N. Jb. Geol. Paläont. Abh. 260/2, 165–171
published online March 2011

Article

Synopsis of fossil decapod crustaceans from Slovakia (Western Carpathians)

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With 1 figure and 1 table

Hyžný, M. (2011): Synopsis of fossil decapod crustaceans from Slovakia (Western Carpathians). – N. Jb. Geol. Paläont. Abh., **260**: 165–171; Stuttgart.

Abstract: In the past only very few works dealt with fossil decapod crustaceans from Slovakia. The systematic research of this group has never been fully conducted there. This contribution provides a short review of all known Mesozoic and Cenozoic fossil decapod occurrences. So far, most of the taxa were described from the Eocene and Miocene strata.

Key words: Decapod crustaceans, Slovakia, Mesozoic, Eocene, Miocene.

1. Introduction

The presence of fossil decapod crustaceans from the area, which is today Slovakia, is known since 19th century (Reuss 1859). However, until very recently only little attention, has been paid to the systematic research of this arthropod group in this area. Thus it has virtually no history in Slovakia, except the scattered mentions of the occurrences of fossil decapods in the literature which have rather informative character (e.g. Papšová 1970, 1975, 1977, 1978; Papšová in Gross et al. 1973; Filo & Siráňová 1996; Krempaská 1998). The only systematic works dealing partly with fossil decapod crustaceans from today's Slovakia are those by Reuss (1859), Dornyay (1913) and Lőrenthey & Beurlen (1929). Several occurrences are also mentioned in a palaeontological textbook by Houša in Špinar et al. (1966).

The aim of this contribution is to provide a list of all occurrences of fossil decapod crustaceans from Slovakia known to date. However, it should be considered as the preliminary one, as the research is still ongoing.

2. Studied material

Material shortly reviewed here is deposited in several institutions and private collections in Slovakia, namely Prírodovedné múzeum SNM (Bratislava), Múzeum Spiša (Spišská Nová Ves), Liptovské múzeum – Čierny Orol (Liptovský Mikuláš) and Department of Geology and Palaeontology, Comenius University (Bratislava).

The material can be divided in three groups: 1) Taxa collected and described personally by myself; 2) taxa deposited in the museums or other institutions and examined by myself; and 3) taxa mentioned in the literature only and still waiting for the re-examination. Fossil decapod crustaceans are known from several formations mainly of Cenozoic age. Up to date over 20 genera in 17 families including 6 new species have been identified (see Table 1).

Still, there is yet undescribed material from several localities of the middle Miocene age known to me and previous studies on many geological units were simply not focused on fossil decapods. Although a great collecting bias should be considered when making further conclusions from the presented results, in some cases the studied material provides enough data for considering palaeoecological and palaeobiogeographical implications (Hyžný & Schlögl in press).

© 2011 E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany
DOI: 10.1127/0077-7749/2011/0164
www.schweizerbart.de
0077-7749/2011/0164 $ 1.50

Mesozoic: From Slovakia there are very few Mesozoic occurrences of decapods known. This may in part be attributed to collection failure.

The oldest decapod remain from Slovakia is one left propodus of a presumed paguroid anomuran from the Pliensbachian of the Belá Unit (Maheľ 1959). If its affinity was confirmed it would be one of the oldest fossil representatives of that group.

From the middle Oxfordian of the Bohunice Formation (Mišík et al. 1994) several specimens assignable to decapod crustaceans come from (Hyžný & Schlögl 2009). All material originates from a single layer of white ammonite coquina (*Gregoryceras transversarium* Zone) at the locality Štepnická skala (Aubrecht et al. 2002; Aubrecht & Jamrichová 2009). It comprises one almost complete internal mould of a dorsal carapace of *Tanidromites insignis* (v. Meyer, 1857), three propodi of indeterminate anomurans or brachyurans, and further unidentifiable crustacean fragments. The material of *Tanidromites* Schweitzer & Feldmann, 2008 is the only occurrence of a Jurassic crab reported from the Pieniny Klippen Belt and from Slovakia as well.

Paleogene: The Borové Formation (Gross et al. 1984) of the Subtatric Group is known of several brychyuran genera originating from several localities of middle and upper Eocene age.

