

In memory of July Stephanov (1932–1966)

First record of an erymid lobster (Crustacea, Decapoda) from the upper Bajocian of Northwest Bulgaria

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Abstract. Fossil chela of an erymid lobster from a single locality of the upper Bajocian in the Western Fore-Balkan Mts (NW Bulgaria) was studied. Two segments of the thoracic appendages, probably belonging to one individual, were described: 1) P1 propodus with partially preserved pollex and dactylus; and 2) P1 carpus and P1 merus attached. These elements of the first pair of pereopods of a lobster were identified as *Eryma compressum* (Eudes-Deslongchamps, 1842). *Eryma compressum* is a well-known taxon from numerous Jurassic localities in Europe but has not been recorded in Bulgaria to date. Therefore, albeit being an isolated finding with only a few elements, the Bulgarian example contributes to the overall record of European erymid faunas from the Middle Jurassic, and especially in Eastern Europe, from where only a few erymids have been reported.

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Keywords: Jurassic, upper Bajocian, erymid lobster, *Eryma*, Crustacea, Bulgaria.

INTRODUCTION

The intensive collections of fossils from the Middle Jurassic strata in Northwest Bulgaria in the 1960s, and especially those in the area of Belogradchik along the strip of outcrops between Varbovo and Dolni Lom Villages (Vidin–Montana Districts), have provided numerous localities containing abundant and well-preserved fossils. These include a number of ammonites and brachiopods, many of which have been studied and published in the valuable papers of July Stephanov and Platon Tchou-

matchenco (e.g., Stephanov, 1966, 1972; Tchoumatchenco, 1977a, b, 1978, 1993). Regrettably, the premature death of Stephanov, who had a particular interest and diligence in studying the fossils of this area, left much of his material only labeled. At the revision of Stephanov’s collection, we have recently found remains of an erymid lobster, simply labeled as “*Erymastacus* sp., Bajocian, Prauzhda Village, Vidin District”. The latter consist of a P1 propodus and attached P1 carpus and P1 merus, which are preserved in ferruginized fine-grained calcareous sandstone. The lithology of the hostrock suggests

that it is from the lower levels of the Polaten Formation. Based on the age definitions for the Polaten Formation in the area southeast of Belogradchik, mainly from the works of Tchoumatchenco (1977a, b, 1978), the age of the erymid lobster is presumably late Bajocian. Our field knowledge (LM) allowed the lobster locality to be fixed approximately a kilometer north of Prauzhda Village (Vidin District, Fig. 1a, b). The focus herein is on the description of these fossils. We assume that they belong to one individual. They are sufficiently well preserved and bear characteristic morphological features to be identified at specific level.

GEOLOGICAL SETTING

The area of the locality that yielded the fossils for this study is situated in Northwest Bulgaria, near the Bulgarian-Serbian state border. In this region, the Jurassic rocks crop out within two (southern and northern) narrow and almost parallel strips of exposures of NW-SE trend (Fig. 1a). In a regional geological context, the southern strip takes part of a thick succession of Mesozoic rocks that is deformed in a number of fault bends associated with the Vedernik thrust fault. The latter is a prominent structure that divides the internal and external structures in the northwestern part of the Balkan Zone (*sensu* Dabovski *et al.*, 2002). In a local context, along the Vedernik thrust fault in the area of Prauzhda Village, a characteristic S-shaped fault bend was formed, in which the Mesozoic rocks and the underlying older strata were dislocated both vertically and laterally (Fig. 1b). Stratigraphically, the Jurassic rocks of this area lie upon varied Paleozoic rocks, but also on the red clastics of the Lower Triassic, in which the Belogradchik rocks were formed.

