New look at the lobster *Eryma greppini*, Oppel, 1861 (Crustacea, Decapoda, Erymidae) from the Middle Jurassic of France and Switzerland

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With 5 figures

**Abstract:** Erymid lobsters (Decapoda, Erymidae) are a relatively abundant family of decapod crustaceans with a presumed conservative morphology. For these reasons, numerous species of erymids have been synonymized with others by early efforts to review the family. *Eryma greppini* Oppel, 1861, is one of these. A well-preserved specimen of erymid lobster assigned to this species has recently been traced in the palaeontological collections from the Université Claude Bernard Lyon 1 (France). Study of this specimen and examination of the type material of *Eryma greppini*, *Eryma affinis* Ferry, 1865, and *Eryma bedeltum* (Quenstedt, 1857) lead us to consider *Eryma greppini* to be a valid species, characterized by a peculiar pair of dorsal domes. A lectotype is herein designated for *Eryma greppini*. This study is a first step toward the necessary revision of erymid lobsters and proves the importance of taxonomic studies based on type material.

**Key words:** Crustacea, Erymidae, *Eryma*, lobsters, preservation, lectotype, Jurassic, Bathonian, France, Switzerland.

1. **Introduction**

The Jurassic is an important period for the decapod crustaceans with a major diversification of reptantian crustaceans, lobsters in particular (Wahle et al. 2012; Klompmaker et al. 2013). Glypheoid, erymoid and polyehelidan lobsters are relatively abundant and diverse in Jurassic deposits of Europe (e.g., Van Straelen 1925; Förster 1966; Garassino & Schweigert 2006; Charbonnier & Garassino 2012; Charbonnier et al. 2013). However, a great number of these lobsters are known only from Konservat-Lagerstätten such as at Osteno (Sinemurian, Italy; Garassino 1996), La Voulte-sur-Rhône (Callovian, France; Charbonnier 2009; Charbonnier et al. 2010), and from the renowned Solnhofen Lithographic Limestones (Kimmeridgian-Tithonian, Germany; Schweigert et al. 2000; Garassino & Schweigert 2006; Audo et al. 2014). Some fossil lobsters do not come from localities with exceptional preservation but may present connections between carapace and pleon or carapace and pereiopods such as in the Aalenian of France (Hyžný et al. in prep.) or in the Oxfordian nodules of France (Charbonnier et al. 2012). Unfortunately, most of the time, only isolated carapaces or chelae are usually found (e.g., Schweigert 2013), which makes difficult the specific determination and the identification of intraspecific variations and of possible sexual dimorphism and/or heterochely. Erymid lobsters (Erymidae Van Straelen, 1925) do not constitute an exception to the rule and the knowledge of the group is mainly based upon the carapace. Between 1840 and 2014, more than 150 species of erymid lobsters have been described (see Förster 1966; De Grave et al. 2009; Schweitzer et al. 2010) and nu-
Numerous systematic problems have accumulated in the literature: problems of nomenclature, species validity, type species designations, synonymies, type material having been lost during the wars in the twentieth century, heterogeneity in the descriptive terminologies and misquotations of previous studies.

The last global contribution on erymid lobsters was that of Förster (1966) who emphasized the fact that the members of the family Erymidae – notably the genus Eryma Meyer, 1840 itself – present an extremely conservative and constant morphology throughout the time. As a consequence, since Förster (1966), studies dealing with erymid lobsters remained purely descriptive and lacked in-depth reviews of the group or taxonomic work on previously described species. This situation leads to a situation that can be called the “erymid problem”: the conception of the whole group remains uncompleted.

The present work illustrates this tenuous situation, by the rediscovery of a well-preserved specimen of erymid lobster from the Middle Jurassic of France and Switzerland, which is accompanied by numerous taxonomic issues, highlighting the necessity of a major revision of erymids.

2. Previous work and material

Erymid lobsters from the Middle Jurassic of France and Switzerland have been subject of systematic studies since the 19th century. They were discussed by Étallon (1859, 1861), Oppel (1861, 1862), Mérière (1882, 1888), Méchin (1901), Lissajous (1907, 1923), Hée (1924), Van Straelen (1925), Förster (1966), Crônier & Courville (2004), and Charbonnier et al. (2010).

Lissajous (1907) published a well-preserved erymid lobster collected by his wife in the Bathonian limestones from Hurigny (Saône-et-Loire, France) (Fig. 1). This specimen has recently been traced in the palaeontological collections of the Université Claude Bernard Lyon 1 (Villeurbanne, France), by the first author. The re-determination of this specimen leads the authors to revise the following species: *Eryma greppini* Oppel, 1861, *Eryma affinis* Ferry, 1865, and *Eryma bedeltum* Quenstedt, 1857.

The studied material is composed of (1) specimen FSL 170597 (Lissajous coll.) (Figs. 2-3) published by Lissajous (1907), (2) type material of *Eryma greppini* (MJSN Col.Del.1 & Del.475, Greppin coll.) (Fig. 4).
from the Bathonian of Vellerat, Delémont (Jura, Switzerland), (3) type material of Eryma affinis (syntypes MNHN.F.A29727, A29728, A29731;Dé Ferry coll.) from the Bathonian of Fuissé and Milly-Lamartine (Saône-et-Loire, France), and (4) type material of Eryma bedeltum (lectotype GPIT/43/53-5; designation by Förster 1966: 97) (Fig. 5) from the Bajocian of Balingen (Baden-Württemberg, Germany). One of the co-authors (G. Schweigert) noted that, concerning the lectotype of E. bedeltum, this specimen must come from an ironoolitic bed of the Middle Jurassic. In the vicinity of Balingen only the Subfurcanenooolith Bed (Upper Bajocian, Niortense Zone) of the Ostreenkalk Formation shows exactly this lithology.

