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New report of *Glypheopsis robusta* (Feldmann & McPherson, 1980) (Crustacea, Decapoda, Glypheidae) from the Middle Jurassic of British Columbia, Canada

Alessandro Garassino, Sylvain Charbonnier, Torrey Nyborg & John Fam

Abstract

We report the glypheoid lobster, *Glypheopsis robusta* (Feldmann & McPherson, 1980) (Glypheidae Zittel, 1885) from the Middle Jurassic (Bajocian – Bathonian) of British Columbia. The fossil record of this species is very rare in Canada, limited to date to the type locality located in the Prince Patrick Island (Northwest Territories). This new report enlarges the palaeogeographic distribution of this species, representing the second occurrence in North America.

Keywords: Crustacea, Decapoda, Glypheidae, Middle Jurassic, British Columbia, Canada.

1. Introduction

Glypheoid lobsters form a specialized group of decapod crustaceans that is highly diversified in the fossil record. They appeared in the Triassic, prospered in the Jurassic, declining between the Cretaceous and the Eocene. This group was considered extinct in the Eocene until the discovery of two extant species from the Pacific area (Forest & de Saint Laurent 1975; Richer de Forges 2006). By 2013, more than 120 species of glypheoid lobsters had been described causing numerous systematic problems in the literature, such as problems of nomenclature, species validity, type species designations, and synonymies. Consequently Charbonnier et al. (2013) proposed a general review of fossil glypheoid lobsters based upon the type specimens in order to establish an updated view of the group. At the same time the development of phylogenetic analyses allowed neontologists and palaeontologists to test placement of glypheoid lobsters into various evolutionary schemes, but without reaching a definitive solution regarding the systematic placement of this group. Indeed, though Karasawa et al. (2013) and Charbonnier et al. (2015) proposed different classifications of Glypheidea, the position of the fossil glypheoid lobsters among other reptant groups is still under debate. Based upon the review provided by Charbonnier et al. (2013) the family Glypheidae Zittel, 1885 is known from Canada by just two reported species: *Glypheopsis robusta* (Feldmann & McPherson, 1980) from the Middle Jurassic (Bajocian) of Prince Patrick Island (Northwest Territories) and *Angarestia jeletzkyi* (Feldmann & McPherson, 1980) from the Lower Cretaceous (late Barremian or Aptian) of the Longstick Creek canyon (northern Richardson Mountains, Northwest Territories).

Herein we report a new specimen of glypheoid lobster within the Glypheidae, *Glypheopsis robusta* from the Lower to Middle Jurassic Hazelton Group (British Columbia). This new specimen is the second report for this species, enlarging its palaeogeographic distribution.

2. Geological setting

The studied specimen was collected by S. P. Gordy for Tom Richards in June of 1973 from a calcareous concretion. No other fossils were collected with this specimen. The locality was thought to be part of the late Callovian – early Oxfordian Ashman Formation (Tipper & Richards 1976; Woodsworth 1985; MacIntyre et al. 1989; Nelson & Kennedy 2007). However, the Ashman Formation was later shown to be divided between the Lower to Middle Jurassic Hazelton Group and the Middle to Upper Jurassic Bowser Lake Group (Evenchick et al. 2007, 2008a, 2008b, 2010; Gagnon & Waldron 2008; Gagnon et al. 2012).

Recent mapping places the locality where the studied specimen was collected within the Hazelton Group (Evenchick et al. 2008b) (Fig. 1). Gagnon et al. (2012) refined the stratigraphy of the Hazelton Group to Lower to Middle Jurassic, placing the previously recognized Ashman Formation within the Middle Jurassic as a subunit or member of the Smithers or Quock formations (see Gagnong et al. 2012: fig. 15 and explanation therewith). The Smithers Formation consists of medium- to fine-grained sandstone with a variety of marine fauna, including ammonoids, belemnites, gastropods, bivalves, and solitary scleractinian corals (Gagnong et al. 2012). The Smithers Formation is conformably overlain by the Quock Formation, which consists of siliceous mudstone

