

# A new Early Jurassic lobster (Decapoda: Glypheoidea: Glypheidae) from Lyme Regis, England

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## Abstract

Examination of a single specimen of glypheoid lobster from the collections of The Natural History Museum, London, warrants designation of a new species, *Glyphea macromuscula*. The specimen, collected from Lyme Regis, Dorset, UK, increases the number of Early Jurassic glypheids to eleven, and the number of species of *Glyphea* from the United Kingdom to six.

*Key words:* Decapoda, Glypheoidea, Early Jurassic, England

## Introduction

The Jurassic rocks of the Lyme Regis area along the southern coast of England are among the most famous collecting localities in the world. The discovery of a single specimen of glypheid lobster from Church Cliffs, just east from the center of the town, by Mr. Mike Sanders in 1968, added yet another new species to the array of fossils from the area. Yet it remained unidentified and undescribed until it was brought to the attention of the authors. Previously, it had been suggested to be similar to, but not *Pseudoglyphea* or *Glyphea*, by A. J. Ross and P. Davis. Their insight prompted further study of the specimen and recognition of it as a new species, hence, this report.

## Systematics

Infraorder Glypheoidea Winkler, 1882

Superfamily Glypheoidea Winkler, 1883

Family Glypheidae Winkler, 1883

*Included fossil genera:* *Cedrillosia* Garassino, Artal, and Pasini, 2009; *Glyphea* Von Meyer, 1835; *Litogaster* Von Meyer, 1847; *Paralitogaster* Glaessner, 1969; *Squamosoglyphea* Beurlen, 1930; *Trachysoma*, Bell, 1858.

*Diagnosis:* Subcylindrical carapace, slightly compressed laterally, with longitudinal cephalic carinae; short or long rostrum; cervical groove well-developed, oriented at over 70° angle to dorsal surface of carapace, extending from dorsal surface to position beyond half-height of cephalothorax; postcervical groove variable, converging with branchiocardiac groove either dorsally and ventrally or only ventrally; branchiocardiac groove at less than 70° angle to dorsal carapace; hepatic groove sometimes present, inferior groove present; pleonal somites generally smooth, rarely with transverse keels, with triangular pleural terminations, subrectangular telson; exopodite with diaeresis; third maxillipeds long, pediform; pereopod 1 pseudochelate, pereopods 2–4 pseudo- or achelate, pereopod 5 with

terminal dactylus.

*Discussion:* Glypheidae is a long-ranging family, having originated in the Early Triassic in the form of *Paralitogaster* Glaessner, 1969, in Idaho, United States. The family has persisted into recent times in the form of *Neoglyphea* Forest and de Saint Laurent, 1975, and *Laurentaeglyphea* Forest, 2006. The specimen in question conforms to the definition of the family in all characters preserved on it; absence of the pleon and lack of details of the terminations of the pereopods render those aspects of the definition impossible to test. The only family whose genera might be confused with those of Glypheidae is Mecochiridae; however, species within the latter family typically exhibit parallel or nearly parallel postcervical and branchiocardiac grooves, and they generally lack an inferior groove. The grooves in mecochirids do not extend as far ventrally as they do in typical glypheids.

Genus *Glyphea* Von Meyer, 1843

*Type species:* *Palinurus regleyanus* Desmarest, 1822, by subsequent designation of Glaessner (1969).

*Included species:* See Schweitzer et al. (2010). In addition to the species listed therein, we include *Glyphea tomesi* Woodward, 1868, and the new species, *G. macromuscula*.

*Diagnosis:* Strongly tuberculate subcylindrical carapace, with median suture; short rostrum lacking both supra- and subrostral spines; two or three tuberculate longitudinal carinae in the gastric region; deep and sinuous cervical groove, joining the antennal grooves in the pterygostomial region, at >70° angle to dorsal surface of carapace; branchiocardiac groove and postcervical groove distinct, converging with one another both dorsally and ventrally, branchiocardiac groove at less than 70° angle to dorsal surface; hepatic groove (sensu Holthuis, 1974) connects cervical and postcervical/branchiocardiac grooves which are confluent at this level; pereopod 1 isochelous, pseudochelate; pereopods 2–4 may be pseudochelate or achelate; pereopod 5 with terminal dactylus; telson rectangular, exopodite of uropod with diaeresis.