The rocks of the Riksa Formation take up the basal part of the Jurassic succession in the Prauzhda vicinity and the adjacent area (see Fig. 2). These sediments correspond to siliciclastic coal-bearing (lacustrine-palustrine) deposits and are Toarcian–Aalenian in age (Sapunov *et al.*, 1990). Up-section, thick shallow-marine quartzose (oligomict) clastic rocks, referred to the Kichera Formation, lie with a more or less sharp lithological boundary upon the continental strata. These sediments correspond to syntransgressive deposits and are Aalenian–early Bajocian in age (Sapunov *et al.*, 1988). From above, the Kichera Formation is covered by the shallow bioclastic terrigenous-carbonate rocks of the Polaten Formation, which are late Bajocian in age (Tchoumatchenco, 1977a, b, 1978). The latter

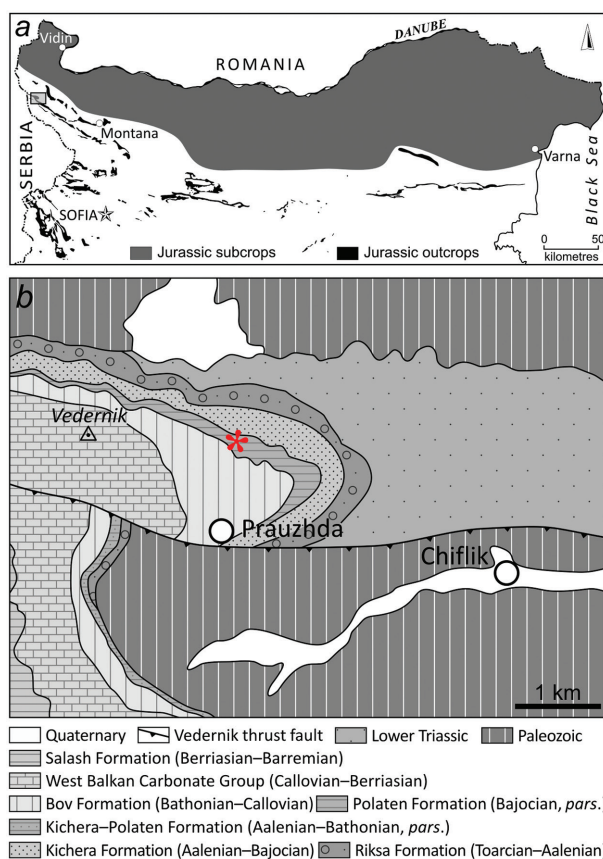


Fig. 1. Location maps of the locality yielding the fossil chela for this study: a) Outcrops and subcrops of the Jurassic rocks in Bulgaria (after Sapunov and Metodiev, 2007), showing the position of the area containing the locality of Prauzhda; b) geological sketch map of the Western Fore-Balkan Mts in the area of Prauzhda Village (after Angelov *et al.*, 2006; simplified) and the approximate position of the Prauzhda locality (red asterisk).

display sharp erosional bounding limits and, from a depositional viewpoint, denote post-transgressive deposits. They are overlain by the marlstone-limestone succession of the Bov Formation. A few unpublished ammonites (*e.g.*, *Procerites ex gr. imitator* (Buckman), *Polyplectites* spp.) from Stephanov's collection, from scattered nearby localities, dated the basal beds of the Bov Formation as middle Bathonian. The uppermost parts of the Jurassic succession in the Prauzhda area are made up of sediments of the West Balkan Carbonate Group which have a total chronostratigraphical range from the Callovian to the Berriasian (Sapunov *et al.*, 1988). In terms of the overall depositional history, it should be noted that the Lower–Middle Jurassic strata correspond to a trend from a relatively slow (Aalenian–Bajocian) increase to an apparently rapid (Bathonian) rise of the sea level and its composing