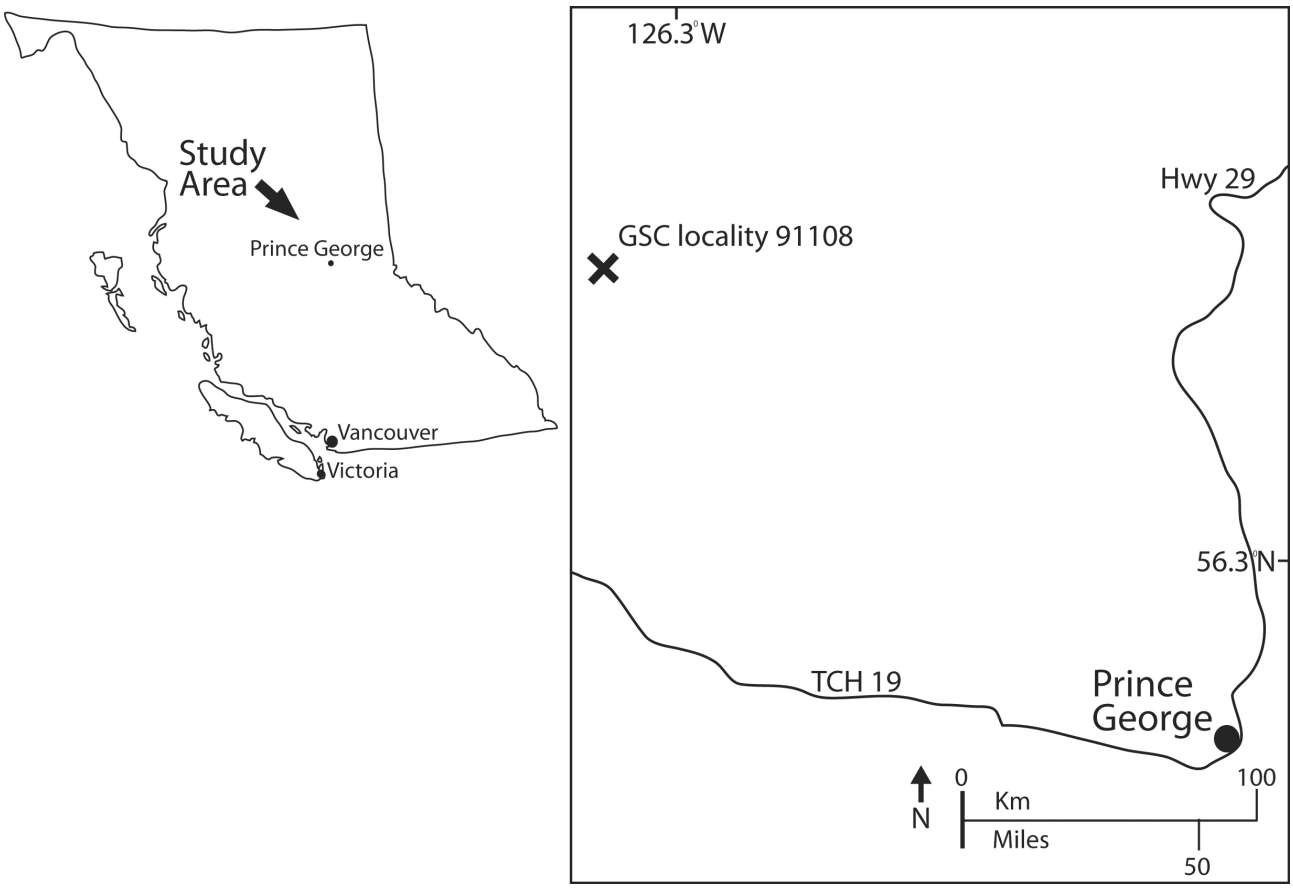

Fig. 1. Simplified locality line drawing showing outcrop where the new specimen of *Glypheopsis robusta* (Feldmann & McPherson, 1980) was collected indicated with an (X).

interbedded with tuff beds. The Quock Formation is distinguished from the Smithers Formation by its finer grain size, fewer bivalves, and sparse bioturbation (Gagnong et al. 2012). Gagnong et al. (2012) noted that belemnites and calcareous concretions were abundant in the upper half of the Quock Formation. The studied specimen was preserved within a calcareous concretion and therefore its best estimated age would be Bajocian – Bathonian, based upon the most recent work by Gagnong et al. (2012).

3. Material

One specimen three-dimensionally preserved within a calcareous concretion. The concretion is split in half preserving portions of the carapace on either half of the concretions as main part and counterparts (Fig. 2). The studied specimen is housed in the Geological Survey of Canada, Ottawa, Ontario (Canada).