*Discussion:* The genus is the most speciose among Glypheoidea. Currently, *Glyphea* is undergoing a revision (A. Garassino, personal commun. to RMF, 2011) which may result in definition of new genera. At present, the specimen in question conforms to the characters in the current generic diagnosis of *Glyphea* more than it does with other glypheid genera. The cervical groove on species of *Cedrilloxia* and *Trachysoma* are nearly at right angles to the dorsal surface, and the former genus also exhibits a distinctive accessory branchiocardiac groove (Garassino et al., 2009, p. 205). Species of *Litogaster* and *Paralitogaster* bear three longitudinal carinae on the cephalic region,

whereas the studied specimen has only two. Additionally, *Litogaster* spp. have parallel postcervical and branchiocardiac grooves; those grooves on the present specimen converge anteriorly and posteriorly. The heavily imbricated ornamentation on the surface of the cephalothorax, the beaded dorsum, and the deep postcervical groove on species of *Squamosoglyphea* readily distinguish it from *Glyphea* spp.

***Glyphea macromuscula* new species**

(Fig. 1)

*Diagnosis:* Carapace relatively short for genus; two granular carinae

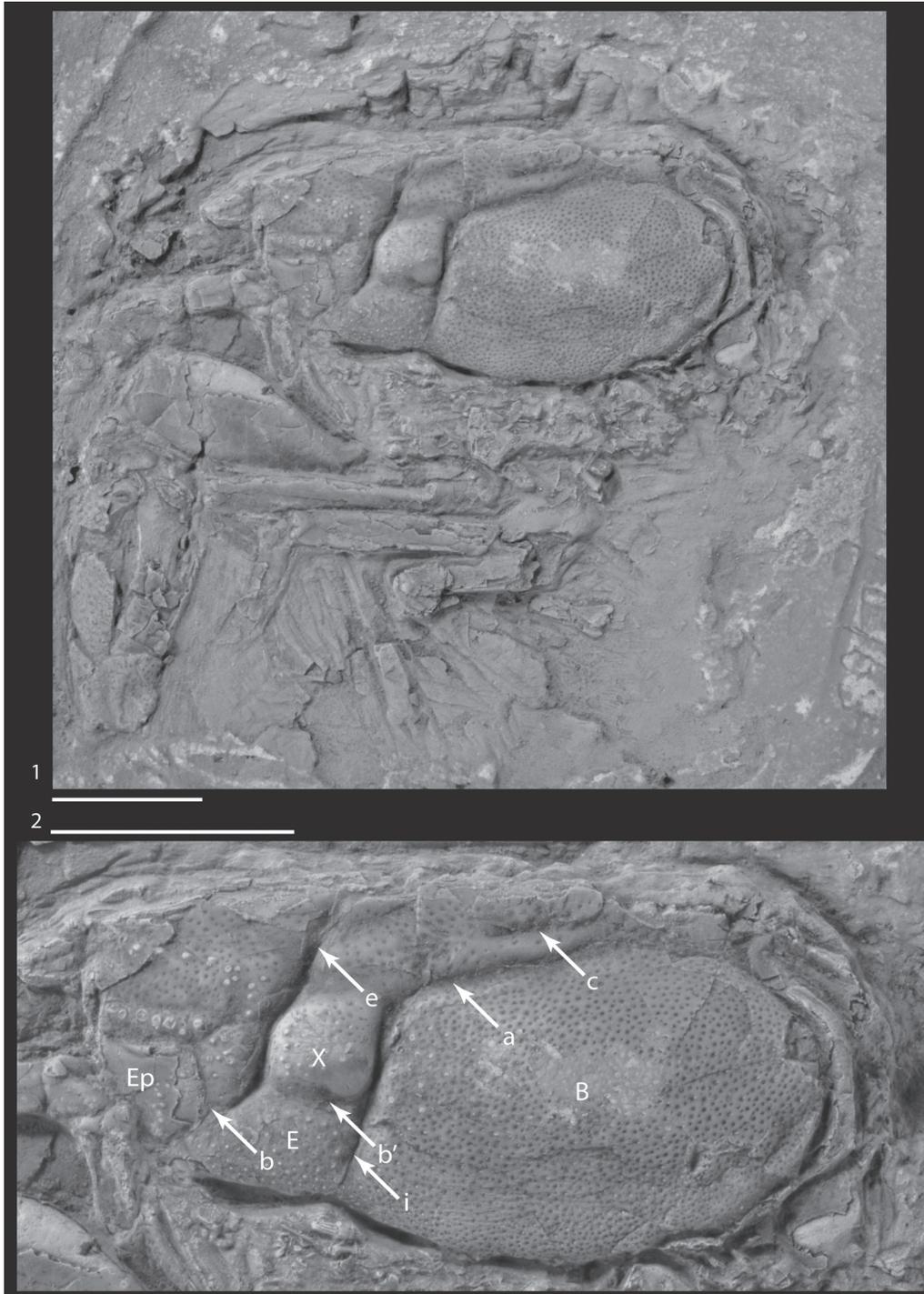


Fig. 1. *Glyphea macromuscula* n. sp. 1, Left lateral view of entire specimen. 2, Close-up of the cephalothorax indicating position of carapace grooves and carapace regions. a = branchiocardiac groove, b = antennar groove, b' = hepatic groove, c = postcervical groove, e = cervical groove, I = inferior groove, B = branchiostegite, E = epibranchial region, Ep = epistome (displaced fragment), X = musculus adductor testis. Scale bars = 1 cm.

on cephalic region; postcervical groove less well-developed than branchiocardiac groove, interrupted near anterior end; very prominent, inflated, rectilinear musculus adductor testis region.

