On *Praecalpionellites* Pop (Calpionellidea Bonet) and description of *Praecalpionellites hillebrandti* n. sp. (Lower Cretaceous, Italy)

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With 6 figures

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**Abstract:** A taxonomical overview of the genus *Praecalpionellites* Pop, 1986a (Calpionellidea Bonet) is presented and *Praecalpionellites hillebrandti* n. sp. described.

**Zusammenfassung:** Es wird ein taxonomischer Überblick der Gattung *Praecalpionellites* Pop, 1986a (Calpionellidea Bonet) gegeben und *Praecalpionellites hillebrandti* n. sp. beschrieben.

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**Introduction**

In the area of Ra Stua (Prov. Belluno, Italy) a section of Rosso Ammonitico Superiore and Biancone (Malmian/Early Cretaceous) was sampled to study the calpionellid faunas. This section is exposed in a little creek some 500 m SW of Rifugio Ra Stua where the trail crosses a bridge (see fig. 1). Detailed information on the lithologic succession, the provenance of the samples studied and the sample numbers are given in Grün & Blau (1996, 1997) and Blau & Grün (1997) and are therefore not repeated here.

The samples yield excellent preserved calpionellids, which made possible to recognize the collar construction of *Remaniella* and also serve the data for the present study. All figured specimens are housed in the collection of Beate Grün, Institut für Angewandte Geowissenschaften, Justus Liebig-Universität Gießen. The sample/section numbers are documented in the figure captions.
Systematics

Genus *Praecalpionellites* POP, 1986a

According to the emended diagnosis of the genus *Praecalpionellites* (GRÜN & BLAU, 1996) the loricca shape is heteromorphous. The loriccae can be either bellshaped to broad-amphorellid as well as cylindrical. The common feature is that the whole loricca or at least the aboral pole is amphorellid, a short caudal appendix can be present. The collar apparatus is twofold with both elements separated from the loricca (see below). Following this
emendation, Praecalpionellites POP (1986a) and Remaniella CATALANO (1965) can be easily distinguished.

Bellshaped to broad-amphorellid lorica morphologies are represented by Pcts. filipescui (POP), Pcts. murgeanui (POP), and Pcts. hillebrandti n.sp., whereas Pcts. dadayi (KNAUER) and Pcts. siriniaensis POP show a cylindrical lorica with an amphorellid aboral pole. The presence of two morphological types of the lorica can be observed also in other genera, e.g. in Remaniella and Tintinnopsella. HOUSA (1990) interprets this in terms of ecological niches.

Thus, the morphology of the lorica is not only a tool to separate the genus Praecalpionellites from Remaniella but – together with the collar construction – also of important value for species differentiation. The collar in Praecalpionellites consists of two rings, an outer and an inner one. Diagnostic is the position of the base of these rings in comparison to the oral end of the lorica (see fig. 6a-e, for technical term explanation fig. 6f). Both rings can be based at the oral end of the lorica (Praecalpionellites filipescui, Praecalpionellites dadayi), the outer ring can be based above the oral end of the lorica and the inner ring below (Praecalpionellites hillebrandti n.sp.) or the bases of both rings can be positioned below the oral end of the lorica (“tripartite” in the terminology of KNAUER, 1963) with Praecalpionellites murgeanui and its cylindrical shaped counterpart Praecalpionellites siriniaensis. It might be supposed, that there is also a cylindrical counterpart to Praecalpionellites hillebrandti n.sp.