Decapods from middle Eocene strata of the Borové Fm. of Liptovská kotlina Depression have been known since the work of Dornyay (1913) who reported the presence of *Harpactoxanthopsis quadrilobata* (Desmarest, 1822) at the locality Mních near the town of Ružomberok (Rózsahegy). The presence of the species was confirmed by Lőrenthey & Beurlen (1929) and Papšová (1970). Lőrenthey & Beurlen (1929) mentioned from the same area also *Raninoides fabianii* (Lőrenthey in Lőrenthey & Beurlen, 1929) and *Harpactocarcinus punctulatus* A. Milne-Edwards, 1862.

From the upper Eocene strata of the Ružomberok area Dornyay (1913) reported *Lophoranina bittneri* (Lőrenthey, 1902) and *L. reussi* (Woodward, 1866). However, the re-examination of the material deposited in the Liptovské Múzeum in Liptovský Mikuláš revealed the presence of *L. reussi* only (Hyžný 2010).

Several brachyuran genera have been identified in the upper Eocene Tomášovce Member (Filo & Siráňová 1996) of the Borové Fm. The first mention is that by Reuss (1859) who described *Ranina hazslinskyi* from Radács (today's Radatice, eastern Slovakia) on the basis of a rather poorly preserved specimen (see Reuss 1859: pl. 4, figs. 4-5; compare with the comments by Lőrenthey & Beurlen 1929: 12, 109). The place of repository of the specimen is unknown. Lőrenthey & Beurlen (1929: 33) noted the late Oligocene age of the specimen, however, the more recent geological survey of the area identified the surrounding of the locality as a part of the exposed Tomášovce Mb. and yielded the Priabonian – early Oligocene age (predominantly latest Priabonian) (Filo & Siráňová 1996). Remains of fossil crabs of Tomášovce Mb. exposed in the same area (locality Sedlice) are mentioned by Papšová in Gross et al. (1973).

From Ďurkovec quarry (Hornádska kotlina Depression, northeastern Slovakia), the stratotype locality of the Tomášovce Mb., quantitatively rich decapod fauna has been collected (Hyžný 2007). Several species have been identified: *Ranina* sp. (presumably a new species), *Calappilia tridentata* (Beurlen, 1939) (Fig. 1D) and *Coeloma vigil* A. Milne-Edwards, 1865 (Fig. 1B). At the same locality also heavily bioturbated horizons occur with very abundant *Thalassinoides* burrows. These horizons usually yield very few decapod body fossils (pers. obs.).

The presence of indeterminate decapod remains at several other localities of presumed middle to late Eocene age of Liptovská kotlina Depression were reported by Papšová (1970, 1975, 1978). Similarly, decapods were reported from borehole cores NB-1 and Š2-NB of the Paleogene basement of the Danube Basin and the regions of Banská Bystrica and Brezno (Papšová 1977).

Neogene: In Slovakia there are several depositional basins filled with sediments of Miocene age forming once parts of Central Paratethys.

The lower Miocene (upper Karpatian) sediments of Lakšárska Nová Ves Fm. of the Vienna Basin yielded up to now six species (Hyžný & Schlögl in press): *Callianopsis* sp. nov., *Crosniera* sp. nov., *Agononida* sp. nov., *Munidopsis* sp. nov., *Mursia* sp. nov., and *Styrioplax exiguus* (Glaessner, 1928). The representatives of *Crosniera* Kensley & Heard, 1991 and *Agononida* Baba & de Saint Laurent, 1996 are the first members of these genera known from the fossil record. The whole decapod association is dominated by ctenochelid *Callianopsis* sp. nov. representing more than 90 % of more than 120 studied specimens. The association indicates deep-water conditions (Hyžný & Schlögl in press).