*Description:* Carapace with well defined regions and generally deep, narrow grooves. Cephalic region and rostrum broken and rostrum not present; carapace surface punctuate and finely granular locally.

Carapace longer (31.3 mm), measured from posterior margin to estimated position of orbital notch, than high (16.7 mm) measured at approximately midlength of branchiostegite. Dorsal margin straight, at least 27.5 mm long. Front broken. Ventral margin biconvex with weak inflection at inferior groove; ventral margin of branchiostegite smoothly convex. Posterior margin strongly convex ventrally, becoming concave near dorsal termination; strong postmarginal carina and groove.

Cephalic region broken but appears to be short; cervical groove crosses midline 18.3 mm from posterior corner of dorsal surface. Supraorbital carina defined only by row of 5 or 6 coarse granules inclined posteroventrally. Antennal carina with row of 6 coarser granules inclined slightly posteroventrally. A smooth region, rimmed dorsally, with a row of fine granules oriented perpendicular to the midline lies ventral to antennal groove; however, that area is broken, displaced, and difficult to interpret, but appears to be a displaced part of the epistome. Subtle swellings lie between posterior terminations of postorbital and antennal carinae and cervical groove. Surface of cephalic region punctuate dorsal to antennal carina.

Cervical groove biconcave forward, intercepts midline at about 73° angle, becoming convex forward at midheight and curving anteroventrally to antennal groove.

Branchiocardiac groove steeply inclined ventrally, at angle of about 82° to midline and curving abruptly to low angle, about 15°, as it approaches midline, deeply incised. Postcervical groove less distinct, nearly parallels branchiocardiac groove posteriorly, becomes obscure near anterior termination at which point postcervical groove curves ventrally to terminate against branchiocardiac groove just posterior to inflection in branchiocardiac groove.