Abbreviations: GSC: Geological Survey of Canada, Ottawa (Ontario, Canada), Type Specimens Collections to National Repository; GSC locality: Geological Survey of Canada locality identification number; a: branchiocardiac groove; ac: antennal carina; b: antennal groove; b_i: hepatic groove; c: postcervical groove; cd: cardiac groove; dm: dorsal margin; e_ie: cervical groove; gc: gastro-orbital carina; i: inferior groove; ic: intercervical groove; lcxp: carapace length; pm: posterior margin; oc: orbital carina; vm: ventral margin; wcxp: carapace width.

4. Systematic palaeontology

Infraorder Glypheidea Zittel, 1885

Superfamily Glypheoidea Zittel, 1885

Family Glypheidae Zittel, 1885

Genus *Glypheopsis* Beurlen, 1928

Type species: *Orphnea ornata* Quenstedt, 1857, subsequent designation by Glaessner (1929).

Included species: See Charbonnier et al. (2013: table 5).

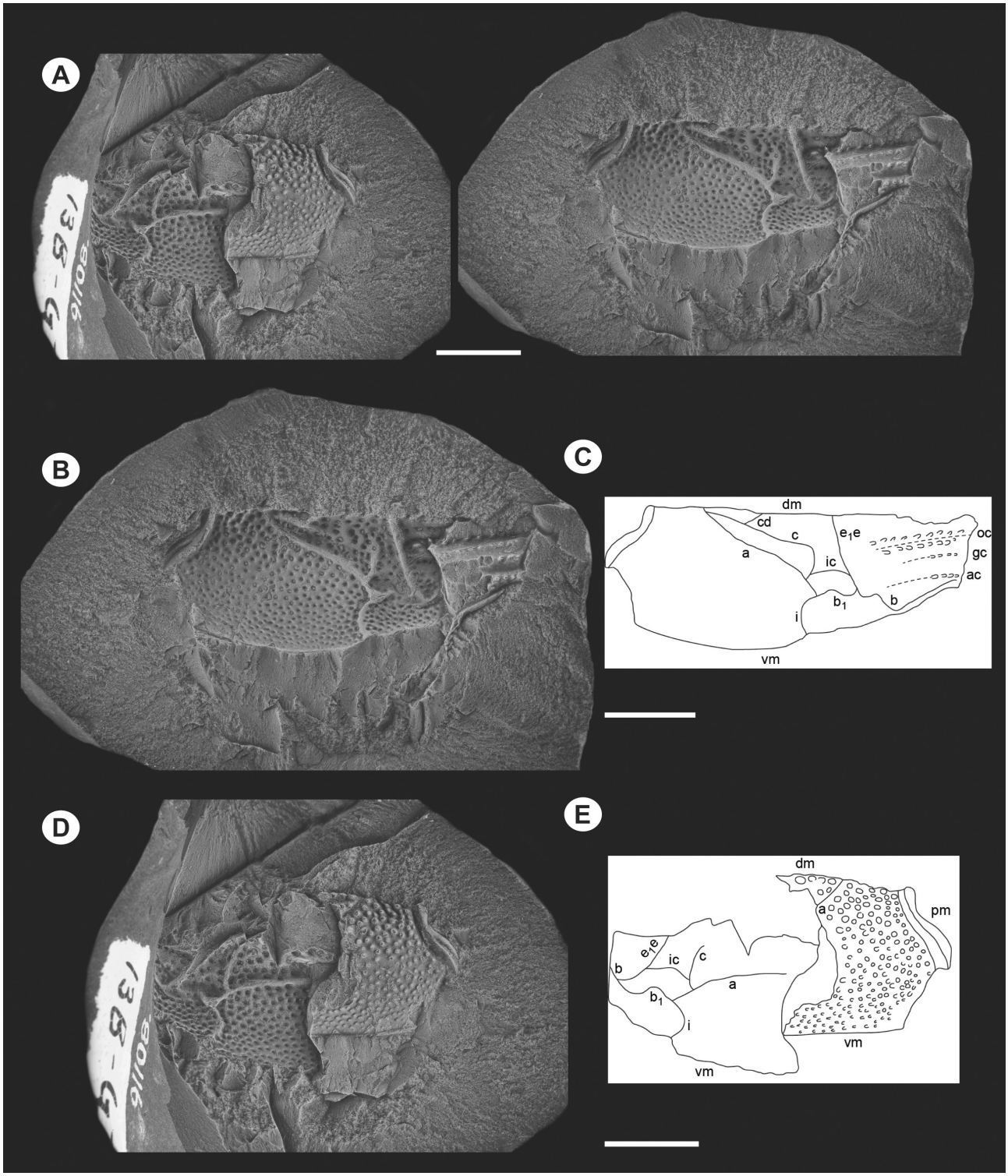

Fig. 2. *Glypheopsis robusta* (FELDMANN & MCPHERSON, 1980), GSC 140527. **A** – concretion preserving two halves of dorsal carapace, main part (right) and counterpart (left); **B** – Close-up view of carapace (main part). **C** – Interpretative line drawing of carapace (main part). **D** – Close-up view of carapace (counterpart). **E** – Interpretative line drawing of carapace (counterpart). Scale bar: 1 cm.

Glypheopsis robusta (Feldmann & McPherson, 1980)
Fig. 2

*1980 *Glyphea robusta*. – Feldmann & McPherson, pp. 8–10, figs. 3–5, pl. 2, figs. 8, 9, pl. 3, figs. 2–7.
1996 *Glyphea robusta*. – Garassino, p. 346.
1997 *Glyphea robusta*. – Feldmann & Gaździcki, p. 443.
2001 *Glyphea robusta*. – Schweitzer & Feldmann, p. 177.
2002 *Glyphea robusta*. – Feldmann & de Saint Laurent, pp. 364, 369.
2008 *Glyphea robusta*. – Garassino et al., p. 48.
2010 *Glyphea robusta*. – Schweitzer et al., p. 18.
2013 *Glyphea robusta*. – Feldmann & Schweitzer, table 1.
2013 *Glypheopsis robusta*. – Charbonnier et al., pp. 139–141, figs. 292, 293.
2015 *Glypheopsis robusta*. – Charbonnier et al., tables 1, 2, figs. 3, 4.

Locality: GSC locality 91108, Hazelton (126° 32.4′W 55° 33.8′N), Kitimat-Stikine (British Columbia, Canada).

Geological age: Lower to Middle Jurassic Hazelton Group, probably collected from the Bajocian to Bathonian Quock Formation of the Hazelton Group.

Material and measurements: One specimen in lateral view. GSC 140527 – lcxp: ~ 40 mm; wcxp: 15.7 mm.