In the middle Miocene (lower Badenian) deposits of the Plášťovce Mb. (Vass 1971) of the Sebechleby Fm. of the Novohrad Basin (southern Slovakia) various

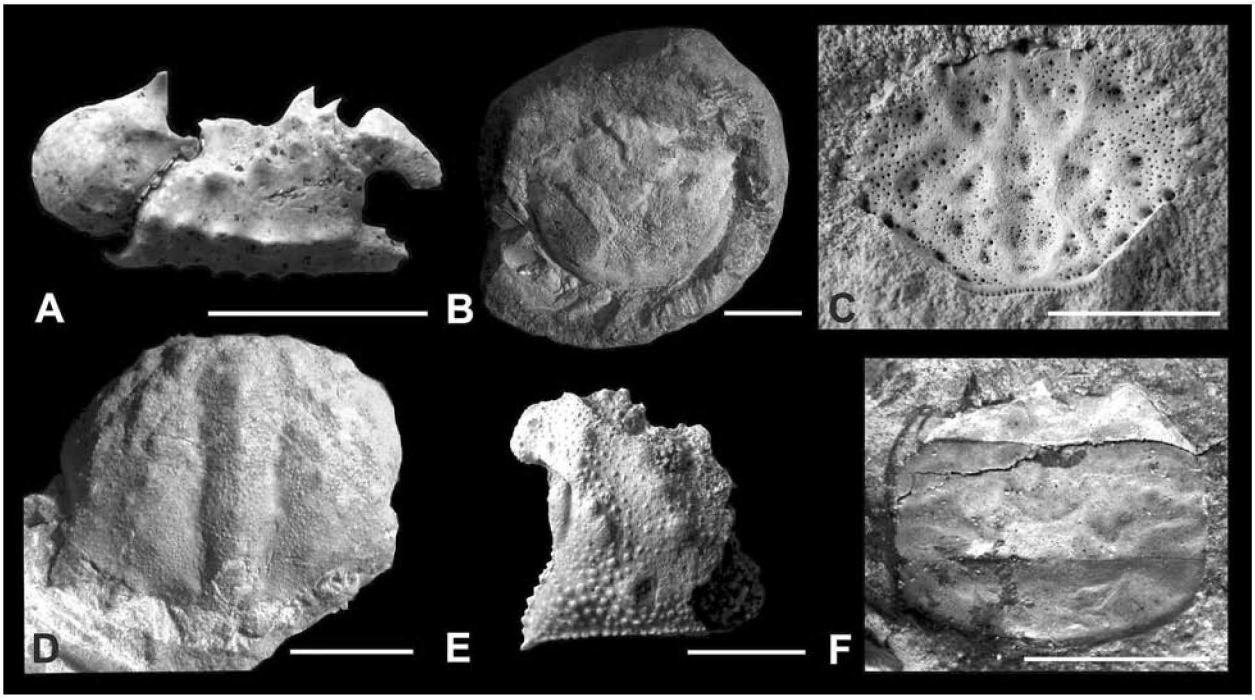

Fig. 1. Some Cenozoic decapod crustaceans from Slovakia. **A** – *Szaboa inermis* (Brocchi, 1883); inner mould of right cheliped consisting of carpus, propodus and dactylus, Studienka Fm., Sandberg. **B** – *Coeloma vigil* A. Milne-Edwards, 1865; dorsal carapace preserved in the sandstone nodule, Borové Fm., Hlinisko. **C** – *Tasadia carniolica* (Bittner, 1884); imprint of dorsal carapace, Sebechleby Fm., Plášťovce, whitened with ammonium chloride. **D** – *Calappilia tridentata* (Beurlen, 1939); dorsal carapace, Borové Fm., Ďurkovec. **E** – *Calappa heberti* Brocchi, 1883; isolated left propodus, Studienka Fm., Sandberg. **F** – *Retropluma borealis* Fraaije, Hansen & Hansen, 2005; imprint of dorsal carapace, Sebechleby Fm., Plášťovce. – Scale bars equal 1 cm.

decapod species were identified coming from several localities around the Plášťovce village (Sukatcheva et al. 2006). The most abundant are commonly complete individuals of *Tasadia carniolica* (Bittner, 1884) (Fig. 1C). Less frequent are *Jaxea kuemeli* Bachmayer, 1954 (see Hyžný 2011, this volume) and *Retropluma borealis* Fraaije, Hansen & Hansen, 2005 (Fig. 1F). The latter has been previously only reported from the upper Miocene of Gram, Denmark (Fraaije et al. 2005).

