianassa* [*sic*] *Munieri* Brocchi – Lőrenthey in Lőrenthey & Beurlen: 33, 62–64, pl. 2, figs. 19–23. [non fig. 24]
1984 *Callianassa munieri* Brocchi – Müller: 50, pl. 1, figs. 1–7; pl. 2, figs. 1–2.
2010 *Callianassa munieri* Brocchi – Gatt & De Angeli: 1324, pl. 2, figs. 1–2.
2012 *Glypturus munieri* (Brocchi) – Hyžný & Müller: 978, figs. 4D, 8A–J, 9A–M. [cum. syn.]

Description: Inv.No. 211427: L major dactylus (Fig. 4.3) and R major dactylus (Fig. 4.4).

Locality: A, Stmk., Wetzelsdorf in der Weststeiermark, "2 Winkeltoni".

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925).

Remarks: Although the Wetzelsdorf material consists only of isolated dactyli, they are morphologically identical with typical dactyli of *Glypturus munieri* (compare Hyžný & Müller 2012: figs 9A, C). The species has been previously reported from the Badenian of the Styrian Basin (localities Wagna bei Aflenz and Pöls, for details see Hyžný & Müller 2012).

Familia Ctenochelidae Manning & Felder, 1991
Genus *Callianopsis* de Saint Laurent, 1973

Callianopsis jahringensis (Glaessner, 1928)

Figs. 7.1, 8.1–8.5

* 1928 *Callianassa jahringensis* – Glaessner: 164, pl. 4 (upper figure & carbon copy).
1929 *Callianassa jahringensis* Glaessner – Glaessner: 83.

1998a *Callianassa* sp. – Müller: 11.
2012b *Callianopsis jahringensis* (Glaessner) – Hyžný: 48, pl. 6, figs. A–B.

Description: Inv.No. 5752: two major (R, L) ♀ chelae (dactylus, propodus) (Fig. 8.4), one (L) with associated branchiostegite (Fig. 8.5); holotype Inv.No. 5754: near-complete ♂ individual (including appendages, carapace and abdomen) (figured in Glaessner 1928: pl. 4, upper figure; Fig. 7); Inv.No. 5758: major L ♀ cheliped (dactylus, propodus, carpus, merus) with associated minor chela; Inv.No. 5759: major R ♀ cheliped (dactylus, propodus, carpus, merus, ischium) with associated minor chela (Fig. 8.1); Inv.No. 77876: major L ♂ cheliped (dactylus, propodus, carpus, merus) with associated minor chela; Inv.No. 77877: major R ♀ cheliped (dactylus, propodus, carpus) with associated minor chela; Inv.No. 77878: major R ♂ propodus; Inv.No. 77879: major R ♀ cheliped (dactylus, propodus, carpus, merus); Inv.No. 77880: major R ♀ chela (dactylus, propodus); Inv.No. 77881: major R ♂ cheliped (dactylus, propodus, carpus) with associated fragments of appendages; Inv.No. 77882: major R ♀ chela (dactylus, propodus) with associated branchiostegite; Inv.No. 77883: major R ♂ chela (dactylus, propodus); Inv.No. 211040: major R ♀ propodus (Fig. 8.3) ; Inv.No. 211043: major L ♀ propodus; Inv.No. 211044: major L ♂ cheliped (dactylus, propodus, carpus, merus, ischium); Inv.No. 211045: two major L ♂ propodi; Inv.No. 211046: major L ♀ cheliped (dactylus, propodus, carpus, merus, ischium) with associated minor chela (Fig. 8.2); Inv.No. 211047: major L ♀ chela (dactylus, propodus); Inv.No. 211048: major L ♂ chela (dactylus, propodus) with associated remains of appendages and abdomen; Inv.No. 211049: major L ♀ cheliped (dactylus, propodus, carpus); Inv.No. 211050: major R ♀ cheliped (dactylus, propodus, carpus, merus, ischium) with associated minor chela.

Localities: SLO, Jarenina [Jahring], "Winzerei vulgo Ruesser in Gromberg bei Jahringhof [Jareninski Dvor]" (Inv.Nos. 5754, 5758, 5759, 77876, 77878–77883, 211040, 211043–211050); SLO, Jareninski Dvor [Jahringhof], "Weingarten nördlich Jahringhof, Strasse unterhalb Cote 380" (Inv.No. 77877); SLO, Vukovski Dol [Wolfsthal], "Zell bei Jahring" ["Žell, Jahring SO., im Wolfsthal, rechte Thalseite; JB 1898"] (Inv.No. 5752).

Stratigraphy: Haloze Formation; Karpatian–lower Badenian (Jelen & Rifelj 2011).

Acquisition: Possibly all specimens collection and donation Leopold Kühnelt (compare JB 1898, 1899).

Remarks: Glaessner (1928: 164) described in detail this species based on a near-complete individual (holotype Inv.No. 5754) and additional 20 specimens (chelipeds). He figured only the best preserved specimen (Glaessner 1928: pl. 4, upper figure; Fig. 7), therefore, more well-preserved specimens are figured herein (Figs. 8.1, 8.2) to do-

cument the intraspecific variation as well as sexual dimorphism. The species is known only from its type area in northern Slovenia (Jarenina).

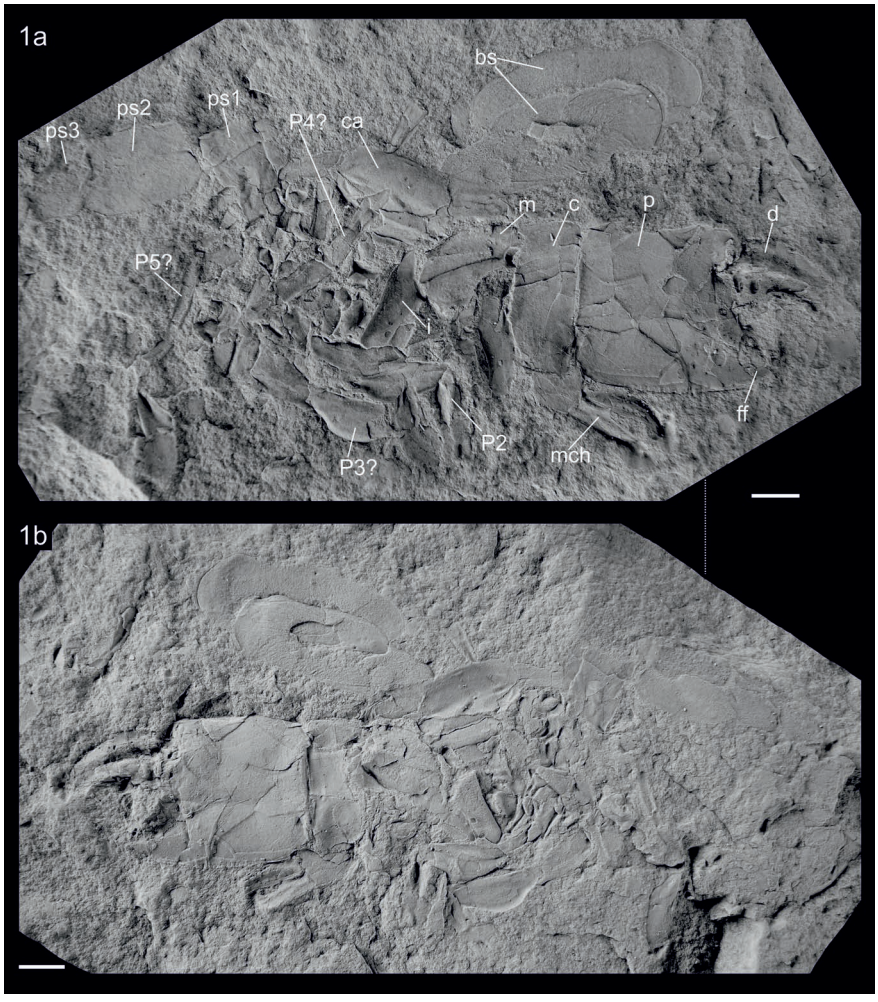


Fig. 7: Axiidea: Ctenochelidae. Holotype of *Callianopsis jahringensis* (Jarenina, Inv.No. 5754), a near complete ♂ individual preserved as part and counterpart. Specimen was covered with ammonium chloride prior the photography. Scale bar equals 5 mm. bs = branchiostegite, c = carpus, ca = carapace, d = dactylus, ff = fixed finger, mch = minor cheliped, p = propodus, P2–P4 = pereiopod 2–4, ps1–ps3 = pleonal somite 1–3.
Abb. 7: Axiidea: Ctenochelidae. Holotyp von *Callianopsis jahringensis*, ein fast vollständiges ♂ Individuum, erhalten mit Druck und Gegendruck. Das Stück wurde vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm. bs = Branchiostegit, c = Carpus, ca = Carapax, d = Dactylus, ff = unbeweglicher Finger, mch = kleine Schere, p = Propodus, P2–P4 = Pereiopoden 2–4, ps1–ps3 = Pleonsegmente 1–3.

Müller (1998a: 11) stated that "although the specimen [the holotype] is exceptional for callianassids, being preserved with body, the chela, the only part used for determining fossil specimens, is much distorted, therefore its relation with other described forms remains obscure". In fact, the holotype is one of the best preserved callianassid ghost shrimps reported from the area once covered by Central Paratethys Sea. It retains all important taxonomic characters on minor and major chelipeds that allow the reassignment of the material to the genus *Callianopsis* as discussed in detail by Schweitzer Hopkins & Feldmann (1997) and Hyžný & Schlögl (2011). *Callianassa jahringensis* was informally re-assigned to *Callianopsis* de Saint Laurent, 1973 by the senior author in his PhD. thesis (Hyžný 2012b).

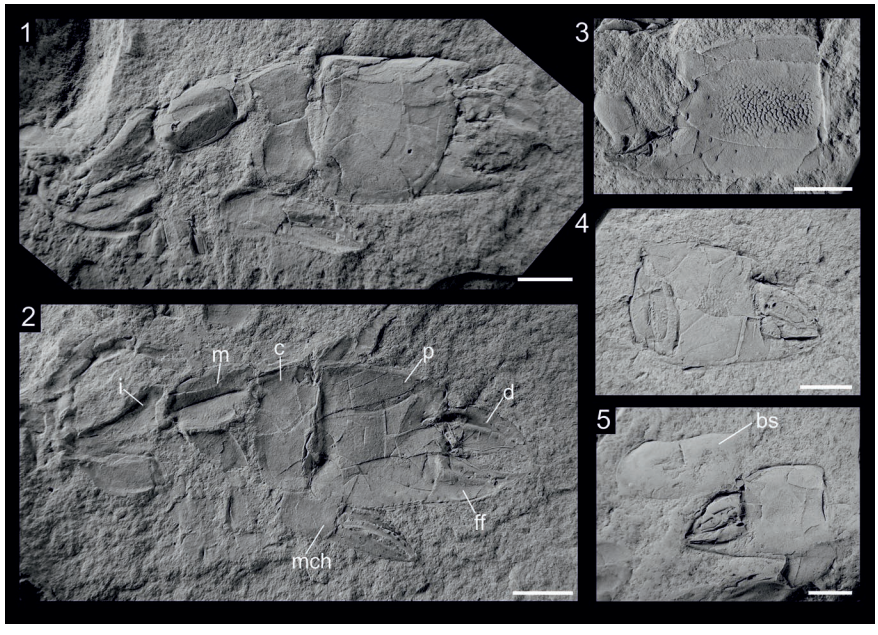


Fig. 8: Axiidea: Ctenochelidae: *Callianopsis jahringensis*. 1) Inv.No. 5759, major R ♀ cheliped with associated minor chela. 2) Inv.No. 211046, major L ♀ cheliped with associated minor chela. 3) Inv.No. 211040, major R ♀ propodus. 4) Inv.No. 5752, major R ♀ chela. 5) Inv.No. 5752, major L ♀ chela with associated branchiostegite. All specimens are from the vicinity of Jarenina [Jahring]. Specimens were covered with ammonium chloride prior the photography. Scale bar equals 5 mm. bs = branchiostegite, c = carpus, d = dactylus, ff = fixed finger, i = ischium, m = merus, mch = minor cheliped, p = propodus.
Abb. 8: Axiidea: Ctenochelidae: *Callianopsis jahringensis*. 1) große R ♀ Schere mit assoziierter kleiner Chela. 2) große L ♀ Schere mit assoziierter kleiner Chela. 3) großer R ♀ Propodus. 4) große R ♀ Chela. 5) große L ♀ Chela mit assoziiertem Branchiostegit. Alle Exemplare stammen aus der Umgebung von Jarenina [Jahring]. Die Exemplare wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm. bs = Branchiostegit, c = Carpus, d = Dactylus, ff = unbeweglicher Finger, i = Ischium, m = Merus, mch = kleine Schere, p = Propodus.