Description: *Carapace* – Subcylindrical carapace, laterally compressed; rostrum poorly preserved; cephalic region with three longitudinal spiny carinae: orbital, gastro-orbital, and antennal carinae; very deep cervical groove, steeply inclined, intercepting dorsal margin at angle of ca. 70° at distance one-third of total length of dorsal margin from anterior; cervical groove ventrally joined to deep antennal groove, delimiting very narrow cephalic region; ventral margin of antennal-pterygostomial region slightly concave; antennal groove strongly arched ventrally, forming weak raised antennal lobe; deep postcervical groove joined dorsally and ventrally to branchiocardiac groove, forming one narrow elongate lobe; shallow straight cardiac groove, inclined antero-dorsally and joined posteriorly to postcervical groove; deep branchiocardiac groove slightly sinuous, strongly inclined, intercepting dorsal margin of carapace at angle of *ca.* 30° at distance four-fifths of total length of dorsal margin from anterior; weak, slightly curved intercervical groove; deep hepatic groove, convex dorsally at intersection with branchiocardiac groove and concave at intersection with antennal groove; weakly inflated adductor muscle insertion area; deep inferior groove, convex posteriorly, joined to hepatic groove.

Ornamentation of carapace – All regions uniformly tuberculate except cephalic region, branchial region with larger tubercles dorsally, decreasing in size ventrally.

Discussion: According to Charbonnier et al. (2013) the studied specimen has been assigned to *Glypheopsis* for the combination of cardiac and intercervical grooves and the lack of the gastro-orbital groove. This genus includes 26 species from the Lower Jurassic (Sinemurian) to the Eocene (Bartonian) of Europe, North America (Canada, Greenland), New Zealand, and Antarctica Peninsula (Charbonnier et al. 2013). Based upon the fossil record for the genus, only one species, *G. robusta* (Feldmann & McPherson, 1980) has been reported from the Middle Jurassic (Bajocian) of the Prince Patrick Island (Northwest Territories, Canada). We justify the assignment of the studied specimen to *G. robusta* because it was collected from similar age deposits and it shares with this species the same carapace characters and ornamentation.

In conclusion, the discovery of this new specimen of *G. robusta* represents the second occurrence for the genus in North America, expanding its palaeobiogeographic distribution.

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