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New data on the raninid crab *Cretacoranina schloenbachi* (Schlüter, 1879) (Late Cretaceous, NW Germany)

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Abstract

From lower Upper Campanian strata temporarily exposed at Coesfelder Berg (Coesfeld, Münsterland, NW Germany), two fairly well-preserved, partially overlapping carapaces of the raninid crab, *Cretacoranina schloenbachi* (Schlüter, 1879), are described. Not only do both specimens represent the largest and best-preserved individuals of this species to date, they also extend its stratigraphic range. Previous records of *C. schloenbachi* were from the Coniacian to ? Upper Santonian. The unusual cuticular morphology (pebbled surface) recently noted for other species of the raninid genera, *Cretacoranina* and *Eucorystes*, and considered to have aided in burrowing as well as in defence against predation, is seen here as well.

Key words: Cretaceous, Raninidae, Germany

Introduction

With the exception of the Maastrichtian type area (SE Netherlands, NE Belgium), from where seven species of late Late Maastrichtian age have been recorded to date (Collins *et al.*, 1995; Fraaye & van Bakel, 1998; Jagt *et al.*, 2000), post-Cenomanian raninid crabs appear to be rare in the NW European Cretaceous. Schlüter (1879, p. 612, pl. 18, figs. 2, 2a) described a fragmentary raninid carapace from the 'unteren Partie der Nordseite des Graseberges bei Wöltingerode (westl. Vienenburg)' [= lower portion of northern side of the Graseberg near Wöltingerode (west of Vienenburg)], as a new species, *Raninella Schlönbachi*. He assumed this to be of 'Emscher' or 'Unter-Senon' age, i.e. either Coniacian-Early Santonian or Late Santonian-earliest Campanian (compare Schlüter, 1871-1876).

A few years later, Fritsch (in Fritsch & Kafka, 1887, p. 46, pl. 10, fig. 9; text-fig. 69) recorded *Palaeocorystes callianassarum* from the 'Chlomeker Schichten' (= Emscher, or Coniacian) at Kieslingwalda (Bohemia). According to Mertin (1941), Wright & Collins (1972) and Tucker (1998), this is a junior synonym of *Raninella elongata* A. Milne-Edwards, 1861, now *Hemioon elongatum*.

Subsequently, Mertin (1941, p. 237, pl. 8, figs. 9-12, text-figs. 26a-e) erected the subgenus *Cretacoranina* within the genus *Notopocorystes*, and designated *Raninella schloenbachi* as the type species. From the 'Priesener Schichten' (Middle Turonian) of Bohemia, Glaessner (1929, p. 155, pl. 10, fig. 5) had meanwhile described *Notopocorystes fritschi*, now also assigned to *Cretacoranina* (see Tucker, 1998). Mertin (1941, p. 238) considered that Schlüter's original material of *C. schloenbachi* was of 'Emscher' age, i.e. Late Coniacian or Early Santonian (compare Kaplan & Kennedy, 1994, fig. 7; Mutterlose *et al.*, 1997). He also noted the poor preservation of the type specimen, and remarked that its slightly squatter outline, in comparison to material described by himself, might well be an expression of individual variation. The material assigned to *C. schloenbachi* by Mertin comprised four fragmentary carapaces associated with portions of abdomen and pereiopods, all of which came from the 'Unteremscher' (= Upper Coniacian) of Halberstadt, as well as a carapace fragment from the 'mittlerer Emscher' (= Lower Santonian) of Brühlfriedhof near Quedlinburg.

In the present paper, two partially overlapping carapaces associated with poorly preserved chelipeds are recorded from the lower Upper Campanian of the Coesfeld area (Coesfelder Berg). This record constitutes a notable stratigraphic range extension for *C. schloenbachi*. On the lower surface, the matrix block on which the specimens are preserved reveals an external mould of a medium-sized invididual of the pachydiscid ammonite *Patagiosites*

stobaei (Nilsson, 1827) (see revision by Kennedy & Christensen, 1997). Unfortunately, the original position of the matrix block was not recorded. In addition, earlier preparation of the fronto-orbital and anterolateral margins (spines) was not ideal, and left both carapaces coated with a shellac-like substance, which tends to obscure certain details of ornament. Despite these drawbacks, this material is of interest in representing the largest, stratigraphically youngest and best-preserved specimens of *C. schloenbachi* to date.