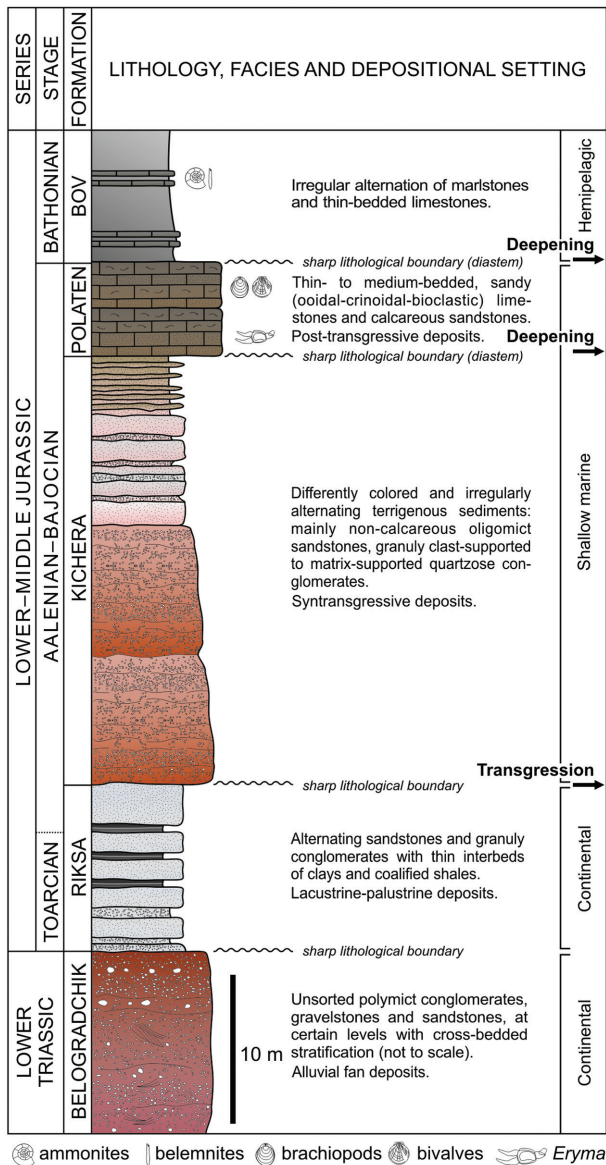


Fig. 2. Generalized stratigraphic section, facies and depositional settings of the Lower–Middle Jurassic rocks in the area of Prazhda Village.

sediments often contain intraformational gaps due to sedimentary misaccumulation (diastems or submarine washout).

As noted above, the erymid lobster remains probably originate from the lower levels of the Polaten Formation, a few-meters thick, thin- to medium-bedded, light brown fine-grained calcareous sandstones, containing crinoidal bioclasts and tiny particles of bivalve and brachiopod debris. The beds are generally devoid of fossils, but may contain sporadic specimens, or quite rare clusters, of poorly preserved bivalves of *Entolium* Meek, 1865 and *Oxytoma* Meek, 1864, and brachiopods *Sphaero-*

idothyris Buckman, 1917 (LM). Ammonites are virtually absent.

SYSTEMATIC PART

The terminology and taxonomic views adopted herein mainly follow Devillez and Charbonnier (2017, 2019, 2021) and Devillez *et al.* (2019). The described erymid lobster chela is kept at the Museum of Palaeontology and Historical Geology at Sofia University “St Kliment Ohridski”, Bulgaria.

Order Decapoda Latreille, 1802

Superfamily Erymoidea Van Straelen, 1925

Family Erymidae Van Straelen, 1925

Genus *Eryma* Meyer, 1840

Type species. *Macrourites modestiformis* Schlotheim, 1822 (p. 160, pl. 77, fig. 9), by subsequent designation (Glaessner, 1929, p. 150).

Diagnosis. According to the emended diagnosis of Devillez and Charbonnier (2019), this genus possesses thoracic appendages with chelate P1–P3. The P1 chelae display homogeneous ornament, without prominent spines. The P1 propodus is dorsoventrally compressed and has narrow inner and outer margins with a narrow dactylar bulge. The P1 fingers are of equal length; they are usually longer than the propodus and progressively taper to their distal edge. The pollex is wider than the dactylus. P1 chelae can be of two types: 1) with a short rectangular propodus and straight fingers, which are slightly longer than the propodus; and 2) with an elongated, subrectangular to trapezoidal propodus and curved inward fingers, which are quite longer than the propodus.

Remarks. The most extensive recent discussions of *Eryma* are those of Hyžný *et al.* (2015), and Devillez and Charbonnier (2017, 2019, 2021). Following these authors, the chelae of *Eryma* can easily be distinguished based on the shape of the propodus, its characteristic dorsoventral flattening and narrow margins, and the style of ornamentation, which is devoid of spines but is dense, fine and tuberculate.

Occurrence. Sinemurian–Albian: Europe (France, Germany, Italy, UK, Switzerland, Russia, Romania and Bulgaria), North Africa (Morocco), Iran, Lebanon, Madagascar, Japan, and the United States.