Infraordo Gebiidea de Saint Laurent, 1979
Familia Upogebiidae Borradaile, 1903
Genus *Gebiacantha* Ngoc-Ho, 1989

***Gebiacantha* sp.**
Figs. 9.1–9.3

Description: Inv.No. 211423: two isolated propodi (Fig. 9.1–9.2); Inv.No. 211433: R propodus (Fig. 9.3).

Localities: A, Stmk., Wetzelsdorf in der Weststeiermark, "2 Winkeltoni" (Inv.No. 211423), "8 Kreuzschaller W" (Inv.No. 211433).

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925).

Remarks: Isolated propodi possess small spines on their upper and lower margins. Additionally, there was a much larger spine on the lower margin positioned more distally; it was broken in all specimens prior the study (Fig. 9.1–9.3). Such spiny propodi are quite typical for *Gebiacantha* (Ngoc-Ho 1989, 2001). The specimens from Wetzelsdorf are rather similar to *Gebiacantha tuscia* Garassino, Pasini, De Angeli & Charbonnier in Garassino et al., 2012 from the Pliocene (Zanclean) of Italy (Garassino et al. 2012). The Austrian material, however, is too fragmentary to be identified into the species level.

Infraordo Anomura MacLeay, 1838
Superfamilia Paguroidea Latreille, 1802
Familia Diogenidae Ortmann, 1892
Genus *Petrochirus* Stimpson, 1858

?*Petrochirus* sp.
Fig. 9.4

Description: Inv.No. 211155: fragmentary finger (Fig. 9.4); Inv.No. 211422: seven isolated dactyli.

Localities: A, Stmk., Wetzelsdorf in der Weststeiermark, "2 Winkeltoni" (Inv.No. 211422); SLO, Polička vas [Pöllitschdorf], "Steinbruch Šošmann, Pöllitschdorf bei Jahring [Jarenina]" (Inv.No. 211155).

Stratigraphy: Wetzelsdorf (Florian Beds ("Florianer Schichten"); lower Badenian; Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014); Polička vas (Haloze Formation; Karpatian–lower Badenian; Jelen & Rifelj 2011).

Acquisition: Inv.No. 211155 (possibly collection and donation Leopold Kühnelt; compare JB 1898); Inv.No. 211422 (collection Herbert Lamprecht, donation 1918–1923; compare JB 1925).

Remarks: The material is too fragmentary to be confidently identified into the genus and species level. However, the size and morphology of the material are reminiscent of *Petrochirus*.

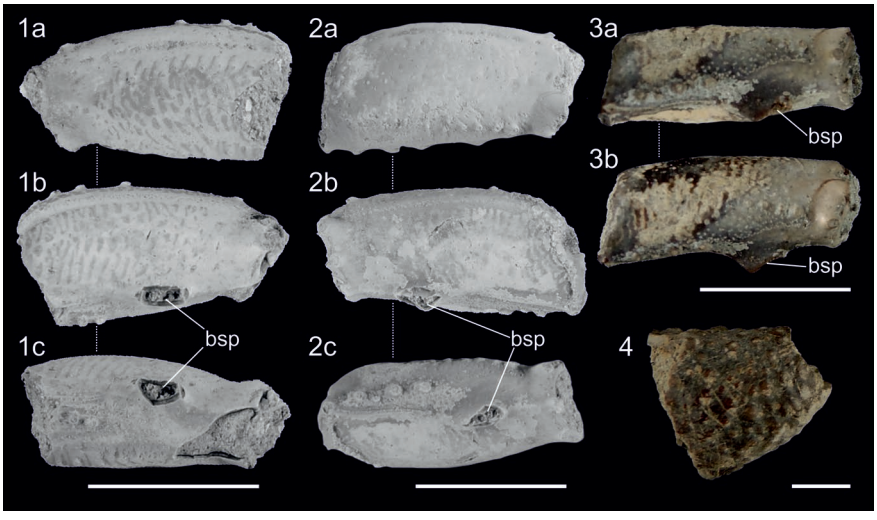


Fig. 9: Gebiidea: Upogebiidae, and Anomura: Diogenidae. 1–2) *Gebiacantha* sp. (Wetzelsdorf, "2 Winkeltoni", Inv.No. 211423), two isolated propodi in outer (1a, 2a), inner (1b, 2b), and ventral (1c, 2c) view. 3) *Gebiacantha* sp. (Wetzelsdorf, "8 Kreuzschaller W", Inv.No. 211433), isolated propodus in ventral (3a) and lateral (3b) view. 4) ?*Petrochirus* sp. (Polička vas, Inv.No. 211155), fragmentary finger. Specimens in 1 and 2 were covered with ammonium chloride prior the photography. Scale bar equals 5 mm. bsp = broken spine.
Abb. 9: Gebiidea: Upogebiidae und Anomura: Diogenidae. 1–2) *Gebiacantha* sp., zwei isolierte Propodi in Außen- (1a, 2a), Innen- (1b, 2b) und Ventralansicht (1c, 2c). 3) *Gebiacantha* sp., isolierter Propodus in Ventral- (3a) und Lateralansicht (3b). 4) ?*Petrochirus* sp., Fingerfragment. Exemplare 1 und 2 wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm. bsp = abgebrochener Stachel.

Infraordo Brachyura Linnaeus, 1758
Superfamilia Dromioidea de Haan, 1833
Familia Dynomenidae Ortmann, 1892
Genus *Dynomene* Desmarest, 1823

***Dynomene emiliae* Müller, 1979**
Fig. 10.1

* 1979 *Dynomene emiliae* – Müller: 4, pl. 1, fig. 1.
1984 *Dynomene emiliae* Müller – Müller: 65, pl. 33, figs. 1–6.
1987 *Dynomene emiliae* Müller – Friebe: 60, fig. 2, pl. 2, fig. 1.
1996 *Dynomene emiliae* Müller – Müller: 9, pl. 1, fig. 9.
1998a *Dynomene emiliae* Müller – Müller: 19, pl. 1, fig. 5.

Description: Inv.No. 200003 (originally as UGP No. 2912): a near-complete carapace (figured in Friebe 1987: pl. 2, fig. 1).

Locality: A, Stmk., Wurzing bei Wildon.

Stratigraphy: Weissenegg Formation; middle–upper Badenian (Friebe 1987, 1990; Hohenegger et al. 2009, 2014).

Acquisition: a) collection J. Georg Friebe, 1986; b) donation (2002) of the Institute of Earth Sciences, University of Graz.

Remarks: The material was reported by Friebe (1987). *Dynomene emiliae* is a well-known species reported exclusively from reefal settings (Müller 1984, 1996).

Sectio Eubrachyura de Saint Laurent, 1980
Subsectio Heterotremata Guinot, 1977
Superfamilia Calappoidea de Haan, 1833
Familia Calappidae de Haan, 1833
Genus *Calappa* Weber, 1795

***Calappa* sp.**
Figs. 10.2–10.4

Description: Inv.No. 211420: three R isolated dactyli (Fig. 10.2–10.4); Inv.No. 211432: three isolated fragmentary dactyli.

Localities: A, Stmk., Wetzelsdorf in der Weststeiermark, “2 Winkeltoni” (Inv.No. 211420), “9 Kreuzschaller O” (Inv.No. 211432).

Fig. 10: Brachyura. 1) *Dynomene emiliae* (Wurzing bei Wildon, Inv.No. 200003), carapace. 2–4) *Calappa* sp. (Wetzelsdorf, "2 Winkeltoni", Inv.No. 211420), isolated dactyli. 5) *Eocarpilius antiquus* (Retznei, Inv.Nos. 201153 and 201156), R chela. 6) *E. antiquus* (Retznei, Inv.No. 211431), carapace. All specimens were covered with ammonium chloride prior the photography. Scale bar equals 10 mm.
Abb. 10: Brachyura. 1) *Dynomene emiliae*, Carapax. 2–4) *Calappa* sp., isolierte Dactyli. 5) *Eocarpilius antiquus*, R Chela. 6) *E. antiquus*, Carapax. Alle Exemplare wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 10 mm.

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925).

Remarks: The material is too fragmentary to be identified into the species level. For more details on distinguishing respective species of *Calappa* from the Paratethys a reference is made to Bachmayer (1962) and Müller (1984).

Superfamilia Carpilioidea Ortmann, 1893
Familia Carpiliidae Ortmann, 1893
Genus *Eocarpilius* Blow & Manning, 1996

Eocarpilius antiquus (Glaessner, 1928)

Figs. 10.5–10.6

* 1928 *Carpilius antiquus* – Glaessner: 191, text-figs. 5–6, pl. 3, fig. 13.
1984 *Carpilius antiquus* Glaessner – Müller: 87, pl. 75, figs. 1–5.
1993 *Carpilius antiquus* Glaessner – Müller: 16, figs. 7F, 7G, 8A.
1996 *Carpilius antiquus* Glaessner – Müller: 11.
1998a *Carpilius antiquus* Glaessner – Müller: 32, pl. 2, fig. 4.
2014 *Carpilius antiquus* Glaessner – Collins: 38, pl. 2, fig. 11.

Description: Inv.Nos. 201153 and 201156: R chela (dactylus, propodus) – two parts of a single broken specimen were labelled separately (Fig. 10.5); Inv.No. 211431: fragmentary carapace (Fig. 10.6).

Locality: A, Stmk., Retznei quarry.

Stratigraphy: Weissenegg Formation; lower Badenian (Friebe 1990; Hohenegger et al. 2009, 2014; Reuter et al. 2012).

Acquisition: Inv.Nos. 201153, 201156 (collection of the department, 05/2004); Inv.No. 211431 (collection of the department).

Remarks: The material consists of a fragmentary carapace and isolated left chela. Both specimens possess characters typical for the species (Müller 1984: 87). *Eocarpilius antiquus* is known from coral-associated decapod faunas of the middle Miocene of Austria, Hungary, Poland and Spain (Glaessner 1928; Müller 1984, 1993, 1996; Collins 2014).

