A new type of pylochelid sixth abdominal tergite (Anomura, Paguroidea) from the Upper Jurassic of Poland

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Oxfordian (Upper Jurassic) siliceous sponge-microbial reef strata in the southern Polish Uplands around Kraków have recently yielded two types of sixth abdominal tergites of pylochelid paguroids. We here add a third one, *Pylochelitergites exspectatus* sp. nov. These small-sized, operculiform remains have a high preservation potential and thus allow us to document the geological history of two families of symmetrical hermit crabs, the Pylochelidae and Parapylochelidae, in some detail.

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Introduction

Recently, Fraaije *et al.* (2012a) have documented several types of operculate sixth abdominal tergites of pylochelid paguroids from the Oxfordian and Kimmeridgian (Upper Jurassic) of southern Poland and southern Germany. For these small-sized, operculiform structures, those authors introduced a new (para-)taxonomy to accommodate three genera and six species. To date, Middle and Late Jurassic taxa comprise *Liocaris quadratus* Van Straelen, 1925, *Stagmacaris quenstedti* Schweigert, 2006, *Stagmaris adielklopmakeri* Fraaije, Krzemiński, Van Bakel, Krzemińska & Jagt, 2012a, *Stagmacaris biarcus* Fraaije, Krzemiński, Van Bakel, Krzemińska & Jagt, 2012a, *Pylochelitergites westbergensis* Fraaije, Krzemiński, Van Bakel, Krzemińska & Jagt, 2012a, and *Pylochelitergites gelasinus* Fraaije, Krzemiński, Van Bakel, Krzemińska & Jagt, 2012a. Previously, only carapaces of the symmetrical hermit crab family Pylochelidae had been described from strata of Late Jurassic age (Van Bakel *et al.*, 2008; Fraaije *et al.*, 2012b).
McLaughlin & Lemaitre (2009) presented a new classification for extant pylochelids and recognised three subfamilies, the Pylochelinae, Pomatochelinae and Trizochelinae. In the diagnoses of all genera then known within these subfamilies these authors supplied brief descriptions of the external morphology of the sixth abdominal tergites. Outlines of extant sixth abdominal tergites show a certain consistency within the subfamilies in being subrectangular to subquadrate in the Pylochelinae, rounded subquadrate in the Pomatochelinae and subcircular to subquadrate in the Trizochelinae.

Lately, a new family of symmetrical paguroids, the Parapylochelidae, has been erected by Fraaije et al. (2012c) on the basis of carapace morphology, to comprise some Late Jurassic representatives (see Fraaije et al., in press) and a single extant form, Parapylocheles scorpio Alcock, 1894. The outline of the sixth abdominal tergite in the latter is ellipsoidal (see Forest, 1987, p. 141, fig. 42). As far as can be determined at present, the genus Stagmacaris Schweigert, 2006 is best assigned to the Parapylochelidae, while Pylochelitergites Fraaije, Krzemiński, Van Bakel, Krzemińska & Jagt, 2012a can be referred with some confidence to the Pylochelidae.

Over 7,000 specimens of decapod crustacean remains from about a dozen localities within the southern Polish Uplands, west of Kraków, were collected over a period of two years by the Borek family of Dąbrowa Górnicza (southern Poland). The sixth abdominal tergite presented herein originates from this collection and has been transferred to the collections of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Kraków, Poland (ISEA).

**Systematic palaeontology**

**Infraorder Anomura MacLeay, 1838**
**Superfamily Paguroidea Latreille, 1802**
**Family Pylochelidae Bate, 1888**
**Genus Pylochelotergites Fraaije, Krzemiński, Van Bakel, Krzemińska & Jagt, 2012a**

*Type species* – *Pylochelitergites westerbergensis* Fraaije, Krzemiński, Van Bakel, Krzemińska & Jagt, 2012a, by original designation.

*Pylochelitergites exspectatus n. sp.*

Fig. 1.

**Diagnosis** – A medium-sized, very wide and smooth form of *Pylochelitergites* with long posterior notches that extend onto the anterior half.

**Derivation of name** – From Latin *exspectatus*, meaning ‘[to be] expected’, in allusion to the expected discovery of more types of paguroid sixth abdominal tergite.

**Type** – Holotype, and sole specimen known, is ISEA/MP/601/1502/08, a complete tergite; maximum length and width 3.0 and 2.5 mm, respectively.

**Locality and stratigraphy** – A large disused limestone quarry at Ogrodzieniec. On ammonite evidence, the section exposed there can be dated as early and middle Oxfordian.
With the exception of the discontinuous *Quenstedtoceras mariae* Zone, all zones and subzones from the *Cardioceras cordatum* to the *Gregoriceras transversarium* zones have been documented there (Głowniak, 2006; Starzyk et al., 2011).

**Description** – Subhexagonal tergite, convex in longitudinal and transverse sections; faint longitudinal median groove, most pronounced on posterior half but shallowing anteriorly, with short, deep, posterior median furrow; transverse grooves absent; relatively long posterolateral notches directed centro-anteriorly, extending as shallow grooves almost to anterior rim; longitudinal groove on anterior part of lateral bulge; anterior rim slightly convex; central portion of posterior rim straight.

**Remarks** – The hexagonal outline clearly distinguishes this form from both *Liocaris* Van Straelen, 1925 and *Stagmacaris*; it appears best assigned to *Pylochelitergites*, at least for the time being. The new form can be differentiated from *P. gelasinus* in the absence of a dimpled ornament. The closest form would appear to be *P. westerbergensis*, from which the new species differs in having longer posterior notches which extend onto the anterior half. Concerning to the extant forms, the general morphology of *Pylochelitergites exspectatus* sp. nov. most closely resembles that of the extant pylochelid genus *Cheiroplatea* Bate, 1888.
Discussion

Long-term taphonomic experiments on decapod crustaceans by Krause et al. (2011) suggest that isolated decapod remains should be better represented in the fossil record than currently documented. Amongst brachyurans, and swimming crabs in particular, fragmentary cheliped fingers have the highest fossilisation potential. Amongst symmetrical paguroids (families Pylochelidae and Parapylochelidae), the sixth operculate abdominal tergites seem to be the elements with the highest preservational scores. The relatively small sizes and difficulties in recognition of these ‘new fossils’ (Fraaije et al., 2012a) are probably the main biases for the current hiatus in our knowledge of assemblages of extinct decapod crustaceans.

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