Eryma compressum (Eudes-Deslongchamps, 1842)

(Fig. 3a–h; Fig. 4)

1842. *Palinurus compressus* Eudes-Deslongchamps, p. 60, pl. 4, Figs 8–9 (carapace).

1865. *Bolina etalloni* Ferry, p. 368, Pl. 7, Figs 1, 2 (left chela).
 2019 *Eryma compressum* (Eudes-Deslongchamps): Devillez and Charbonnier, pp. 9–12 (cum syn.).

Holotype. The original material of Eudes-Deslongchamps (1842, p. 60, pl. 4, figs 8, 9), NHMUK In.22917, is a carapace from the Bathonian at Ranville, Lower Normandy, Department of Calvados (NW France). It is housed at the Natural History Museum, London (UK). The holotype was refigured by Devillez and Charbonnier (2019, fig. 5A).

Other type material. The original of Ferry (1865, p. 368, pl. 7, figs 1–2), MNHN.F.A29729, is a left chela from the Bajocian at Solutré, Bourgogne-Franche-Comté, Department of Saône-et-Loire (SE France). It is housed at the Natural History Museum, Paris (France). This type was refigured by Devillez and Charbonnier (2019, fig. 5E).

Synonymy. For other type materials, corresponding to synonyms of *Eryma compressum* (Eudes-Deslongchamps), see Devillez and Charbonnier (2019, pp. 9–12, cum syn.).

Material. Specimen Inv.-Nr U.S., J^{nov} 266 (Fig. 3a–c, g) corresponding to a P1 propodus and specimen Inv.-Nr U.S., J^{nov} 267 (Fig. 3d–f, h) consisting of a P1 carpus and a P1 merus. Unpublished material of July Stephanov, probably from the base of the Polaten Formation, near Prauzhda Village (Vidin District). Upper Bajocian.

Description and discussion. Medium-sized, wide and subtrapezoidal P1 propodus, which is compressed dorsoventrally (see Fig. 3a–c). The inner margin is 22 mm long, and the outer margin is 24.5 mm. The thickness of the propodus is 9.5 mm. The ventral side is slightly convex, almost flat. The dorsal side bears a pronounced mid-side longitudinal bulge. Both the inner and the outer margin are narrow and tapered. The proximal end is elliptical, with a length of 17 mm and a narrow collar around it. The distal end is slightly flattened, with a length of 23 mm. It bears the very base of both the dactylus and the pollex. The latter are limited by wide and shallow grooves. The fingers are not preserved.

The P1 carpus has a rounded subtriangular outline and an elliptical cross-section, which is slightly sharpened towards both the inner and outer margin (see Fig. 3d–f). It is 14 mm long, 11.5 mm wide at its widest end, and 8.5 mm thick. The connections with the propodus and the merus, which are convex and elliptical, are clearly visible. The P1 merus is partly preserved, with a triangular shape in cross section.

The propodus, carpus and merus are ornamented with fine and dense tubercles that are accentuated