Superfamilia Leucosioidea Samouelle, 1819
Familia Leucosiidae Samouelle, 1819
Genus *Myra* Leach, 1817

Myra emarginata Glaessner, 1928

Fig. 11.1

* 1928 *Myra emarginata* – Glaessner: 175, pl. 3, fig. 16.
1929 *Myra emarginata* Glaessner – Glaessner: 261.
1998a *Myra emarginata* Glaessner – Müller: 23.

Description: Inv.No. 60813 (holotype): complete carapace with partially preserved cuticle (figured in Glaessner 1928: pl. 3, fig. 16).

Locality: A, Stmk., Wetzelsdorf in der Weststeiermark, "Rinngraben".

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Collection of the department (1898; compare JB 1899).

Remarks: The affinities of the species are rather obscure, although it is still classified within *Myra* Leach, 1817 (Schweitzer et al. 2010). *Myra* as revised by Galil (2001) usually has a more elongated carapace, which is broadest in its anterior half, and the median posterior spine is distinctly longer than the lateral posterior spines. *Myra emarginata* is rather close to *Tanaoa* Galil, 2003 and *Toru* Galil, 2003. Unfortunately, the species is known only from its holotype with poorly presented front. So far, no additional material has been found, and therefore discussion on the generic assignment of *M. emarginata* remains open.

Leucosiidae indet.
Figs. 11.6–11.7

Description: Inv.No. 75560: isolated female pleon (Fig. 11.6); Inv.No. 211424: six isolated P1 meri (Figs. 11.7a–f).

Localities: A, Stmk., Wetzelsdorf in der Weststeiermark, "2 Winkeltoni" (Inv.No. 211424); "16 Suppan vulgo Priegl" (Inv.No. 75560).

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925).

Remarks: The specimens do not possess characters important for closer taxonomic identification. A female pleon in leucosiid crabs is far less informative than the male one and it cannot be attributed to any lower level taxon with certainty. As for isolated P1 meri, they resemble those of *Coleusia* Galil, 2006a, *Seulocia* Galil, 2005, and *Soceulia* Galil, 2006b. An isolated female pleon and P1 meri do not necessarily belong to the same taxon.

Familia Iphiculidae Alcock, 1896
Genus *Iphiculus* Adams & White, 1849

***Iphiculus eliasi* Hyžný & Gross, 2016**
Figs. 11.3–11.5

* 2016 *Iphiculus eliasi* sp. nov. – Hyžný & Gross: 263, figs. 2A, 3, 4.

Description: Inv.No. 75612 (holotype): near-complete carapace (figured in Hyžný & Gross 2016: figs. 2A, 3A–D; Fig. 11.3); Inv.No. 75613 (paratype): near-complete carapace with partially preserved cuticle (figured in Hyžný & Gross 2016: fig. 3E; Fig. 11.5); Inv.No. 211339: fragmentary carapace with partially preserved cuticle (figured in Hyžný & Gross 2016: fig. 4; Fig. 11.4).

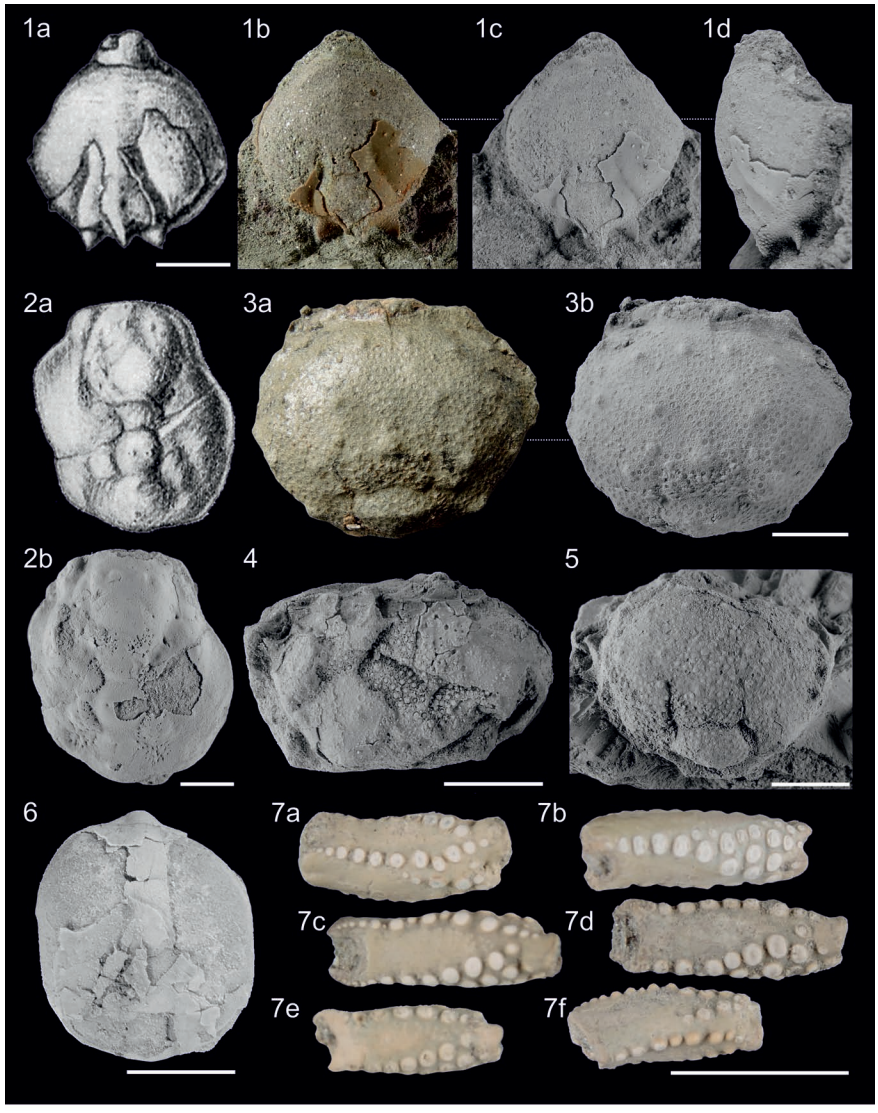
Localities: A, Stmk., Wetzelsdorf in der Weststeiermark, "15 Schmidtbauer" (Inv. Nos. 75613, 211339); "16 Suppan vulgo Priegl" (Inv.No. 75612).

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925).

Remarks: *Iphiculus eliasi* Hyžný & Gross, 2016 represents the only fossil European occurrence of the genus and simultaneously the oldest record of the genus known to date.

Fig. 11: Brachyura: Leucosioidea and Majoidea. 1) *Myra emarginata* (Wetzelsdorf, "Rinngraben", holotype Inv.No. 60813); digital copy (1a) of the original figure of Glaessner (1928: pl. 3, fig. 16), carapace in dorsal (1b, 1c) and lateral (1d) view. 2) *Hyas meridionalis* (Wetzelsdorf, "Wenzelsteffi-Bergweg", holotype Inv.No. 60816); digital copy (2a) of the original figure of Glaessner (1928: pl. 3, fig. 15), carapace in dorsal view (2b). 3) *Iphiculus eliasi* (Wetzelsdorf, "16 Suppan vulgo Priegl", holotype Inv.No. 75612), carapace. 4) *I. eliasi* (Wetzelsdorf, "15 Schmidtbauer", Inv.No. 211339), fragmentary carapace. 5) *I. eliasi* (Wetzelsdorf, "15 Schmidtbauer", paratype Inv.No. 75613), carapace. 6) Leucosiidae indet. (Wetzelsdorf, "16 Suppan vulgo Priegl", Inv.No. 75560), female pleon. 7) Leucosiidae indet. (Wetzelsdorf, "2 Winkeltoni", Inv.No. 211424), isolated P1 meri. Specimens in 1c, 1d, 2b, 3b, 4–6 were covered with ammonium chloride prior the photography. Scale bar equals 5 mm.
Abb. 11: Brachyura: Leucosioidea und Majoidea. 1) *Myra emarginata*, Holotyp, Kopie (1a) der Originalabbildung in Glaessner (1928: Taf. 3, Fig. 16), Carapax in Dorsal- (1b, 1c) und Lateralansicht (1d). 2) *Hyas meridionalis*, Holotyp, Kopie (2a) der Originalabbildung in Glaessner (1928: Taf. 3, Fig. 15), Carapax in Dorsalansicht (2b). 3) *Iphiculus eliasi*, Holotyp, Carapax. 4) *I. eliasi*, unvollständiger Carapax. 5) *I. eliasi*, Carapax. 6) Leucosiidae indet., weibliches Pleon. 7) Leucosiidae indet., isolierte P1 Meri. Exemplare 1c, 1d, 2b, 3b, 4–6 wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm.



Superfamilia Majoidea Samouelle, 1819
Familia Oregoniidae Garth, 1958
Genus *Hyas* Leach, 1814

Hyas meridionalis Glaessner, 1928

Fig. 11.2

* 1928 *Hyas meridionalis* Glaessner: 198, pl. 3, fig. 15.
1929 *Hyas meridionalis* Glaessner – Glaessner: 225.
1998a '*Hyas meridionalis*' Glaessner – Müller: 26, pl. 3, fig. 1.

Description: Inv.No. 60816 (holotype): carapace without front (figured in Glaessner 1928: pl. 3, fig. 15).

Locality: A, Stmk., Wetzelsdorf in der Weststeiermark, "Wenzelsteffi-Bergweg".

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Collection of the department (1898; compare JB 1899).

Remarks: The species is known only from its holotype. So far, no additional material has been found. Due to the incompleteness of the material, Müller (1998a: 26) expressed doubts about the generic status of the species. Kato et al. (2014) recently described two fossil species of *Hyas* and treated *Hyas meridionalis* as their congener.