The middle Miocene (upper Badenian) strata of the Studienka Fm. of the Vienna Basin in the vicinity of Bratislava represent several different facies with different decapod associations. The near-shore facies exposed at Dúbravská hlavica locality are represented by hundreds of claws of "*Callianassa*" *brocchi* Lőrenthey, 1898 and "*Callianassa*" *pseudorakosensis* Lőrenthey in Lőrenthey & Beurlen, 1929. Together with them many burrow structures are preserved, in several occasions also containing the callianassid body fossils (Hyžný in press). Both species are currently under detailed revision (Hyžný in prep.). Another facies exposed at the localities of Devín-Merice and Sandberg contain remains of *Calappa heberti* Brocchi, 1883 (Fig. 1E), *Szaboa inermis* (Brocchi, 1883) (Fig. 1A), *Tasadia carniolica* (Bittner, 1884) and yet indeterminate brachyuran claws (presumably xanthids and portunids). The presence of *C. heberti* at Sandberg was already mentioned by Lőrenthey & Beurlen (1929). Finally, a more basinal lithology exposed in the former claypit in Devínska Nová Ves (the locality is no more accessible) yielded abundant specimens of *T. carniolica*, and much less frequent *Mursia* sp. and undescribed galatheids. The *Tasadia* claws were already mentioned and figured by Toula (1900), and the presence of crabs was later noted by Tomašových (1998). None of these works, however, provided a systematic treatment of this material. The material from the locality is currently under description.

Decapods from the localities, where upper Badenian strata are exposed, show similarities to coeval very well known decapod associations described from the Budapest area (Müller 1984).

The upper Miocene strata yielded up to now only few decapod remains. The strata of the Stretava Fm. of the early Sarmatian (Serravallian) age of Ždaňa and Slanská Huta (eastern Slovakia) are known of some remains of presumably freshwater crabs (Kőrössy 1940; Zlinská & Fordinál 1995). They were described as *Potamon hungaricum* Kőrössy, 1940, however, Klaus & Gross (2010) recently cast doubts on their potamid affinities.

True potamids were identified in upper Pannonian (Tortonian) strata of the Beladice Fm. in borehole PiD-1 in the vicinity of the Orešany village (Fordinál 1994; Fordinál & Nagy 1997) and recently assigned to *Potamon hegauense* Klaus & Gross, 2010 (Klaus & Gross 2010).

From middle Pleistocene strata of the Mogyorós quarry, which is today in Slovakia (Mužla, southern Slovakia), Klaus & Gross (2010: 13) reported the presence of *Potamon antiquum* Szombathy, 1916.

Acknowledgements

Material presented here was donated by Klement Fordinál (Štátny Geologický Ústav Dionýza Štúra, Bratislava, Slovakia), Marián Golej (Geological Institute of Slovak Academy of Sciences, Bratislava, Slovakia), Adrián Harničár (Svit, Slovakia), Peter Ledvák (Geological Institute of Slovak Academy of Sciences, Bratislava, Slovakia), Ján Schlögl, (Comenius University, Bratislava, Slovakia), Štefan Szalma (Plášťovce, Slovakia) and Peter Vršanský (Geological Institute of Slovak Academy of Sciences, Bratislava, Slovakia). René H. B. Fraaije (Oertijdmuseum De Groene Poort, Boxtel, the Netherlands), Adrián Harničár, Natália Hlavatá-Hudáčková (Comenius University, Bratislava, Slovakia) and Ján Schlögl helped with the fieldworks. Access to museal collections was provided by Barbara Chalupová (Prírodovedné múzeum SNM, Bratislava, Slovakia), Pavol Hriadel (Liptovské múzeum – Čierny Orol, Liptovský Mikuláš, Slovakia), Peter Klepsatel (formerly Prírodovedné múzeum SNM, Bratislava, Slovakia) and Zuzana Krempaská (Múzeum Spiša, Spišská Nová Ves, Slovakia). Antonio De Angeli (Museo Civico „G. Zannato", Montechio Maggiore, Italy), Rodney M. Feldmann (Kent State University, Ohio, USA), René H. B. Fraaije, Alessandro Garassino (Museo Civico di Storian Naturale, Milano, Italy) and Carrie E. Schweitzer (Kent State University, Ohio, USA) discussed the affinities of fossil material. Günter Schweigert (Natural History Museum, Stuttgart, Germany) acted as a referee. Sincere thanks to all of these individuals. The work has been supported by research grants APVV 0280-07 to Daniela Reháková (Comenius University, Bratislava, Slovakia) and grant PRIF UK 19/2010 to Matúš Hyžný.