The present note is the first in a series devoted to decapod crustaceans from Campanian strata in the Munsterland Basin, contained mainly in the K.-H. Hilpert Collection (Ruhrlandmuseum der Stadt Essen). This collection comprises copious material of a callianassid mudshrimp from Dülmen, preserved in groups in what appear to be gut infills (A. Radwański, pers. comm.; work under way), and of astacidean and palinuroid lobsters (*Oncopareia coesfeldiensis, Paraclythia nephropiformis*, ? *Hoploparia* spp. and *Linuparus duelmense*), and much rarer examples of homolid and 'xanthid' crabs. The preservation of most specimens is good, revealing morphological details that allow the original descriptions by Schlüter (1862, 1879) and von der Marck & Schlüter (1868) to be revised and enlarged upon.

Systematic description

To denote the repositories of specimens referred to in the text, the following abbreviations are used:

BSPHGM - Bayerische Staatssammlung für Paläontologie und historische Geologie, Munchen;

RE - Ruhrlandmuseum der Stadt Essen, Essen;

SM - Sedgwick Museum, University of Cambridge, Cambridge (UK).

Genus *Cretacoranina* Mertin, 1941

Type species: *Raninella schloenbachi* Schlüter, 1879, by original designation.

Remarks: We follow Tucker (1998) and Haj & Feldmann (2002) in awarding *Cretacoranina* full generic status within the subfamily Notopocorystinae, rather than considering it to represent the subgenus of *Notopocorystes* M'Coy, 1849 (compare Collins, 1996).

Tucker (1998, pp. 331, 332) defined the genus as follows, 'Dorsal surface finely granulate or smooth. Carapace only weakly vaulted, if at all. Cervical and branchiocardiac furrows shallow, incomplete, often reduced to medial portions only; anterolateral margins distinctly convex', and 'Carapace oval to oblong; surface finely granulate or smooth; distinct, longitudinal, median keel for almost entire length of carapace not tuberculate. Front slightly produced, rostrum bifid; postfrontal area sometimes depressed. Supraorbital margin bears 2 distinct fissures. Anterolateral margins toothed'.

***Cretacoranina schloenbachi* (Schlüter, 1879)**

(Fig. 1)

1879 *Raninella Schlönbachi* Schlüter, p. 612, pl. 18, figs. 2, 2a [p. 615:



Fig. 1. *Cretacoranina schloenbachi* (Schlüter, 1879) (RE 551.763.333 A 3963), Coesfelder Berg (Coesfeld, Münsterland), 'Coesfelder Schichten' (lower Upper Campanian) ; two partially overlapping carapaces and associated chelipeds.

Raninella Schloenbachi in caption].

1941 *Notopocorystes* (*Cretacoranina*) *schloenbachi* (Schlüter, 1879); Mertin, p. 237, pl. 8, figs. 9-12; text-figs. 26a-e.

Material: Two partially overlapping carapaces, both apparently representing moults (see below), associated with poorly preserved chelipeds (RE 551.763.333 A 3963, ex K.-H. Hilpert Colln, no. 16641), from 'Ausschachtung Wasserrückhaltebecken' (= excavation material of water basin) at Coesfelder Berg (Coesfeld, Münsterland).

Description: Carapace large (total length: *c.* 84 mm inclusive of and > 76 mm exclusive of rostrum), elongate, width *c.* 80% of total length, greatest width anterior of midline (*c.* one-third of length); weakly convex longitudinally and fairly strongly convex transversely. Front produced; rostrum extending well beyond orbits, longer than wide (L/W ratio 1.14; *c.* 10% of total carapace length), slightly downturned, with one pair of spines forming bifid termination, separated by deep notch; only weakly constricted posteriorly, deeply grooved, with ornament of scattered granules; no median keel over entire length of carapace.