Superfamilia Portunoidea Rafinesque, 1815
Familia Portunidae Rafinesque, 1815
Genus *Portunus* Weber, 1795

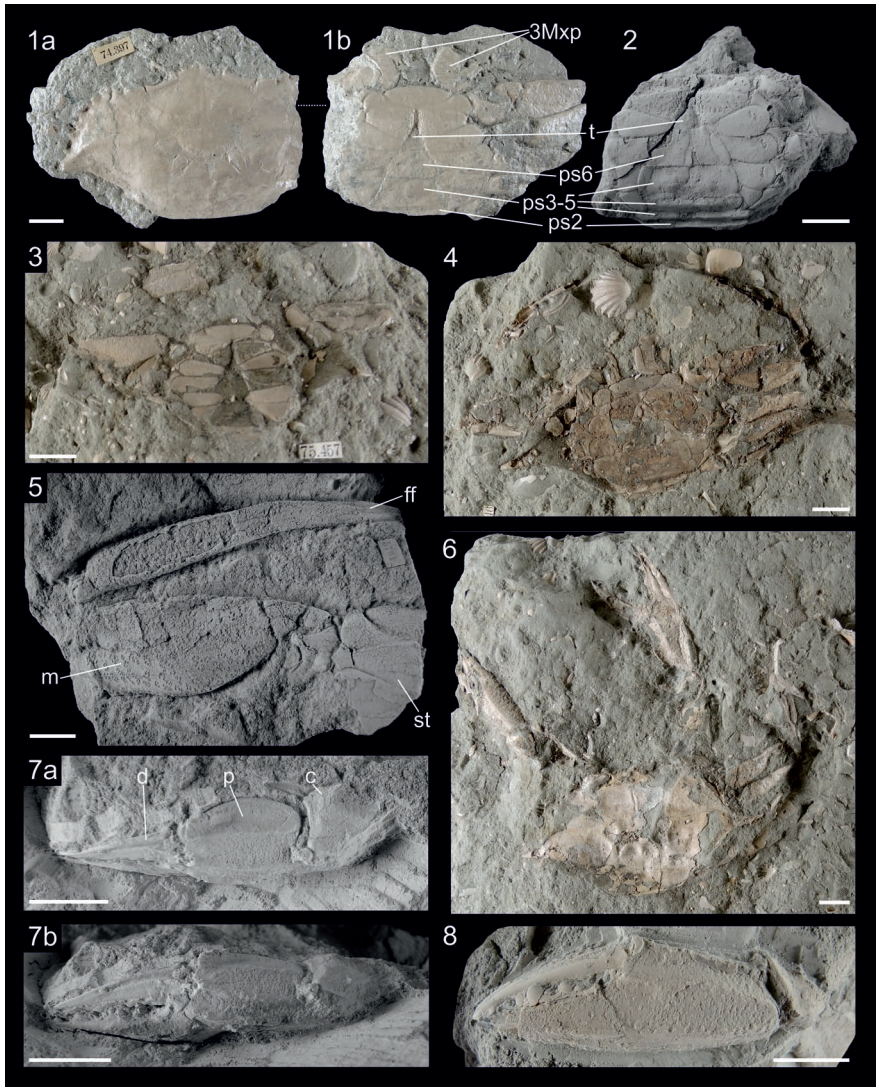
Portunus monspeliensis (A. Milne-Edwards, 1860)

Figs. 12.1–12.8

* 1860 *Neptunus monspeliensis* A. Milne-Edwards: 232, pl. 4, fig. 1, pl. 5, fig. 1.
1860 *Neptunus granulatus* A. Milne-Edwards: 241, pl. 3, fig. 1, pl. 7, fig. 2.
1928 *Neptunus granulatus* A. Milne-Edwards – Glaessner: 183.
1929 *Neptunus granulatus* A. Milne-Edwards – Glaessner: 267. [cum. syn.]
1949 *Neptunus granulatus* A. Milne-Edwards – Schouppé: 140, fig. 2.
1979 *Portunus granulatus* (A. Milne-Edwards) – Förster: 94. [cum. syn.]
1984 *Portunus monspeliensis* (A. Milne-Edwards) – Müller: 79, pl. 62, figs. 1–2.

1986 *Portunus monspeliensis* (A. Milne-Edwards) – Flügel: 91, pl. 1, figs. 1–2, pl. 2, figs. 1–2.
1993 *Portunus monspeliensis* (A. Milne-Edwards) – Müller: 14, figs. 6G, 7A.
1998a *Portunus monspeliensis* (A. Milne-Edwards) – Müller: 29.
2009 *Portunus monspeliensis* (A. Milne-Edwards) – Marangon & De Angeli: 5. [cum. syn.]
2016 *Portunus monspeliensis* (A. Milne-Edwards) – Gašparič & Ossó: 58, pl. 1, figs. A–H, pl. 2, figs. A–H.

Description: Inv.No. 5450: ♀ in ventral aspect with legs and both chelae; Inv.No. 5451: ♂ in ventral aspect with both chelae; Inv.No. 5452: fragmentary chela (dactylus, propodus); Inv.No. 5760: fragments of legs and sternum; Inv.No. 5761: R cheliped (propodus, carpus, merus) with partially preserved sternum (Fig. 12.5); Inv.No. 5762: R cheliped (dactylus, propodus, carpus, merus) (Fig. 12.7); Inv.No. 60812: ♂ in ventral aspect; Inv.No. 60814: ♂ in ventral aspect; Inv.No. 60815: ♂ in ventral aspect; Inv.No. 74397: ♂ in dorsal and ventral aspect and isolated R propodus (Fig. 12.1); Inv. No. 74492: fragmentary R chela (dactylus, propodus); Inv.No. 74890: incomplete carapace with partially preserved sternum; Inv.No. 75193: twelve fragmentary specimens (carapaces, chelae); Inv.No. 75246: ♀ in ventral aspect with legs and both chelae (Fig. 12.4); Inv.No. 75258: ♂ in dorsal and ventral aspect (carapace is detached and flipped vertically in relation to sternum); Inv.No. 75259: ♀ in ventral aspect with legs and both chelae; Inv.No. 75260: individual in dorsal aspect with legs and both chelae (Fig. 12.6); Inv.No. 75283: specimen missing; Inv.No. 75284: individual in dorsal aspect with both chelae; Inv.No. 75285: poorly preserved individual in dorsal aspect; Inv.No. 75457: ♂ in ventral aspect (Fig. 12.3); Inv.No. 75511: ♂ in ventral aspect; Inv.No. 75512: 2♂ in dorsal and ventral aspect, ♀ in dorsal and ventral aspect, ♀ in ventral aspect; Inv.No. 75554: R chela (propodus + dactylus); Inv.No. 75555: fragmentary chela (dactylus, propodus); Inv.Nos: 75556-75558: isolated fingers; Inv. No. 75559: L fragmentary propodus; Inv.No. 75562: isolated fingers; Inv.No. 75608: ♂ in dorsal and ventral aspect; Inv.No. 75611: poorly preserved chela (propodus, carpus, merus); Inv.No. 75834: ♂ in ventral aspect and fragmentary sternum of indeterminate sex; Inv.No. 76876: ♂ in ventral aspect; Inv.No. 76877: carapace in dorsal aspect; Inv.No. 76879: R chela (propodus + dactylus); Inv.No. 76884: fragments of carapace and chelae (preserved chaotically in the matrix); Inv.No. 79124: five specimens (carapace in dorsal aspect with and fragmentary legs and chelae); Inv.No. 200195 (UGP No. 1890): ♀ in ventral aspect (figured in Flügel 1986: pl. 1, fig. 1, pl. 2, fig. 1; Fig.12.2) and left cheliped (dactylus, propodus, carpus, merus) of the same individual (figured in Flügel 1986: pl. 1, fig. 2, pl. 2, fig. 1; Fig. 12.8); Inv.No. 200753: specimen missing; Inv.No. 200760: isolated dactylus; Inv.No. 200761: right chela (dactylus, propodus) associated with fragmentary carapace; Inv.No. 200779: isolated dactylus; Inv.No. 203152 (UGP No. 796): ♂ in dorsal and ventral aspect;



Inv.No. 211051: ♂ in dorsal and ventral aspect; Inv.No. 210929: ♂ in ventral aspect; Inv.No. 210930: carapace in dorsal aspect with left cheliped; Inv.No. 210931: ♂ in ventral aspect.

Localities: A, Stmk., Pöls an der Wieserbahn ("ditch NNW farmstead of the family Stefan Alter" (Inv.Nos. 75834, 200753, 200760, 200761, 200779); A, Stmk, Retznei quarry (Inv.Nos. 74397, 74890, 76876, 76877, 76879, 76884, 200195,

Fig. 12: Brachyura: Portunidae: *Portunus monspeliensis*. 1) Inv.No. 74397 (Retznei), ♂ individual in dorsal (1a) and ventral aspect (1b). 2) Inv.No. 200195 (Retznei), ♀ individual in ventral aspect. 3) Inv.No. 75457 (Wetzelsdorf, "16 Suppan vulgo Priegl"), ♂ individual in ventral aspect. 4) Inv.No. 75246 (Wetzelsdorf, "16 Suppan vulgo Priegl"), ♀ individual in ventral aspect with legs and both chelae. 5) Inv.No. 5761 (Spielfeld), R cheliped with partially preserved sternum. 6) Inv.No. 75260 (Wetzelsdorf, "16 Suppan vulgo Priegl"), individual in dorsal aspect with legs and both chelae. 7) Inv.No. 5762 (Spielfeld), R cheliped. 8) Inv.No. 200195 (Retznei), L cheliped. Specimens in 2, 5, 7 and 8 were covered with ammonium chloride prior the photography. Scale bar equals 10 mm. 3Mxp = maxilliped 3, c = carpus, d = dactylus, ff = fixed finger, m = merus, p = propodus, ps2–6 = pleonal somite 2–6, st = sternum, t = telson.
Abb. 12: Brachyura: Portunidae: *Portunus monspeliensis*. 1) ♂ Individuum in Dorsal- (1a) und Ventralansicht (1b). 2) ♀ Individuum in Ventralansicht. 3) ♂ Individuum in Ventralansicht. 4) ♀ Individuum in Ventralansicht mit Laufbeinen und beiden Chelae. 5) R Schere mit teilweise erhaltenem Sternum. 6) Individuum in Dorsalansicht mit Laufbeinen und beiden Chelae. 7) R Schere. 8) L Schere. Exemplare 2, 5, 7 und 8 wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 10 mm. 3Mxp = Maxilliped 3, c = Carpus, d = Dactylus, ff = unbeweglicher Finger, m = Merus, p = Propodus, ps2–6 = Pleonsegmente 2–6, st = Sternum, t = Telson.

210929–210931, 211051); A, Stmk., Spielfeld (Inv.Nos. 5760–5762); A, Stmk., Weitendorf quarry (Inv.No. 74492); A, Stmk., Wetzelsdorf in der Weststeiermark, "1 Oisnitz W" (Inv.No. 75511, 75556), "2 Winkeltoni" (Inv.No. 75562), "6 Wippel NO" (Inv.No. 75558), "7 Simihansl" (Inv.No. 75557), "8 Kreuzschaller W" (Inv.No. 75608), "15 Schmidtbauer" (Inv.Nos. 60814, 60815, 75559, 75611), "Supan" and "16 Suppan vulgo Priegl" (Inv.Nos. 5450, 5451, 5452, 75193, 75246, 75258–75260, 75283–75285, 75457, 75512, 75554, 75555), "Rinngraben"; Inv.No. 60812), "excavation cesspit Schmidtoni" (Inv.No. 79124); A, Stmk., Wildon, "Leithakalk, Wildoner Schloßberg" (Inv.No. 203152).

Stratigraphy: Pöls, Weitendorf, Wetzelsdorf (Florian Beds ("Florianer Schichten"); lower Badenian; Holler 1900; Kopetzky 1957; Kollmann 1965; Krainer 1987; Friebe 1990; Handler et al. 2006; Hohenegger et al. 2009, 2014); Retznei, Spielfeld (Weissenegg Formation; lower Badenian), Wildon (Weissenegg Formation; middle–upper Badenian (Friebe 1990; Hohenegger et al. 2009, 2014; Reuter et al. 2012).