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Manuscript received: July 1st, 2010.
Revised version accepted: July 6th, 2010.

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Appendix

Table 1. List of known fossil decapod crustaceans from Slovakia. Only taxa determined to at least genus level are listed. For all known occurrences see text.

FORMATION (AGE)	**LOCALITY**	
FAMILY	TAXON	REFERENCES
Bohunice Fm. (middle Oxfordian)	**Štepnická skala**	
Tanidromitidae	*Tanidromites insignis*	Hyžný & Schlögl (2009)
Borové Fm. (middle Eocene)	**Ružomberok – Mních**	
Raninidae	*Raninoides fabianii*	Lőrenthey & Beurlen (1929)
Zanthopsidae	*Harpactocarcinus punctulatus*	Lőrenthey & Beurlen (1929)
Zanthopsidae	*Harpactoxanthopsis quadrilobata*	Dornyay (1913); Lőrenthey & Beurlen (1929); Papšová (1970); Hyžný (2010)
Borové Fm. (upper Eocene)	**Ružomberok – Mních, Kleinov lom**	
Raninidae	*Lophoranina reussi*	Dornyay (1913), herein; Hyžný (2010)
Borové Fm. – Tomášovce Mb. (upper Eocene)	**Ďurkovec, Hlinisko**	
Raninidae	*Ranina* sp.	Hyžný (2007)
Calappidae	*Calappilia tridentata*	Hyžný (2007); herein
Mathildellidae	*Coeloma vigil*	Hyžný (2007)
Borové Fm. – Tomášovce Mb. (upper Eocene)	**Radatice**	
Raninidae	*Ranina hazslinskyi*	Reuss (1859)
Lakšárska Nová Ves Fm. (lower Miocene)	**Cerová-Lieskové**	
Ctenochelidae	*Callianopsis* sp. nov.	Hyžný & Schlögl (in press)
Thomassiniidae	*Crosniera* sp. nov.	Hyžný & Schlögl (in press)
Galatheidae	*Agononida* sp. nov.	Hyžný & Schlögl (in press)
Galatheidae	*Munidopsis* sp. nov.	Hyžný & Schlögl (in press)
Calappidae	*Mursia* sp. nov.	Hyžný & Schlögl (in press)
Pilumnidae	*Styrioplax exiguus*	Hyžný & Schlögl (in press)
Sebechleby Fm. (middle Miocene)	**Plášťovce**	
Laomediidae	*Jaxea kuemeli*	Hyžný (2011)
Cancridae	*Tasadia carniolica*	herein
Retroplumidae	*Retropluma borealis*	herein
Studienka Fm. (middle Miocene)	**Devínska Kobyla – Dúbravská hlavica**	
Callianassidae	*„Callianassa" brocchi*	herein
Callianassidae	*„Callianassa" pseudorakosensis*	Hyžný (in press); herein
Studienka Fm. (middle Miocene)	**Devínska Kobyla – Sandberg**	
Calappidae	*Calappa heberti*	Lőrenthey & Beurlen (1929); herein
Matutidae	*Szaboa inermis*	herein
Cancridae	*Tasadia carniolica*	herein
Studienka Fm. (middle Miocene)	**Devínska Nová Ves**	
Calappidae	*Mursia* sp.	herein
Cancridae	*Tasadia carniolica*	Toula (1900); herein
Stretava Fm. (middle Miocene)	**Ždaňa, Slanská Huta**	
?Potamidae	*?Potamon hungaricum*	Klaus & Gross (2010)
Beladice Fm. (upper Miocene)	**Orešany**	
Potamidae	*Potamon hegauense*	Fordinál (1994); Klaus & Gross (2010)
middle Pleistocene	**Mužla**	
Potamidae	*Potamon antiquum*	Klaus & Gross (2010)