Institutional abbreviations: FSL, Université Claude Bernard Lyon 1 (Villeurbanne, France); GPIT, Department of Geosciences University of Tübingen (Germany); MJSN, Musée jurassien des sciences naturelles (Porrentruy, Switzerland).

Anatomical abbreviations: Mx3, third maxilliped; P1–P5, pereiopods 1 to 5; s1–s6, pleonal somites 1 to 6.

3. Systematic palaeontology

Order Decapoda Latreille, 1802
Superfamily Erymoidea Van Straelen, 1925
Family Erymididae Van Straelen, 1925

Genus Eryma Meyer, 1840

Type species: Macrourites modestiformis Schlötheim, 1822, by subsequent designation of Glaessner (1929: 150).

Eryma greppini Oppel, 1861
Figs. 2-4

1861 Eryma Greppini Oppel, p. 357.
1862 Eryma Greppini. – Oppel, p. 27-28, pl. 4, figs. 8-9.
1907 Eryma Greppini. – Lijsaouès, p. 66.
1923 Eryma affinis. – Lijsaouès, p. 35-37, pl. 1, fig. 4.
1925 Eryma Greppini. – Van Straelen, p. 245-247, fig. 114.
1928 Clytia Greppini. – Beurlen, p. 168.
1966 Eryma sp. – Förster, pl. 14, fig. 13.
2004 Eryma greppini. – Crônier & Courville, p. 1007.

Type material: Lectotype herein designated, MJSN Col. Del.475 (Greppin coll., Fig. 4A-D) and paralectotype MJSN Col.Del.1 (Greppin coll., Fig. 4E-F).

Type locality: Vellerat, Delémont, Jura, Switzerland.
Comments: Our examination of the type material of *Eryma greppini* confirms that the morphological characters of this species are those of *Eryma*. Indeed, the carapace groove pattern is diagnostic of *Eryma*: the cervical groove is oblique, the gastro-orbital groove is short with one single branch, and the postcervical groove is joined only medially to the branchiocardiac groove. The intercalated plate is also a typical character preserved in many erymid lobsters. Moreover, the wide cephalic region shows two inclined rows of tubercules with distal antennal and orbital spines.
respectively. The first pereiopods are massive and shows the typical pattern of chelate appendages, notably with laterally flattened palms and elongate fingers.

After Oppel (1861), the original type material was composed of two syntypes (Fig. 4). We consider it important to select a lectotype for Eryma greppini because Oppel (1861) did not designate a holotype. This is the carapace MJSN Col.Del.475 (Greppin coll.) from Vellerat, Switzerland (Fig. 4A-D). In our opinion, carapaces carry more significant taxonomic characters and are therefore more potent in discriminating a species than chelae, whose shapes are highly affected by ecological parameters.

4. Discussion
Lissajous (1907) figured specimen FSL 170597 from the Bathonian of Hurigny (Saône-et-Loire, France). He identified this specimen as Eryma greppini, but with some doubts. Lissajous (1923) figured a second time the same specimen and then identified it as Eryma affinis Ferry, 1865. Examination of the three syntypes of Eryma affinis (MNHN.F.A29727, A29728, A29731; de Ferry coll.) shows that (1) the pair of dor-
S. Charbonnier et al.

Sal domes located near the intercalated plate is absent in *E. affinis*, and (2) the carapace endocuticule is pitted in *E. affinis* and finely granular in *E. greppini*. The identification proposed by Lissajous (1923) is therefore erroneous.

According to Van Straelen (1925), and after the examination of the type material of *Eryma greppini*, specimen FSL 170597 is identified as *Eryma greppini* based upon the following characters: pair of dorsal domes, similar carapace ornamentation, P1 chelae with identical design (index with smooth occlusal margin and dactylus with a row of strong occlusal teeth).

Förster (1966) synonymized a wide array of erymid species with *Eryma bedeltum* (Quenstedt, 1857) including *Eryma greppini* and also the aforementioned specimen. This synonymy was questioned by Crönier & Courville (2004) and maintained by Schweitzer et al. (2010).

**Fig. 4.** Type material of *Eryma greppini* Oppel, 1861, from the Bathonian of Vellerat, Delémont (Jura, Switzerland). A-D – Lectotype herein designated MJSN Col.Del.475 (Greppin coll.), carapace in right lateral (A), left lateral (B) and dorsal (C) views, and original figures (D) by Oppel (1862: pl. 4, fig. 9a,b). E-F – Paralectotype MJSN Col.Del.1 (Greppin coll.), pair of first chelae, inner view (E), and original figure (F) by Oppel (1862: pl. 4, fig. 8). Photographs: D. Becker.
New look at the lobster *Eryma greppini*, Oppel, 1861

**5. Conclusion**

Based upon a specimen figured by Lisjous (1907), the present study elucidates the true nature of *Eryma greppini*, known only from three specimens. It recognizes an independent specific status of *Eryma greppini*, which has been for a long time regarded as a junior subjective synonym of *Eryma bedeltum*. This study highlights that an examination of the type material of all type species is necessary. Such a fundamental and systematic review is inevitable, returning to the original primary bibliographical data.

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