Fronto-orbital margin wide (*c.* 80% and *c.* 60% of carapace width and length, respectively); smoothly rimmed and with a pair of anteriorly (anterolaterally) directed postorbital spines on either side; supraorbital margin with three elements, separated by two deep, open fissures, widest posteriorly and slightly constricted medially. Innermost element broadly concave in dorsal view, with broad-based, anteriorly directed spine, reaching halfway rostrum in length; second element with a pair of comparable spines, directed slightly anterolaterally, separated by narrow concavity; third element comparable to second, also with narrow concavity and two spines; the outer one stronger. Features of orbits and suborbital margins not observable.

Lateral margins downturned; outline of anterolateral margin convex, with three anterolaterally directed spines (at *c.* 38, 32 and 20 degrees from long axis, respectively). Posterolateral margin sigmoid, tapering rather abruptly to poorly preserved, narrow (*c.* 38% of carapace width) posterior margin.

On dorsal carapace surface, only branchiocardiac grooves are visible; postfrontal area slightly depressed, almost smooth, with widely spaced granules of varying sizes. Dorsal surface ornament pebbled, consisting of small, closely packed hexagonal, slightly convex caps. Across carapace, surface abrasion reveals both honeycomb structure in outer exocuticle and undulose/granulose upper surface of inner exocuticle, closely comparable to features described by Haj & Feldmann (2002) for *C. punctata*. Pterygostomial and sternal features not observable.

Chelipeds robust, tuberculate; carpus with large spine on inner distal angle, propodus with at least three short, blunt spines laterally; fixed finger broad based, but damaged.

Discussion

Remarkable is the partial overlap of carapaces; there is a slight difference in size (75.5 *vs* 76.3 mm total length, exclusive of rostrum, and > 60 *vs* 67 mm total width, respectively). With cheliped remains associated, these carapaces are best interpreted as moults. However, whether or not these were produced by the same animal cannot be determined.

As noted above, the main interest of the present specimens lies in the fact that they represent the largest, stratigraphically youngest and best-preserved individuals of *C. schloenbachi* to date. Unfortunately, Schlüter (1879) did not provide measurements of the type specimen, either in text or illustration. The type, and sole specimen known (ex A. Schlönbach Colln), was stated by Schlüter (1879, p. 613) to be housed in the 'Museum der geologischen Landesanstalt und Bergakademie zu Berlin'. Despite considerable effort, both at the Museum für Naturkunde der Humboldt-Universität Berlin and at the Dienstbereich Berlin of the Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) at Berlin-Spandau, we have not been able to examine this specimen. Ms Andrea Heinke (email of July 8, 2002) told is that it might have been destroyed during World War II air raids. In the material described by Mertin (1941), the maximum carapace length was stated to be 50 mm.

In the type, the fronto-orbital area is largely missing, with only the outer orbital and anterolateral spines preserved; Mertin (1941, fig. 26a) was the first to provide a detailed illustration of *C. schloenbachi*. It is here complemented (see above).

As far as stratigraphic provenance of the present material is concerned, the following may be stated. Having been collected from a temporary exposure (water basin excavation site) at Coesfelder Berg, the material is recorded to have come from the so-called 'Coesfelder Schichten'. This local unit has furnished such key index ammonoid taxa as *Hoplitoplacenticeras* spp., *Trachyscaphites spiniger* (Schlüter, 1872), *Patagiosites stobaei* (Nilsson, 1827) and *Scaphites gibbus* Schlüter, 1872. On this evidence, this unit is well correlatable with the *conica/senior*, *basiplana/spiniger* and *roemeri* zones (lower Upper Campanian) of the standard section of the white chalk facies in NW Germany, and may in fact extend upwards into the basal part of the *polyplocum* Zone (upper Upper Campanian) (see Kaplan *et al.*, 1996; Hauschke *et al.*, 1999). Baculitid ammonites on the matrix block are non diagnostic, in contrast to the partial external mould of *P. stobaei* (see above).