Acquisition: Inv.Nos. 5450, 5451, 5452 (collection Ferdinand Drugčevič (assistant at the department for geology of the Joanneum; for his vita see Hilber 1929), purchase 1911; JB 1912); Inv.Nos. 5760–5762 (old collection); Inv.Nos. 60812, 60814, 60815 (collection of the department, 1898; compare JB 1899); Inv.Nos. 74397, 211051 (collection Hartmut Hiden, purchase 1991, 1997); Inv.No. 74492 (collection Wolfgang Phillipek; compare Alker 1980); Inv.Nos. 74890, 75834, 76876, 76877, 76879, 76884 (collection and donation Hartmut Hiden, 1993, 1995); Inv.Nos. 75511, 75512, 75193, 75246, 75258–75260, 75283–75285, 75457, 75554, 75555, 75556-75558, 75559, 75562, 75608, 75611 (collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925); Inv.No. 79124 (collection of the

department, 09/2001); Inv.No. 200195 (a: collection Helmut W. Flügel; b: donation (2002) of the Institute of Earth Sciences, University of Graz); Inv.Nos. 200753, 200760, 200761 (collection of the department, 09/2002); Inv.No.200779 (donation Manuel Schleich, 17.9.2002); Inv.No. 203152 (a: collection Eugen Hussak (Acqu.-B. Univ. Graz 1878); for his vita see Krajicek 1956; b: donation (2002) of the Institute of Earth Sciences, University of Graz); Inv.No. 219029–210931 (purchase Katrin Hollersbacher, 06/2011).

Remarks: Part of the material was reported as *Neptunus granulatus* by Glaessner (1928): Inv.Nos. 5450–5452, 5760–5762, 203152; and as *Portunus monspeliensis* by Flügel (1986): Inv.No. 200195 (supplementary material: Inv.Nos. 60812, 60814, 60815, 74492).

Portunus monspeliensis is one of the most widespread decapod species in the Miocene of Europe (Förster 1979; Müller 1984; Gašparič & Ossó 2016). It has been reported from Styria by several authors (Glaessner 1928; Schouppé 1949; Flügel 1986) as *Neptunus granulatus*. Extensive synonymy lists were given by Glaessner (1929), Förster (1979), Marangon & De Angeli (2009), and Gašparič & Ossó (2016).

Genus *Necronectes* A. Milne-Edwards, 1881

?Necronectes sp.

Figs. 13.1–13.2

Description: Inv.No. 75238: three fragments of dactylus with preserved molariform tooth (Fig. 13.2); Inv.No. 75581: R fixed finger (Fig. 13.1).

Locality: A, Stmk., Wetzelsdorf in der Weststeiermark, "7 Simihansl".

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925).

Remarks: The material is too fragmentary for confident taxonomic identification. In the Miocene of Paratethys, two closely related genera were present, *Scylla* de Haan, 1833 and *Necronectes* A. Milne-Edwards, 1881. A main difference between these genera is the number of anterolateral spines; therefore it is impossible to state with certainty to which taxon the isolated finger fragments belong. However, *Necronectes schafferi* Glaessner, 1928 is known from the Miocene basins of Austria, thus,

it is fairly possible that the material from the Styrian Basin is congeneric or even conspecific with it.

Superfamilia Goneplacoidea MacLeay, 1838
Familia Goneplacidae MacLeay, 1838
Genus *Goneplax* Leach, 1814

Goneplax gulderi Bachmayer, 1953
Fig. 13.3

	1928	*Goneplax* cf. *sacci* Crema – Glaessner: 193, text-fig. 7.
	1929	*Goneplax* cf. *saccoi* Crema – Glaessner: 200.
*	1953	*Goneplax gulderi* Bachmayer: 143, pl. 9, figs. 1–3.
	1984	*Goneplax gulderi* Bachmayer – Müller: 96, pl. 93, figs. 2–3.
	1993	*Goneplax gulderi* Bachmayer – Müller: 23, fig. 11K.
	1998a	*Goneplax* sp. – Müller: 38.
	1998a	*Goneplax gulderi* Bachmayer – Müller: 38.
	2013	*Goneplax gulderi* Bachmayer – Garassino et al.: 357, fig. 1A. [cum. syn.]
	2015	*Goneplax gulderi* Bachmayer – Gašparič & Hyžný: 152, figs. 13–14.

Description: Inv.No. 60817: complete carapace (figured in Glaessner 1928: text-fig. 7).

Locality: A, Stmk, Wetzelsdorf in der Weststeiermark, “Schmidtbauer”.

Stratigraphy: Florian Beds (“Florianer Schichten”); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Collection Herbert Lamprecht, purchase 1911 (compare JB 1912).

Remarks: The material was originally reported by Glaessner (1928) as *Goneplax* cf. *sacci* Crema, 1895. Müller (1998a) considered it as indeterminate at the species level and treated it as *Goneplax* sp. The material of Glaessner (1928), however, has a wide front which is typical for *G. gulderi* as defined by Bachmayer (1953) and revised by Garassino et al. (2013). *Goneplax gulderi* has been reported from the middle Miocene of Austria, Spain, Italy and Slovenia (Bachmayer 1953; Müller 1993; Garassino et al. 2013; Gašparič & Hyžný 2015).

Familia Chasmocarcinidae Serène, 1964
Genus *Mioplax* Bittner, 1884

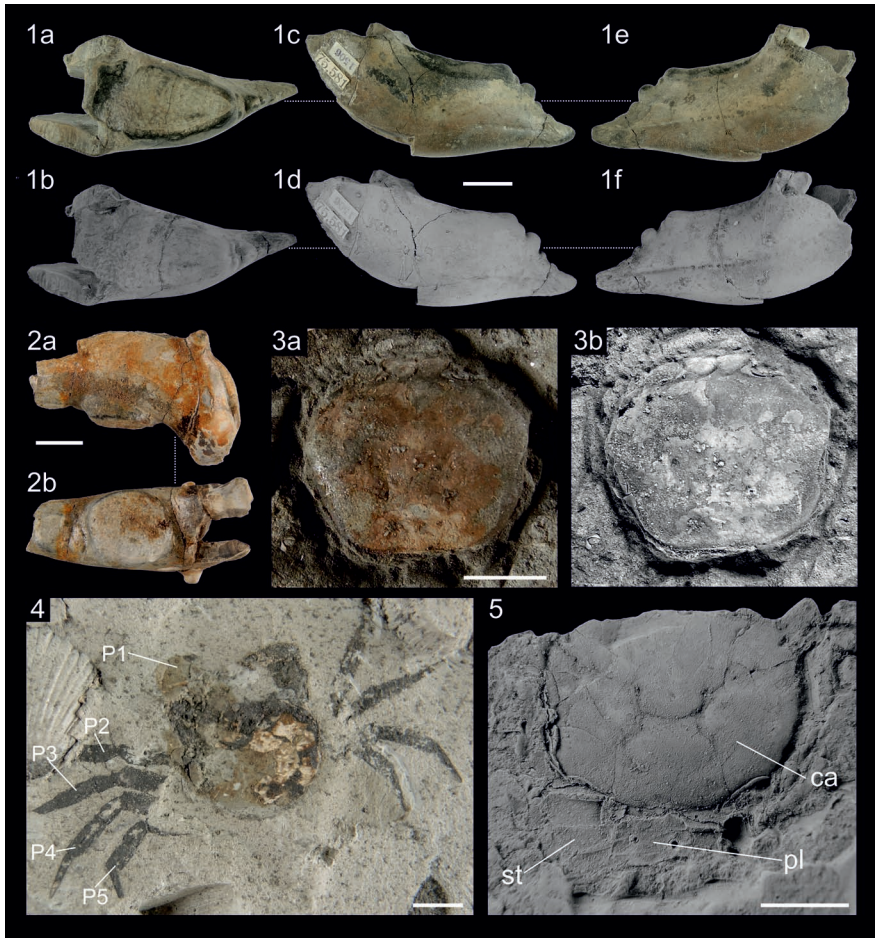


Fig. 13: Brachyura: Portunoidea and Goneplacoidea. 1) ?*Necronectes* sp. (Wetzelsdorf, "7 Simihansl", Inv.No. 75581), fixed finger in occlusal (1a, b), outer (1c, d) and inner (1e, f) views. 2) ?*Necronectes* sp. (Wetzelsdorf, "7 Simihansl", Inv.No. 75238), fragmentary dactylus. 3) *Goneplax gulderi* (Wetzelsdorf, "Schmidtbauer", Inv.No. 60817), carapace. 4) *Mioplax socialis* (Waldhof, Inv.No. 4694), near-complete individual. 5) *M. socialis* (Waldhof, Inv.No. 4695), carapace with partially preserved ventrum. Specimens in 1b, 1d, 1f, 3b and 5 were covered with ammonium chloride prior the photography. Scale bar equals 5 mm. ca = carapace, P1–P5 = pereiopod 1–5, pl = pleon, st = sternum.

Abb. 13: Brachyura: Portunoidea und Goneplacoidea. 1) ?*Necronectes* sp., unbeweglicher Finger in Okklusal- (1a, b), Außen- (1c, d) und Innenansicht (1e, f). 2) ?*Necronectes* sp., unvollständiger Dactylus. 3) *Goneplax gulderi*, Carapax. 4) *Mioplax socialis*, fast vollständiges Individuum. 5) *M. socialis*, Carapax mit teilweise erhaltenem Ventrum. Exemplare 1b, 1d, 1f, 3b und 5 wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm. ca = Carapax, P1–P5 = Pereiopoden 1–5, pl = Pleon, st = Sternum.

Mioplax socialis Bittner, 1884

Figs. 13.4–13.5

* 1884 *Mioplax socialis* Bittner: 23, pl. 2, fig. 3.
1928 *Mioplax socialis* Bittner – Glaessner: 194.
1929 *Mioplax socialis* Bittner – Glaessner: 258.
1998a *Mioplax socialis* Bittner – Müller: 38.
2016 *Mioplax socialis* Bittner – Hyžný et al.: 169, figs. 3–4. [cum. syn.]

Description: Inv.No. 4693: carapace (specimen missing); Inv.No. 4694: poorly preserved near-complete individual (Fig. 13.4); Inv.No. 4695: carapace without front with partially preserved ventrum (figured in Hyžný et al. 2016: fig. 3c; Fig. 13.5).

Locality: A, Stmk., Waldhof, "Waldhof I" (compare Hilber 1897).

Stratigraphy: Rollsdorf Formation ("Waldhof Beds"); lower Sarmatian (Gross 2015, cum Lit.).

Acquisition: collection Ferdinand Drugčevič, 1896; the specimens are labelled as "Famil. Catometopa (Viereckkrabben)", according to a personal comment of Alexander Bittner (Hilber 1897).