Prominent, straight hepatic groove (*sensu* Holthuis, 1974) joining branchiocardiac and cervical grooves is situated about 2/3 carapace height from dorsum and defines ventral edge of prominent rectilinear swelling (musculus adductor testis) 4.9 mm in dorso-ventral direction and 4.6 mm longitudinally. Inferior groove deep, long, straight, inclined weakly anteroventrally. Hepatic and inferior grooves define dorsal and posterior margins of weakly swollen epibranchial area.

Branchiostegite smoothly inflated, lacking carinae, and uniformly punctuate.

Pleon not preserved.

Maxilliped 3 elongate, smooth, pediform.

Pereiopod 1 with stout merus becoming higher distally; surface smooth. Carpus obscure but appears to be short, triangular, and with 3 distally directed spines on distal margin. Propodus long, >17.6 mm, highest at about midheight, uniformly granular; distal end and dactylus not preserved. Remaining pereiopods displaced away from carapace, fragmentary, slender, smooth; meri of pereiopods 2 and 3 long, slender. Termination of pereiopods not preserved.

*Etymology:* The trivial name alludes to the highly swollen musculus adductor testis region which is unique among representatives within the genus. The gender is feminine.

*Holotype:* The holotype, and sole specimen, NHM IC 624, is deposited

in The Natural History Museum, London, UK.

*Occurrence:* The holotype was collected by Mike Sanders in 1968 from Early Jurassic (Lias) rocks near the base of Church Cliffs, Lyme Regis, Dorset, England, Lat. N50°43.5' (50.726), Long. W2°55.6' (-2.929). Sanders donated the specimen to The Natural History Museum in 2007.

*Discussion:* Placement of this specimen in *Glyphea* is based upon the conformation of the carapace grooves, the keeled cephalic region, the presence of a well developed epibranchial region that appears to extend anteriorly beneath the cephalic region, and the narrowing of the cephalothorax in the cephalic region. Although poorly and incompletely preserved, the first pereiopod also seems to be robust, shows no signs of being chelate, and is similar to that seen on other glypheids.

The overall lack of coarse ornamentation is one feature that distinguishes *Glyphea macromuscula* n. sp. from other members of the genus. The surface of the cephalothorax is uniformly punctuate over the branchiostegite and the dorsal part of the area between the cervical and branchiocardiac grooves. The musculus adductor testis region and the epibranchial region are finely granular. The only coarse granules are seen on the two cephalic carinae. The remainder of the cephalic region is covered by punctae that are more widely spaced than those on the branchiostegite.

Although the inferior groove tends to be concave forward in most species of *Glyphea*, that of *Glyphea macromuscula* is straight and nearly perpendicular to the long axis of the cephalothorax. The feature that is most distinctive and that supports recognition of a new species is the prominent, highly swollen, rectilinear musculus adductor testis region. Although defined on other species of *Glyphea*, we know of no other species on which it is so strongly developed. The possibility of a parasitic infestation producing the swelling was considered but ruled out. Swelling produced by bopyrid isopods invariably seem to occur in the branchial region of decapods. Early literature on their occurrence has been discussed by Feldmann (2003) and literature therein. Subsequent to that work, additional reports of bopyrids in a variety of Jurassic crabs have been noted (Schweitzer and Feldmann, 2007, 2009, 2010, 2011). Based upon examination of these occurrences, it seems highly unlikely that the strongly developed musculus adductor testis region in *Glyphea macromuscula* is pathological.

Variation of morphology among species of *Glyphea* is considerable, and the preservation of some specimens is incomplete to the point that detailed comparison is difficult. Recognition of the large number of named species and the range of their variation has prompted a revision of the genus (Garassino, personal commun. to RMF, 2011). To provide a comparison of Jurassic taxa with *Glyphea macromuscula*, a table of some of the significant characters has been prepared (Table 1). Although the tabulation documents the unique plexus of characters in the new species, it is not prudent to draw conclusions about most closely related taxa; that must await more comprehensive analysis. In preparing the tabulation, it was noted that *Glyphea tomesi* Woodward, 1868, was referred to *Trachysoma*, Bell, 1858, by Schweitzer et al. (2010). Examination of illustrations and the description of that species, however, suggests that it is best placed in *Glyphea*. Thus, it appears in Table 1 as a species of that genus.