In the literature, there are two additional records of *C. schloenbachi*, but in both cases carapaces are poorly preserved. Förster (1970, p. 139, pl. 17, fig. 3; text-fig. 4A, as *Notopocorystes* (*Cretacoranina*) cf. *schloenbachi*) recorded a fragmentary carapace (BSPHGM 1969 I 1983, leg. U. Franz) from the ? Lower Santonian of Sauermöser Alm, west of Oberwössen (Bavaria, Germany). He noted that the uniform granulation of the dorsal carapace surface, the fronto-orbital margin with two fissures and three anterolateral 'teeth' (= spines) favoured assignment to the subgenus *Cretacoranina*; we concur. Although in Förster's reconstruction (1970, fig. 4A), details of the fronto-orbital and anterolateral margins and postfrontal area differ slightly from the present specimens, assignment

to *C. schloenbachi* appears justified. Stratigraphically, this single specimen from Bavaria is more or less coeval with material described by Mertin (1941).

Wright & Collins (1972, p. 85, pl. 15, fig. 4; text-fig. 12, as *Notopocorystes (Cretacoranina) schloenbachi* described a single fragmentary carapace (SM B66537, leg. R.M. Brydone) from the Coniacian (Upper Chalk, *Micraster cortestudinarium* Zone) exposed at a cutting north of Droxford Station (Hampshire, southern England). This specimen differs from the present material in having a finely pitted dorsal carapace surface, more clearly marked furrows and lobes, and less well-developed anterolateral spines. It appears that these features are preservation induced, and that this specimen, like those recorded by Mertin (1941, p. 238), does not represent the pebbled outer surface but rather the lower surface of outer exocuticle, revealed through exfoliation. This needs to be checked on the material described by Wright & Collins (1972). In our opinion, assignment to *C. schloenbachi* is tentative at bes t, pending a re-examination of the specimen (SM B66537).

According to Collins (1996), Tucker (1998), Schweitzer & Feldmann (2001) and Haj & Feldmann (2002), the genus *Cretacoranina* contains thirteen (or fourteen) species:

1 - *C. australis* (Upper Santonian-Lower Campanian, Madagascar; Secretan, 1964);
2 - *C. broderipii* (Albian, England and France; Mantell, 1844);
3 - *C. denisae* (Campanian, Madagascar; Secretan, 1964);
4 - *C. dichrous* (Turonian, Texas; Stenzel, 1945);
5 - *C. exiguus* (Cretaceous, Bathurst Island, Australia; Glaessner, 1980);
6 - *C. fritschi* (Turonian, Germany; Glaessner, 1929);
7 - *C. ornatus* (Cenomanian, England; Wright & Collins, 1972);
8 - *C. paututensis* (Upper Santonian/Lower Campanian, Greenland; Collins & Wienberg Rasmussen, 1992);
9 - *C. punctata* (Upper Albian-Cenomanian, Texas ; Rathbun, 1935);
10 - *C. schloenbachi* (Coniacian-Campanian, Germany and ? England);
11 - *C. syriacus* (Cenomanian, Syria; Withers, 1928);
12 - *C. testacea* (Campanian/Maastrichtian, Delaware and New Jersey; Rathbun, 1926);
13 - *C. trechmanni* (? Campanian, Jamaica; Withers, 1927).

A fourteenth species, *C.* cf. *syriacus*, was recorded from the Cenomanian of England by Wright & Collins (1972).

Cretacoranina schloenbachi as here described differs from its congeners in details of fronto-orbital margin (structure of rostrum, fissures), of anterolateral spines and width/depression of the postfrontal area and in the absence of carapace furrows (cervical furrow, in particular).

The pebbled surface in *C. schloenbachi* closely resembles that in *C. punctata*, *C. dichrous*, *C. trechmanni*, *C. testacea* and *Eucorystes carteri* (M'Coy, 1854), as recorded by Haj & Feldmann (2002). Although the present specimens far exceed the size range reported previously for *C. schloenbachi*, it seems fair to conclude that, despite their size, the combination of pebbled surface and well-developed anterior (anterolateral) spines would have been conducive to anchoring the animal.

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