Praecalpionellites murgeanui (POP, 1974)  

pars 1963 Calpionellites dadayi n.sp. – KNAUER, p. 157; pl. 1, fig. 8, 11, 16-23; textfig. 2, fig. 8, 11, 16-23.
- 1964 Calpionellites dadayi KNAUER, 1963. – NAGY, pl. 1, fig. 9.
* 1974 Calpionellites murgeanui n.sp. – POP, p. 105, textfig. 1a-b; pl. 1, fig. 1-5, 7-9.
non 1974 Calpionellites murgeanui n.sp. – POP, pl. 1, fig. 6 (= Praecalpionelli-tes hillebrandti n.sp.).
- 1976 Calpionellites murgeanui POP. – POP, pl. 8, fig. 6.
- 1976 Remaniella “dadayi” (KNAUER). – POP, pl. 8, fig. 8.
- 1977 Remaniella “dadayi” (KNAUER, 1963). – MICARELLI et al., p. 79; pl. 15, fig. 17.
- 1979 Remaniella murgeanui (POP). – ALLEMAN & REMANE, pl. 8, fig. 8-9.
- 1985 Remaniella murgeanui (POP). – REMANE, pl. 18, fig. 20.
- 1986a Praecalpionellites murgeanui (POP). – POP, p. 104, textfig. 1c-d; pl. 1, fig. 4-5.
- 1986b Praecalpionellites murgeanui (POP). – POP, pl. 5, fig. 4; pl. 6, fig. 10.
1987 Remaniella murgeanui Remane, 1985. – Erba & Quadrio, p. 72; pl. 9, fig. 11.
1991 Remaniella murgeanui (Colom). – Altiner & Özkan, pl. 5, fig. 10.
1994a Praecalpionellites murgeanui (Pop, 1974). – Pop, pl. 2, fig. 5.
non 1994a Praecalpionellites murgeanui (Pop, 1974). – Pop, pl. 2, fig. 4 (= Praecalpionellites hillebrandti n.sp.).
non 1994b Praecalpionellites murgeanui (Pop, 1974). – Pop, pl. 3, fig. 17 [= Pop (1994a), pl. 2, fig. 4] (= Praecalpionellites hillebrandti n.sp.).
non 1996 Praecalpionellites murgeanui (Pop). – Grün & Blau, pl. 2, fig. 11; pl. 3, fig. 12 (= Praecalpionellites filipes).
1997 Praecalpionellites murgeanui (Pop). – Grün & Blau, pl. 2, fig. 11; pl. 3, fig. 3.

Holotype: Pop 1974, p. 105, pl. 1, fig. 1.

Description: In axial sections, the lorica shape is amphorellid with an acute caudal pole. As diagnostic for the genus, the collar apparatus consists of two rings, an inner and an outer one. The oral end of the lorica separates these rings (see fig. 6c), therefore the “base” of the rings is situated below the oral end of the lorica. Good preserved specimens show the lorica converging at the base of the inner collar ring (see fig. 6c). That kind of collar construction was called “tripartite” by Knauer (1963) and Pop (1974) used this feature to separate Praecalpionellites murgeanui (Pop) from Praecalpionellites dadayi (Knauer) (see extensive discussion in Grün & Blau, 1996).

* Praecalpionellites filipes (Pop, 1994a)

1968 Remaniella cadischiana (Col.). – Le Hégarat & Remane, textfig. 61; pl. 10, fig. 17.
non 1968 Remaniella cadischiana (Col.). – Le Hégarat & Remane, textfig. 6n; pl. 10, fig. 18 (= Praecalpionellites hillebrandti n.sp.).
1970 Calpionellites dadayi Knauer. – Rusu, pl. 4, fig. 34.
1976 Remaniella cadischiana (Colom). – Pop, pl. 5, fig. 11; pl. 8, fig. 9.
1976 Remaniella dadayi (Knauer). – Pop, pl. 7, fig. 15.
1986b Remaniella dadayi (Knauer). – Pop, pl. 5, fig. 6, 7.
1991 Remaniella cadischiana (Colom). – Altiner & Özkan, pl. 5, fig. 4-6, 8-9.
* 1994a Remaniella filipes Pop n.sp. – Pop, p. 324, textfig. 1b; pl. 1, fig. 7-12.
1994b Remaniella filipes. – Pop, pl. 3, fig. 1-2.
1994 Remaniella dadayi (Knauer). – Vášicek et al., pl. 9, fig. 17.
non 1995 Remaniella filipes Pop. – Rehakova, pl. 2, fig. 8 (= Borzaellata ata-va).
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- 1996 Remaniella cadischiana (Col.). - Adatte et al., pl. 1, fig. 6.
- 1996 Praecalpionellites filipescui (Pop). - Grün & Blau, pl. 2, fig. 7, 10; pl. 3, fig. 5, 11.
- 1997 Praecalpionellites filipescui (Pop). - Grün & Blau, pl. 2, fig. 4; pl. 3, fig. 2.