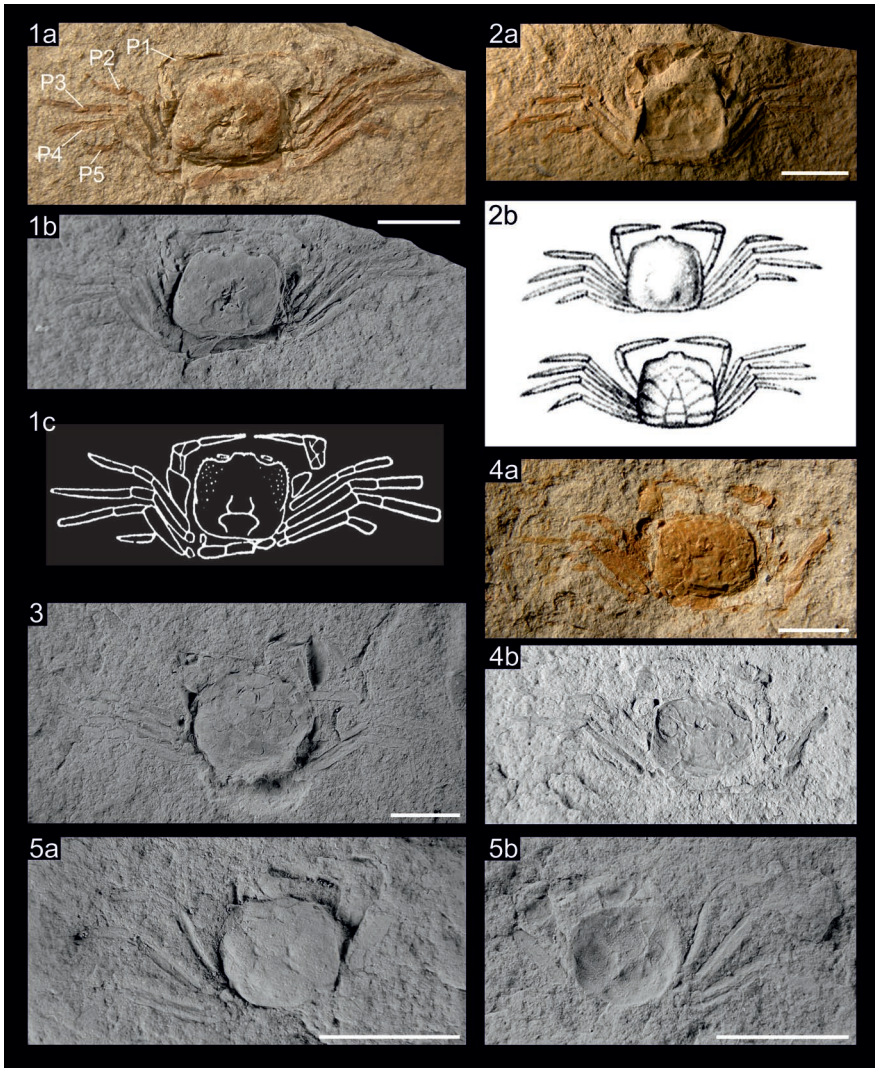
Remarks: Two specimens were reported by Glaessner (1928). Since he did not provide any figure, it is difficult to state which specimens were actually studied by him. Based on the description provided by Glaessner (1928: 194), we suppose that these are the specimens with Inv.Nos. 4693 (currently missing in the collection) and 4694. The species was revised by Hyžný et al. (2016).

Genus *Styrioplax* Glaessner, 1969 (= *Microplax* Glaessner, 1928)

Styrioplax exiguus (Glaessner, 1928)

Figs. 14.1–14.5

* 1928 *Microplax exiguus* Glaessner: 195, text-fig. 8, pl. 3, fig. 14.
1929 *Microplax exiguus* Glaessner – Glaessner: 258.
1969 *Styrioplax exiguus* (Glaessner) – Glaessner: R527, fig. 335/2.
2011 *Styrioplax exiguus* (Glaessner) – Hyžný & Schlögl: 338, text-figs. 12–15.
2015 *Styrioplax exiguus* (Glaessner) – Gašparič & Hyžný: 149, figs. 10–12.
2015 *Styrioplax exiguus* (Glaessner) – Gašparič & Halásová: 202, figs. 3–4.



Description: Inv.No. 211435 (holotype; Hyžný & Schlögl 2011 and Gašparič & Halásová 2015 stated the repository number incorrectly as 5453): complete individual in dorsal aspect (figured in Hyžný & Schlögl 2011: text-fig. 12A; Fig. 14.1); Inv.No. 5749: near-complete individual in dorsal aspect (Fig. 14.3); Inv.No. 5753: near-complete individual in dorsal aspect (figured in Hyžný & Schlögl 2011: text-fig. 12B; Fig. 14.2); Inv.No. 77875: near-complete individual in dorsal aspect (Fig. 14.4); Inv.No. 211039: near-complete individual in dorsal aspect (Fig. 14.5); Inv.No. 211041: near-

Fig. 14: Brachyura: Chasmocarcinidae: *Styrioplax exiguus*. 1) holotype, Inv.No. 211435 (Šentilj v Slovenskih goricah), a complete individual in dorsal view (1a, b), with a digital copy (1c) of the original figure of Glaessner (1928: text-fig. 8). 2) Inv.No. 5753 (Nebova), a complete individual (imprint, 2a) and digital copy (2b) of the original figure of Glaessner (1928: pl. 3, fig. 14). 3) Inv.No. 5749 (Jarenina), near-complete individual in dorsal aspect. 4) Inv.No. 77875 (Šentilj v Slovenskih goricah), near-complete individual in dorsal aspect. 5) Inv.No. 211039 (Šentilj v Slovenskih goricah), near-complete individual in dorsal aspect; part (5a) and counterpart (5b). Specimens in 1b, 3, 4b and 5 were covered with ammonium chloride prior the photography. Scale bar equals 5 mm. P1–P5 = pereiopod 1–5.
Abb. 14: Brachyura: Chasmocarcinidae: *Styrioplax exiguus*. 1) Holotyp, vollständiges Individuum in Dorsalansicht (1a, b) und Kopie (1c) der Originalabbildung in Glaessner (1928: Textabb. 8). 2) ein vollständiges Individuum (Gegendruck, 2a) und Kopie (2b) der Originalabbildung in Glaessner (1928: Taf. 3, Fig. 14). 3) fast vollständiges Individuum in Dorsalansicht. 4) fast vollständiges Individuum in Dorsalansicht. 5) fast vollständiges Individuum in Dorsalansicht; Druck (5a) und Gegendruck (5b). Exemplare 1b, 3, 4b und 5 wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm. P1–P5 = Pereiopoden 1–5.

complete individual in dorsal aspect; Inv.No. 211054: near-complete individual in dorsal aspect.

Localities: SLO, Jarenina [Jahring], "Winzerei vulgo Ruesser in Gromberg bei Jahringhof [Jareninski Dvor]" (Inv.Nos. 5749, 211039, 211041, 211154); SLO, Nebova ("Ebenkreuz bei St. Leonhard [Lenart] in Windischbüheln" (Inv.No. 5753); SLO, Šentilj v Slovenskih goricah [St. Egidi in Windischbühel], "Gasthaus Repnik" (Inv.Nos. 5453, 77875, holotype 211435).

Stratigraphy: Jarenina, Nebova (Haloze Formation; Karpatian–lower Badenian); Šentilj (Špilje Formation (Šentilj Member); lower Badenian; Jelen & Rifelj 2011).

Acquisition: Inv.Nos. 5453, 5749, 77875, 211039, 211041, 211154 (possibly collection and donation Leopold Kühnelt; compare JB 1898, 1899, 1900, 1901); Inv. Nos. 5753, 211435 (donation [drill foreman Eduard] Pilnay [~1900]; compare JB 1903).

Remarks: Glaessner (1928) described the species based on three specimens. According to his description and illustration (Glaessner 1928: pl. 3, fig. 14a), counterpart of one of the individuals (presumably Inv.No. 5753) exhibited also imprint of the ventral side. Unfortunately, this specimen has not been located until now. A fully exposed ventrum of both sexes has been depicted only recently, based on the material from Slovakia (Hyžný & Schlögl 2011) and Slovenia (Gašparič & Hyžný 2015). So far, *Styrioplax exiguus* is known from the lower Miocene of Slovenia, Slovakia and Hungary (Glaessner 1928; Hyžný & Schlögl 2011; Gašparič & Halásová 2015; Gašparič & Hyžný 2015).

Superfamilia Dairoidea Serène, 1965
Familia Dairidae Serène, 1965
Genus *Daira* de Haan, 1833 (= *Phymatocarcinus* von Reuss, 1871)

***Daira speciosa* (Reuss, 1871)**
Fig. 15.2

* 1871 *Phymatocarcinus speciosus* von Reuss: 326, figs. 1–4.
1877 *Phymatocarcinus speciosus* Reuss – Bittner: 435, figs. 1–10.
1877 *Phymatocarcinus speciosus* von Reuss – Hilber: 261.
1928 *Daira speciosa* (von Reuss) – Glaessner: 191.
1929 *Daira speciosa* (von Reuss) – Glaessner: 135.
1949 *Daira speciosa* (von Reuss) – Schouppé: 139, fig. 2.
1984 *Daira speciosa* (von Reuss) – Müller: 90, pl. 79, figs. 1–6, pl. 80, figs. 1–2.
1987 *Daira speciosa* (von Reuss) – Friebe: 61, pl. 2, figs. 3–4.
1993 *Daira* cf. *speciosa* (von Reuss) – Müller: 17.
1996 *Daira speciosa* (von Reuss) – Müller: 11, pl. 2, fig. 5.
1998a *Daira speciosa* (von Reuss) – Müller: 27, pl. 2, fig. 2.
2010 *Daira speciosa* (von Reuss) – Gatt & De Angeli: 1334, text-figs. 8A–C. [cum. syn.]
2014 *Daira speciosa* (von Reuss) – Collins: 38: pl. 2, fig. 12.

Description: Inv.No. 4967: carapace fragment (internal mould); Inv.No. 61062: carapace (internal mould); Inv.No. 76008: carapace with partially preserved cuticle; Inv. No. 200004 (originally as UGP No. 2913): carapace with partially preserved cuticle (figured in Friebe 1987: pl. 2, fig. 3; Fig. 15.2); Inv.No. 200046: incomplete carapaces (internal moulds) and isolated fragmentary R propodus.

Localities: A, Stmk., Gamlitz, "Gamlitz" (Inv.No. 4967); A, Stmk., Grubtal bei Gamlitz, "Gnaser's Steinbruch" (Hilber 1877; Inv.Nos. 76008, 200046); A, Stmk., Retznei quarry (Inv.No. 61062); A, Stmk., Wurzing bei Wildon (Inv.No. 200004).

Stratigraphy: Gamlitz, Grubtal, Retznei (Weissenegg Formation; lower Badenian), Wurzing (Weissenegg Formation; middle–upper Badenian; Friebe 1987, 1990; Hohenegger et al. 2009, 2014, Reuter et al. 2012).

Acquisition: Inv.No. 4967 (donation of Mrs. Prof. Khull 1898); Inv.No. 61062 (collection Karl Murban, 16.3.1940); Inv.No. 76008 (old collection of the Graz University of Technology); Inv.No. 200046 (a: collection Vincenz Hilber, 1877 (for his vita see Heritsch 1931), Acqu.-B. Univ. Graz 1877; b: donation (2002) of the Institute

of Earth Sciences, University of Graz); Inv.No. 200004 (a: collection J. Georg Friebe, 1986; b: donation (2002) of the Institute of Earth Sciences, University of Graz).

Remarks: Material from Gamlitz (Inv.No. 200046) was reported by Hilber (1877; compare Reuss 1871, Bittner 1877), the specimens from Wurzing were described and figured by Friebe (1987).

The species is a well-known taxon and considered as one of the most widespread decapods associated with coral reefs in the Paratethys and Proto-Mediterranean (Müller 1984; Gatt & De Angeli 2010).