Among the Jurassic occurrences of *Glyphea* (Table 1), only three species have been described from Early Jurassic occurrences in England; however, none is known from the vicinity of Lyme Regis. *Glyphea tomesi* has been reported from the vicinity of Bath, in Avon,

Table 1. Compilation of diagnostic characters of morphology of the cephalothorax of Jurassic species of *Glyphea* \*denotes and Early Jurassic occurrence, + denotes an occurrence in the United Kingdom, 0 indicates absence of an accessory groove between the postcervical and branchiocardiac grooves, X denotes presence of the accessory groove.

Species	Cephalic carinae	Ornamentation	Accessory groove	Inferior groove
<i>Glyphea macromuscula</i> n. sp. *+	2	Weak	0	Straight
<i>G. robusta</i> Feldmann and McPherson, 1980 *	3	Granular	0	Arcuate
<i>G. muensteri</i> (Voltz, 1835)	3	Granular	X	Arcuate
<i>G. tomesi</i> Woodward, 1868 *+	3	Granular	0	Arcuate
<i>G. lyrica</i> Blake, 1876 *+	3	Weak	0	Arcuate
<i>G. prestwichi</i> H. Woods, 1929 *+	3	Granular, smooth cephalic	0	Arcuate
<i>G. regleyana</i> (Desmarest, 1822) (type)+	4?	Branchiocardiac coarse, smoother front	X	Arcuate
<i>G. ambigua</i> (Von Fritsch, 1870) *	2	?	0	Arcuate
<i>G. liasina</i> Von Meyer, 1840 *	3	?	0	Arcuate
<i>G. mazelieri</i> Héé, 1924 *	?	?	0	Arcuate
<i>G. solitaria</i> Oppel, 1861 *	3	Granular	0	Arcuate
<i>G. pseudoscyllarus</i> (Schlotheim, 1822)	4	Coarsely granular	0	?
<i>G. gussmani</i> Schütze, 1907 *	3	Granular	X	Arcuate
<i>G. jurensis</i> Oppel, 1861	4	Granular	?	Straight
<i>G. bicarinata</i> Van Straelen, 1925 *	2	Granular	0	Arcuate
<i>G. crassa</i> Oppel, 1861	3	Granular	X	Arcuate
<i>G. bathonica</i> de Ferry, 1865	3	Granular	X	Arcuate
<i>G. spinulosa</i> Van Straelen, 1925	3	Coarse granular	0	Arcuate
<i>G. riasi</i> Van Straelen, 1925	3	Granular	0	Arcuate
<i>G. ferruginea</i> Blake and Hudleston, 1877+	2	Finely granular	0	Biconcave
<i>G. eureka</i> Damborenea and Manceñido, 1987 *	3	Granular	0	Arcuate
<i>G. rosenkrantzi</i> Van Straelen, 1929	4	Coarse granular	0	?
<i>G. serratosai</i> Dupuy-Revilla, 1956	3	Finely granular	X	Arcuate
<i>G. vlohli</i> Polz, 2000	3	?	0	?
<i>G. magnevillii</i> (Eudes Deslongchamps, 1835)	Poorly preserved and partial			
<i>G.? meyeri</i> De Tribolet, 1875	Specimen not located			

and Stratford-on-Avon, Warwick (Woods, 1929). *Glyphea lyrica* and *G. prestwichi* were described from specimens collected in Yorkshire (Woods 1929). None of these species has an enlarged musculus adductor testis, and all exhibit three cephalic carinae and an arcuate inferior groove. Thus, the new species could not be confused with any of them.

#### Acknowledgments

Loan of the specimen was made possible by A. Ross, then at The Natural History Museum, London. C. Mellish, The Natural History Museum, London, secured a catalogue number for the specimen and provided detailed information regarding the locality of Church Cliffs, Lyme Regis. Examination of comparative specimens in various

European museums was supported by NSF DEB EF 0531674 to Feldmann and Schweitzer.

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