Holotype: Pop 1994a, p. 325, textfig. 1b, pl. 1, fig. 7.

Description: In axial sections, the lorica is bell shaped with an amphorellid caudal end. The “base” of both rings are situated above the oral end of the lorica. In section the inner ring is inverse comma-shaped, the outer ring like an oblique comma or crescent shaped (see fig. 3, 5a, 6a). Well preserved specimens (Grün & Blau, 1996: pl. 2, fig. 7; pl. 3, fig. 5; herein fig. 3a, fig. 5a) show that the oral termination of the lateral wall of the lorica is concave, the inner collar ring fitting to this concavity.

Praecalpionellites hillebrandti n. sp.

- 1968 Remaniella cadischiana (Col.). - Le Hégarat & Remane, textfig. 6n; pl. 10, fig. 18.
- pars 1974 Calpionellites murgeanui n. sp. - Pop, pl. 1, fig. 6.
- 1994a Praecalpionellites murgeanui (Pop, 1974). - Pop, pl. 2, fig. 4.
- 1994b Praecalpionellites murgeanui (Pop, 1974). - Pop, pl. 3, fig. 17 [= Pop (1994a), pl. 2, fig. 4].
- 1996 Praecalpionellites murgeanui (Pop). - Grün & Blau, pl. 2, fig. 11; pl. 3, fig. 12.

Derivation nominis: Named in honor to Prof. Dr. Axel von Hillebrandt.

Holotype: The specimen to Grün & Blau (1996), pl. 2, fig. 11; pl. 3, fig. 12 (redrawn herein on fig. 5c).

Type locality and type level: Ra Stua section, Biancone-Fm., Late Berriasian, sample/thin section 23H (for details see Grün & Blau, 1997).

Diagnosis: The lorica is more or less V-shaped with a divergent oral end and an amphorellid aboral pole. The outer collar is crescent-shaped in cross section and overlays the oral end of the lorica in flat position. The distinct inner collar ring is inverse comma-shaped in cross section and its broad end fits to an inner notch of the lorica wall (see fig. 6f) situated below the oral lorica end.

Remarks: In comparison to other Praecalpionellites the wall of the lorica in Praecalpionellites hillebrandti n. sp. appears thicker (see figs. 5b, c). This can also be due to diagenetic effects. For the holotype (see Grün & Blau, 1996: pl. 2, fig. 11) we assume that the relatively thick wall is not a result of diagenetic effects. On the other hand, the lorica wall of one of the specimens figured herein (fig. 4a) shows random variations of the thick-
ness, which might be explained by secondary crystal growth on the inner side of the lorica.

**Praecalpionellites dadayi** (KNAUER, 1963)

* pars 1963 Calpionellites dadayi n.sp. – KNAUER, p. 157, pl. 1, fig. 4, 5, 12, 13; textfig. 2/4, 2/5, 2/12, 2/13.
- 1996 **Praecalpionellites dadayi** (KNAUER, 1963). – GRÜN & BLAU, p. 578, pl. 1, fig. 1-3; pl. 3, fig. 1 (with comprehensive list of synonyms).
- 1997 **Praecalpionellites dadayi** (KNAUER, 1963). – GRÜN & BLAU, pl. 2, fig. 5; pl. 3, fig. 4.

Holotype: KNAUER, 1963: p. 157, Textfig. 2, fig. 4; corresponds to pl. 1, fig. 4; corresponds to tab. 1, no. 21.