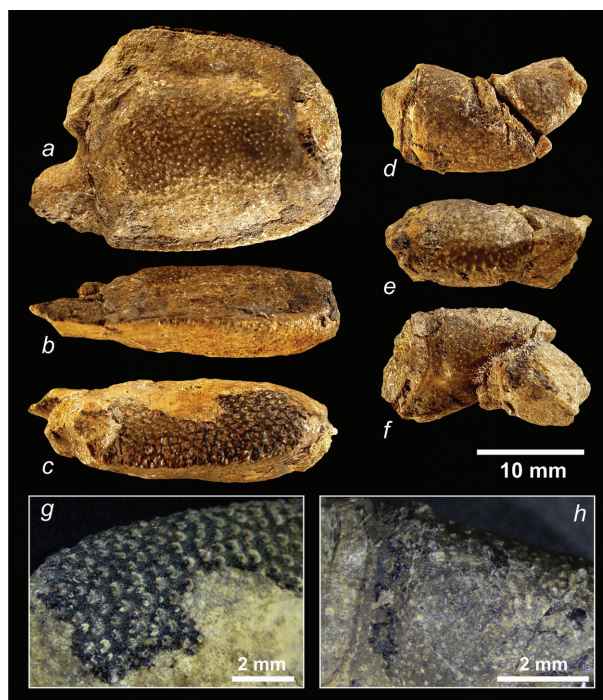


Fig. 3. *Eryma compressum* (Eudes-Deslongchamps, 1842) from the upper Bajocian of the area of Prauzhda Village (Vidin District, Western Fore-Balkan Mts, NW Bulgaria): a–c) P1 propodus (Inv.-Nr U.S., J^{nov} 266): a) dorsal view, b) inner margin view, c) outer margin view; d–f) P1 carpus and P1 merus (Inv.-Nr U.S., J^{nov} 267): d) dorsal view, e) outer margin view, f) ventral view; details of ornamentation of the propodus (g) and the carpus (h).

ated by minute crescent-shaped concavities (see Fig. 3g, h).

Having at their disposal a plentiful collection of original European specimens, Devillez and Charbonnier (2019, pp. 9–13) made a careful revision, in which twenty species (and subspecies), previously assigned to five different genera, were placed in synonymy with *Eryma compressum* (Eudes-Deslongchamps, 1842). They described and discussed this species in detail, and compared it with other closely related taxa. Due to the lack of preserved carapace, the generic and species identification of the Bulgarian remains is based on comparisons with the thoracic appendages revised by Devillez and Charbonnier (2019). Hence, the available Bulgarian P1 propodus is very similar in morphology to the original of Ferry (1865, pl. 7, figs 1–2) from the Bajocian at Solutré (France), which is the holotype for *Bolina etalloni* (see Devillez and Charbonnier, 2019, fig. 5E). The Bulgarian P1 carpus and merus are morphologically very similar to the equivalent

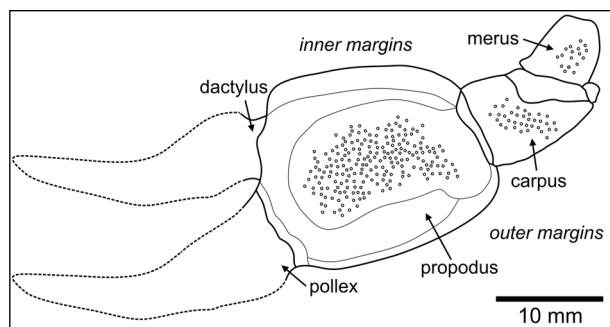


Fig. 4. Reconstruction of the chela of *Eryma compressum* (Eudes-Deslongchamps, 1842) from the upper Bajocian of the area of Prauzhda Village (NW Bulgaria). The fingers were restored following Devillez and Charbonnier (2019).

elements of the original specimen of Quenstedt (1858, pl. 53, figs 5–6) from the Aalenian at Aalen (Germany), which is the holotype for *Glyphea aalensis* (Devillez and Charbonnier, 2019, fig. 5D).

Hyžný *et al.* (2015) opined that *Eryma* Meyer, 1840 and *Erymastacus* Beurlen, 1928 are names that accommodate erymid lobsters, which differ sufficiently from each other, and therefore represent distinct genera. This opinion was argued and supported by abundant and well-preserved material. An emended diagnosis for *Erymastacus* was also made (*ibid.*). Following the emended diagnosis for the thoracic appendages of *Eryma*, however, and also in accordance with the opinion of Devillez and Charbonnier (2019), who, among others, argued that *Erymastacus* is a junior subjective synonym of *Eryma*, we refer our specimens to *Eryma*.

Occurrence. As stated by Devillez and Charbonnier (2019), *Eryma compressum* is an erymid species, which is common in the Middle Jurassic strata

of Western Europe, but also occurs in Iran and Morocco. Detailed information on the stratigraphical distribution and known localities can be found in the work of Devillez and Charbonnier (2019), and nothing can be added.

CONCLUDING REMARKS

Despite being represented by single elements, the erymid lobster described herein is valuable, since it documents the presence of a fossil group that still remains poorly recorded in the Jurassic of Eastern Europe. The abundant erymid faunas from elsewhere suggest that these decapods were an important component of the fossil assemblages of the Jurassic across Europe and beyond. The scarcity of the Bulgarian material does not allow for deeper understanding and conclusions; nevertheless, it is of interest in the framework of the overall Jurassic fossil record, as it seems to be an echo of times of significant diversification of crustaceans.

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