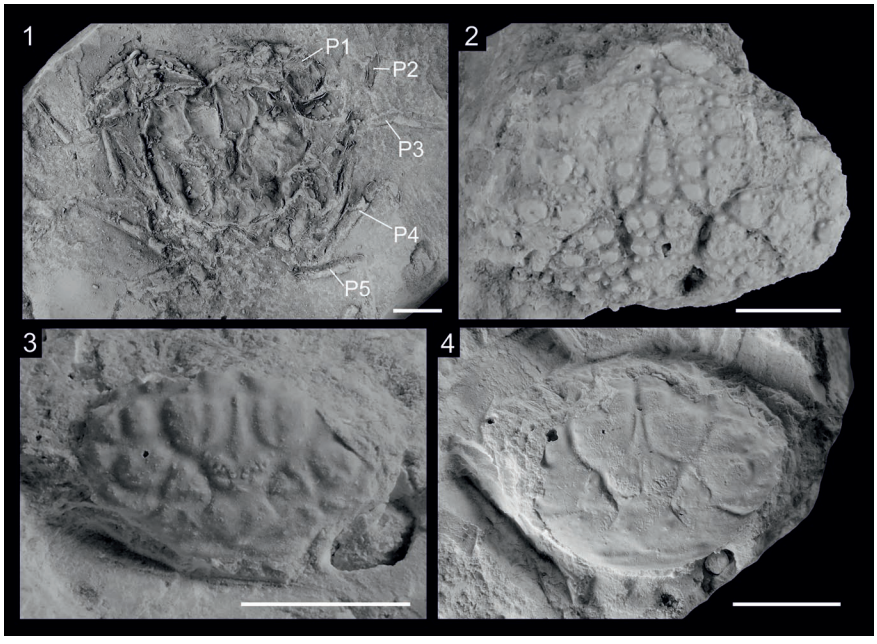


Fig. 15: Brachyura: Xanthoidea. 1) *Glyphithyreus sulcatus* (Trbovlje, Inv.No. 56664), near-complete individual (counterpart of GBA 2007/024/0005). 2) *Daira speciosa* (Wurzing bei Wildon, Inv.No. 200004), carapace. 3) *Actaea turcocampestris* (Wurzing bei Wildon, Inv.No. 200005), carapace. 4) *Pilodius vulgaris* (Wurzing bei Wildon, Inv.No. 200006), carapace. All specimens were covered with ammonium chloride prior the photography. Scale bar equals 5 mm. P1–P5 = pereiopod 1–5.
Abb. 15: Brachyura: Xanthoidea. 1) *Glyphithyreus sulcatus*, fast vollständiges Individuum (Gegenstück zu GBA 2007/024/0005). 2) *Daira speciosa*, Carapax. 3) *Actaea turcocampestris*, Carapax. 4) *Pilodius vulgaris*, Carapax. Alle Exemplare wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm. P1–P5 = Pereiopoden 1–5.

Superfamilia Xanthoidea MacLeay, 1838
Familia Panopeidae Ortmann, 1893

Genus *Glyphithyreus* Reuss, 1859 (= *Plagiolophus* Bell, 1858)

***Glyphithyreus sulcatus* (Beurlen, 1939)**
Fig. 15.1

* 1939 *Plagiolophus sulcatus* Beurlen: 155, pl. 7, fig. 11.
2004 *Glyphithyreus sulcatus* (Beurlen) – Karasawa & Schweitzer: 148.

Description: Inv.No. 56664: near-complete individual with preserved pereiopods (including chelipeds).

Locality: SLO, Trbovlje [Trifail], "Trifail".

Stratigraphy: Trbovlje Formation (Placer 1999); upper Oligocene (Odin et al. 1994; Bechtel et al. 2004).

Acquisition: Old collection.

Remarks: The specimen is a counterpart of GBA 2007/024/0005. *Glyphithyreus sulcatus* (Beurlen, 1939) has been originally described from the upper Oligocene of Hungary (Beurlen 1939); since then, however, the type material has not been studied (Karasawa & Schweitzer 2004: 148).

Familia Xanthidae MacLeay, 1838
Genus *Actaea* de Haan, 1833

***Actaea turcocampestris* Müller, 1984**
Fig. 15.3

* 1984 *Actaea turcocampestris* Müller: 87, pl. 74, figs. 1–5.
1987 *Actaea turcocampestris* Müller – Friebe: 61, pl. 2, fig. 2.
1993 *Actaea turcocampestris* Müller – Müller: 19, figs. 8G–I.
1998a *Actaea turcocampestris* Müller – Müller: 36.

Description: Inv.No. 200005 (originally as UGP No. 2914): carapace (figured in Friebe 1987: pl. 2, fig. 2).

Locality: A, Stmk., Wurzing bei Wildon.

Stratigraphy: Weissenegg Formation; middle–upper Badenian (Friebe 1987, 1990; Hohenegger et al. 2009, 2014).

Acquisition: a) collection J. Georg Friebe, 1986; b) donation (2002) of the Institute of Earth Sciences, University of Graz.

Remarks: The material was reported by Friebe (1987). *Actaea turcocampestris* is a widespread coral-associated species known from the middle Miocene of Hungary, Austria and Spain (Müller 1984, 1993).

Genus *Pilodius* Dana, 1851a

Pilodius vulgaris (Glaessner, 1928)

Fig. 15.4

pars	1928	*Titanocarcinus vulgaris* Glaessner: 185, pl. 3, fig. 9. [non pl. 3, figs. 10–12]
pars	1929	*Titanocarcinus vulgaris* Glaessner – Glaessner: 386.
	1984	'*Pilodius*' *vulgaris* (Glaessner) – Müller: 91, pl. 83, figs. 5–6, pl. 84, figs. 1–4.
	1987	*Xantho* cf. *moldavicus* (Yanakevich) – Friebe: 61, fig. 3, pl. 2, fig. 5.
pars	1998a	*Xantho moldavicus* (Yanakevich) – Müller: 35.
	1998a	*Pilodius vulgaris* (Glaessner) – Müller: 36.
	2014	*Pilodius vulgaris* (Glaessner) – Hyžný et al.: 225, pl. 1, figs. 4, 5.

Description: Inv.No. 200006 (originally as UGP No. 2915): carapace (figured in Friebe 1987: fig. 3, pl. 2, fig. 5).

Locality: A, Stmk., Wurzing bei Wildon.

Stratigraphy: Weissenegg Formation; middle–upper Badenian (Friebe 1987, 1990; Hohenegger et al. 2009, 2014).

Acquisition: a) collection J. Georg Friebe, 1986; b) donation (2002) of the Institute of Earth Sciences, University of Graz.

Remarks: The material was reported by Friebe (1987) and identified as *Xantho* cf. *moldavicus* (Yanakevich, 1977). Friebe (1987) compared the studied carapace to "*Pilodius*" *vulgaris* as defined by Müller (1984). Friebe (1987) opined that "*Pilodius*" *vulgaris* has different carapace ornamentation and since the front of the material was not preserved, he used the morphology of carapace regions to assign it more closely to *Xantho moldavicus*. Re-examination of the material, however, revealed that the carapace with Inv.No. 200006 represents an internal mould and no cuticle is preserved. Therefore comparison with the holotype of *Titanocarcinus vulgaris* Glaessner, 1928

(NHMW 1927/0001/0002) with preserved cuticle (Hyžný et al. 2014: pl. 1, fig. 4) can be misleading (see Klompmaker et al. 2015). Moreover, the specimen of Friebe (1987) possesses a front which is well-pronounced as it is in the holotype of *Pilodius vulgaris*. Recently, Hyžný et al. (2014: pl. 1, fig. 6) refigured the holotype of *Xantho moldavicus* and compared it with the holotype of *T. vulgaris* and the newly described *Etisus evamuellerae* Hyžný, van Bakel & Guinot, 2014. All these xanthoids possess similarly developed carapace regions, but differ from each other in the shape of frontal margin, carapace outline and carapace ornamentation. Based on the comparisons given by Hyžný et al. (2014), the material of Friebe (1987) can be best accommodated within *T. vulgaris*, currently classified as a member of *Pilodius*. It should, however, be noted that as already pointed out by Müller (1984: 92), the species as originally presented by Glaessner (1928) is a compound taxon. Thus, much care is necessary when re-evaluating the published occurrences of this species.

Xanthoidea indet.

1987 Xanthidae, Gen. et spec. indet. – Friebe: 62, pl. 2, figs. 6–9.

Description: Inv.Nos. 200007 (originally as UGP No. 2916a, b, d, e): four cheliped fragments (figured in Friebe 1987: pl. 2, figs. 6–9).

Locality: A, Stmk., Wurzing bei Wildon.

Stratigraphy: Weissenegg Formation; middle–upper Badenian (Friebe 1987, 1990; Hohenegger et al. 2009, 2014).

Acquisition: a) collection J. Georg Friebe, 1986; b) donation (2002) of the Institute of Earth Sciences, University of Graz.

Remarks: Specimens are too fragmentary for closer identification.

Subsectio Thoracotremata Guinot, 1977
Superfamilia Ocypodoidea Rafinesque, 1815
Familia Macrophthalmidae Dana, 1851b
Genus *Macrophthalmus* Desmarest, 1823

***Macrophthalmus aquensis* A. Milne-Edwards & Brocchi, 1879**
Figs. 16.1–16.3

* 1879 *Macrophthalmus aquensis* A. Milne-Edwards & Brocchi: 115.
1924 *Macrophthalmus vindobonensis* Glaessner: 109, figs 1–2.
1928 *Macrophthalmus vindobonensis* Glaessner – Glaessner: 196.

1929 *Macrophthalmus aquensis* A. Milne-Edwards & Brocchi – Glaessn er: 242.
1929 *Macrophthalmus vindobonensis* Glaessner – Glaessner: 243.
1984 *Macrophthalmus vindobonensis* Glaessner – Müller: 98, pl. 95, fig. 6, pl. 96, figs 1–2, 4–5, ?fig. 3.
1993 *Macrophthalmus aquensis* A. Milne-Edwards & Brocchi – Müller: 24, figs 11A–B.
1996 *Macrophthalmus aquensis* A. Milne-Edwards & Brocchi – Müller: 13.
1998a *Macrophthalmus aquensis* A. Milne-Edwards & Brocchi – Müller: 39.
1998b *Macrophthalmus aquensis* A. Milne-Edwards & Brocchi – Müller: 275, pl. 1, figs 9–10, pl. 2, fig. 1.

Description: Inv. Nos. 60807–60811: fragmentary carapaces; Inv.Nos. 61063–61064: counterpart (dorsal aspect) and part (ventral aspect) of an entire individual (Fig.16.3); Inv.No. 211419: two carapaces (Fig. 16.1); Inv.No. 211434: specimen in ventral aspect (Fig. 16.2).

Localities: A, Stmk., Lamberg, "Lamberg bei Hengsberg. Auf dem Grund Bauer." (Inv.Nos. 61063–61064); A, Stmk., Wetzelsdorf in der Weststeiermark, "Rinngraben" (Inv.Nos. 60807–60811), "16 Suppan vulgo Priegl" (Inv.No. 211419); A, Stmk., Zehndorf, "Zöhndorf bei Preding" (also spelled Zohndorf; Hilber 1878; Inv.No. 211434).

Stratigraphy: Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014).

Acquisition: Inv.Nos. 61063–61064 (donation Johann Adam, 1902; fireman at the Joanneum; compare JB 1903); Inv.Nos. 60807–60811 (collection of the department, 1898; compare JB 1899); Inv.No. 211419 (collection Herbert Lamprecht, donation 1918–1923; compare JB 1925); Inv.No. 211434 (possibly collection Vincenz Kollar; compare Inv.No. 61186: *Balsscallichirus florianus*).

Remarks: The specimens with Inv.Nos. 60807–60811 were originally reported (but not figured) by Glaessner (1928). *Macrophthalmus aquensis* is a well-known species from lower to middle Miocene fine-grained sediments of France, Spain, Austria, Hungary and Poland (Müller 1984, 1993, 1996, 1998b).