Remarks: Although KNAUER (1963) designated a holotype for his species which he described exactly, great confusion among calpionellid students either on the validity or the determination of the species continued to exist. This was discussed in detail by GRÜN & BLAU (1996) and these authors justified KNAUER's species taxonomically. The lorica is cylindrical with an amphorellid aboral pole. Lorica height (LH, for measure scheme see GRÜN & BLAU, 1996: fig. 3) varies between 145 and 165 microns, the lorica width (LW) ranges from 75 to 92 microns. The two rings of the collar apparatus are placed above the oral lorica end ("bipartite" collar in the terminology of KNAUER, 1963).

**Praecalpionellites siriniaensis** POP, 1986a

* 1986a **Praecalpionellites siriniaensis** n.sp. – POP, p. 105, textfig. 1a-b; pl. 1, fig. 1-3.
- 1986b **Praecalpionellites siriniaensis** POP. – POP, pl. 6, fig. 12.
- 1994a **Praecalpionellites siriniaensis** POP 1986. – POP, pl. 2, fig. 6 (= POP 1986a, pl. 1, fig. 1).
- 1994b **Praecalpionellites siriniaensis** POP, 1986. – POP, pl. 3, fig. 19 (= POP 1986a, pl. 1, fig. 1), pl. 4, fig. 1-2 (fig. 1 = POP 1986a, pl. 1, fig. 2).
- 1997 **Praecalpionellites siriniaensis** POP. – GRÜN & BLAU, pl. 2, fig. 10; pl. 3, fig. 5.

Holotype: POP 1986a, p. 150, textfig. 1a, pl. 1, fig. 1.

Remarks: In lorica shape and size this species resembles **Praecalpionellites dadayi** (KNAUER). The difference is, that the bases of the two collar rings lie below the oral lorica end ("tripartite" collar in the terminology of KNAUER, 1963). At the fitting of the inner collar ring, the lorica converges. This type of collar is also known from **Praecalpionellites murgeanui** (POP).
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Fig. 2. *Praecalpionellites murgeanui* (Pop). Fig. 2a: sample/section number 23J2, Fig. 2b: sample/section number 23I6.

Fig. 3. *Praecalpionellites filipescaui* (Pop). Fig. 3a: sample/section number 23E5, Fig. 3b: sample/section number 23C2.
Fig. 4. *Praecalpionellites hillebrandti* n.sp. Fig. 4a, b: sample/section number 2318.

Fig. 5. Line drawings of a) *Praecalpionellites filipescui* (Pop) (drawn after the specimen to fig. 3a), b) *Praecalpionellites hillebrandti* n.sp. (drawn after the specimen to fig. 4a), c) *Praecalpionellites hillebrandti* n.sp. (holotype, refigured from GRÜN & BLAU, 1996: pl. 3, fig. 12), and d) *Praecalpionellites murgeanui* (Pop) (drawn after the specimen to fig. 2b).
Conclusions

We present a summarized taxonomical overview of the species in Praecalpionellites POP (1986a). The genus can be easily separated from Remaniella CATALANO (1965) by its lorica morphology and the collar construction. In Praecalpionellites two types of loricae are present: either (1) cylindrical or (2) bellshaped to broad-amphorellid. In all species at least the apical pole is amphorellid. Species differentiation is based on the lorica shape and on the position of the base of collar elements in comparison to the lorica’s oral end. The genus comprises at the moment Pcts. filipescui (Pop), Pcts. mur-
geanui (POP), Pcts. hillebrandti n.sp., Pcts. dadayi (KNAUER) and Pcts. siriniaensis POP.

Annex

In 1997, GRÜN & BLAU erected the family Chitinoidellidae, based on wall ultrastructure data given by REHAKOVA & MICHALIK (1992, 1993). As a matter of fact, these data are not in contradiction to the definition of Chitinoidellidae TREJO (1975). Therefore Chitinoidellidae GRÜN & BLAU (1997) is synonymous to Chitinoidellidae TREJO (1975).

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