Superfamilia Potamoidea Ortmann, 1896
Familia Potamidae Ortmann, 1896

Genus *Potamon* Savigny, 1816

Potamon proavitum Glaessner, 1928

Figs. 16.4–16.8

* 1928 *Potamon proavitum* Glaessner: 212, pl. 4 (lower fig. & carbon copy).
1929 *Potamon proavitum* Glaessner – Glaessner: 338.
1998a *Potamon proavitum* Glaessner – Müller: 39, pl. 3, fig. 3.
2010 *Potamon proavitum* Glaessner – Klaus & Gross: 9, fig. 4G. [cum. syn.]

Description: Holotype Inv.No. 5828: ♀ carapace with abdomen and appendages; Inv.No. 203389: carapace; Inv.No. 203390: R dactylus; Inv.No. 203391: R dactylus; Inv.No. 203392: carapace; Inv.No. 203393: carapace fragment; Inv.No. 203394: carapace fragment with fragmentary sternum (Fig. 16.6); Inv.No. 203395: carapace fragment; Inv.No. 203396: carapace; Inv.No. 203397: R propodus; Inv.No. 203398: carapace fragment; Inv.No. 203399: carapace fragment; Inv.No. 203400: carapace fragment; Inv.No. 203401: carapace; Inv.No. 203402: carapace fragment; Inv.No. 203403: carapace; Inv.No. 203404: propodus; Inv.No. 203405: sternum fragment; Inv.No. 203406: L propodus; Inv.No. 203407: propodus fragment; Inv.No. 203408: propodus fragment; Inv.No. 203409: carapace; Inv.No. 203410: carapace fragment; Inv.No. 203411: propodus; Inv.No. 203412: R fixed finger; Inv.No. 203413: carapace fragment (Fig. 16.5); Inv.No. 203414: carapace (Fig. 16.7); Inv.No. 203415: carapace; Inv.No. 203416: carapace; Inv.No. 203417: carapace (part + counterpart); Inv.No. 203418: carapace (part + counterpart); Inv.No. 203726: L chela (propodus + dactylus; Fig. 16.8); Inv.No. 203727: carapace; Inv.No. 203728: carapace (Fig. 16.4).

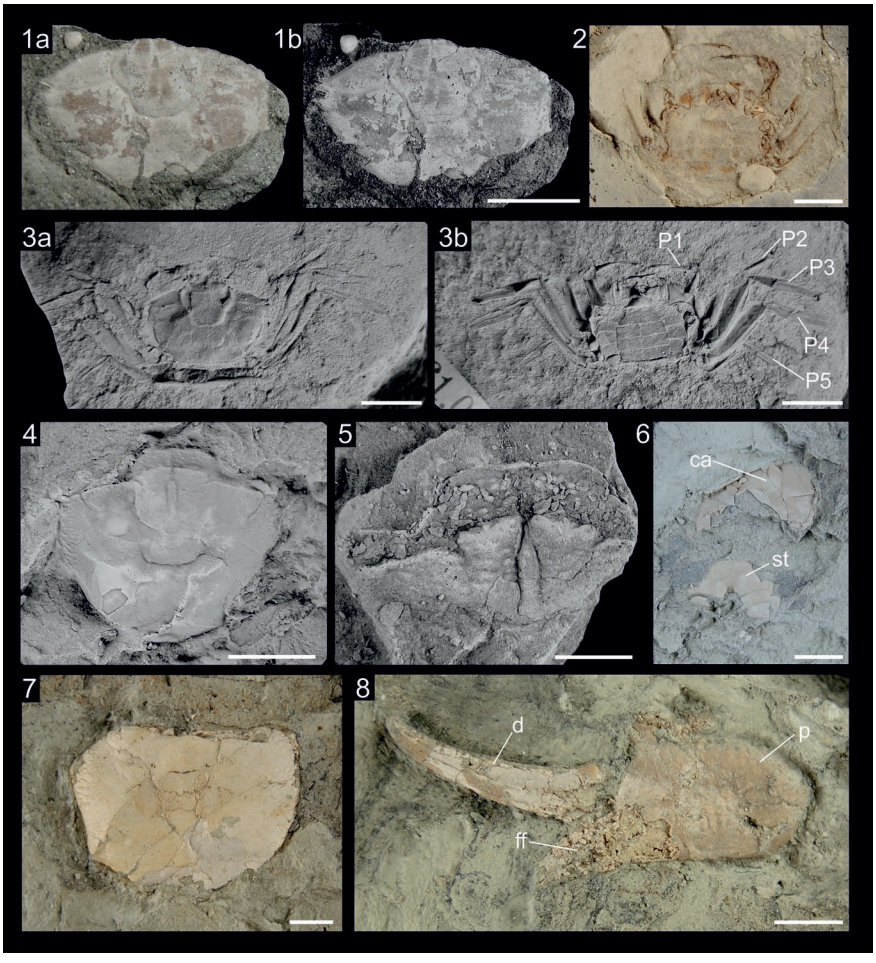
Fig. 16: 1–3) Brachyura: Thoracotremata. 1) *Macrophthalmus aquensis* (Wetzelsdorf, "16 Suppan vulgo Priegl", Inv.No. 211419), carapace. 2) *M. aquensis* (Zehndorf, Inv.No. 211434), individual in ventral aspect. 3) *M. aquensis* (Lamberg, Inv.No. 61063–64), dorsal view (3a), ventral view (3b). 4) *Potamon proavitum* (Gratkorn, Inv.No. 203728), carapace. 5) *P. proavitum* (Gratkorn, Inv.No. 203413), carapace front. 6) *P. proavitum* (Gratkorn, Inv.No. 203394), carapace fragment with sternum. 7) *P. proavitum* (Gratkorn, Inv.No. 203414), fragmentary carapace. 8) *P. proavitum* (Gratkorn, Inv.No. 203726), P1 chela. Specimens in 1b, 3–6 were covered with ammonium chloride prior the photography. Scale bar equals 5 mm. ca = carapace, d = dactylus, ff = fixed finger, p = propodus, P1–P5 = pereiopod 1–5.
Abb. 16: 1–3) Brachyura: Thoracotremata. 1) *Macrophthalmus aquensis*, Carapax. 2) *M. aquensis*, Ventralansicht. 3) *M. aquensis*, Dorsal- (3a) und Ventralansicht (3b). 4) *Potamon proavitum*, Carapax. 5) *P. proavitum*, Carapaxfront. 6) *P. proavitum*, Carapaxfragment mit Sternum. 7) *P. proavitum*, unvollständiger Carapax. 8) *P. proavitum*, P1 Chela. Exemplare 1b und 3–6 wurden vor dem Fotografieren mit Ammoniumchlorid bedampft. Maßstab = 5 mm. ca = Carapax, d = Dactylus, ff = unbeweglicher Finger, p = Propodus, P1–P5 = Pereiopoden 1–5.

Localities: A, Stmk., Gratkorn, "St. Stefan clay pit" (Inv.Nos. 203389–203418, 203726–203728); A, Stmk., Graz/Andritz, "Wolf clay pit" (holotype Inv.No. 5828).

Stratigraphy: Gleisdorf Formation; upper Sarmatian (Gross 2015, cum Lit.).

Acquisition: Inv.No. 5828 (collection Ferdinand Drugčevič); Inv.Nos. 203389–203418, 203726–203728 (collection Martin Gross, 07/2005).

Remarks: Detailed description of the female holotype from Andritz was given by Glaessner (1928). Klaus & Gross (2010) reviewed and re-figured the type material and reported on additional material from Gratkorn.



***Potamon* sp.**

2010 *Potamon* sp. – Klaus & Gross: 8, fig. 4D.

Description: Inv.No. 204339: claw fragment (figured in Klaus & Gross 2010: fig. 4D).

Locality: A, Schönweg, "Brüchl" in Carinthia.

Stratigraphy: "Granitztal Beds" or lateral equivalent of the (lower) "Mühldorf Beds"; Karpatian–lower Badenian (Beck-Mannagetta 1952; Beck-Mannagetta & Draxler 1987; Reischenbacher et al. 2007; Reischenbacher & Sachsenhofer 2013; Prieto et al. 2016).

Acquisition: Collection and donation Madelaine Böhme (university Munich, 04/2008).

Remarks: Klaus & Gross (2010) considered this claw fragment the oldest known European freshwater crab record south of the Alpine orogen.

Brachyura indet.

1987 Fam., Gen. et spec. indet. – Friebe: 63, pl. 2, figs. 10.

Description: Inv.No. 200008 (originally as UGP No. 2917): isolated cheliped element (figured in Friebe 1987: pl. 2, figs. 10).

Locality: A, Stmk., Wurzing bei Wildon.

Stratigraphy: Weissenegg Formation; middle–upper Badenian (Friebe 1987, 1990; Hohenegger et al. 2009, 2014).

Acquisition: a) collection J. Georg Friebe, 1986; b) donation (2002) of the Institute of Earth Sciences, University of Graz.

Remarks: Specimen is too fragmentary for closer identification. Müller in Friebe (1987: 63) opined for possible attribution to Trapeziidae or Majidae.

Brachyura indet.

Description: Inv.Nos. 75561, 75565, 75580, 75609, 75610, 75621, 211157, 211158: isolated fingers.

Localities: A, Stmk., Wetzelsdorf in der Weststeiermark, "2 Winkeltoni" (Inv.No. 75609), "7 Simihansl" (Inv.No. 75561), "8 Kreuzschaller W" (Inv.Nos. 75580, 75610), "9 Kreuzschaller O" (Inv.No. 75565), "12 Tomahiaslgraben SSW" (Inv.No. 75621); SLO, Polička vas [Pöllitschdorf], "Steinbruch Šošmann, Pöllitschdorf bei Jahring [Jarenina]" (Inv.Nos. 211157, 211158).

Stratigraphy: Wetzelsdorf (Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014)); Polička vas (Haloze Formation; Karpatian–lower Badenian; Jelen & Rifelj 2011).

Acquisition: Inv.Nos. 75561, 75565, 75580, 75609, 75610, 75621 (collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925); Inv.Nos. 211157, 211158 (possibly collection and donation Leopold Kühnelt; compare JB 1898).

Remarks: Isolated cheliped fingers of brachyuran crabs are difficult to identify on the genus and/or species level. Here, such material is treated as Brachyura indet., pending more comparative research in the future.

Decapoda indet.

Description: Inv.Nos. 5750, 5756: pereiopod fragments; Inv.No. 211430: isolated fingers.

Localities: A, Stmk., Wetzelsdorf in der Weststeiermark, "2 Winkeltoni" (Inv.No. 211430); SLO, Jarenina [Jahring], "Winzerei vulgo Ruesser in Gromberg bei Jahringhof [Jareninski Dvor]" (Inv.No. 5750, 5756).

Stratigraphy: Wetzelsdorf (Florian Beds ("Florianer Schichten"); lower Badenian (Holler 1900; Kopetzky 1957; Kollmann 1965; Friebe 1990; Hohenegger et al. 2009, 2014)); Jarenina (Haloze Formation; Karpatian–lower Badenian; Jelen & Rifelj 2011).

Acquisition: Inv.No. 211430 (collection Herbert Lamprecht, donation 1918–1923 (compare JB 1925); Inv. Nos. 5750, 5756 (collection and donation Leopold Kühnelt; compare JB 1898).

Remarks: The material is too fragmentary for closer identification.

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