

CONDYLOPYGE HAWLE ET CORDA, 1847 IN THE PŘÍBRAM-JINCE BASIN (BARRANDIAN AREA, THE CZECH REPUBLIC, AGNOSTIDA)

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Abstract. A common occurrence of the widely distributed Cambrian agnostid *Condylopyge* HAWLE et CORDA, 1847 in the Skryje-Týřovice Basin has been well known since the forties of the nineteenth century. In comparison very rare specimens of *Condylopyge* in the Příbram-Jince Basin were collected as late as in 1992. In this contribution, five disarticulated remains of *Condylopyge* are reported from three different stratigraphical levels of the Jince Formation in the Příbram-Jince Basin (Barrandian area, the Czech Republic). An internal mould of a small broken cephalon and an external mould of a pygidium collected from lower stratigraphical levels of the *Paradoxides* (*Eccaparadoxides*) *pusillus* Biozone are provisionally assigned to *Condylopyge* cf. *rex* (BARRANDE, 1846), as is also a well preserved internal mould of another cephalon originating from lower part of the *Onymagnostus hybridus* Biozone. The internal mould of the cephalon figured by Valíček and Szabad (2002) from the lower levels of the *Acadolenus snajdri* Biozone is classified as *Condylopyge* sp.

■ Cambrian, Agnostida, *Condylopyge*, stratigraphy, Příbram–Jince Basin.

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Introduction

An abundant Cambrian fauna is known from the marine clastic sediments of the Skryje-Týřovice and Příbram-Jince basins of the Barrandian area. Due to an abundant occurrence and suitable preservation, trilobites and agnostids have attracted attention since the early 19th century and were studied by numerous researchers (e.g. Schlotheim 1823, Beyrich 1845, Barrande 1846, 1852, 1872; summary see Šnajdr 1958 and Bruthansová et al. 2007).

Several trilobite and agnostid genera established by Hawle and Corda (1847) were based on species described by Barrande (1846). Two of them, *Battus rex* BARRANDE, 1846 and *Battus granulatus* BARRANDE, 1846 from Cambrian sediments of the Skryje-Týřovice Basin were designated as type species of two agnostid genera, namely *Condylopyge* HAWLE et CORDA, 1847 and *Pleuroctenium* HAWLE et CORDA, 1847. The very specific cephalic and pygidial morphology of these two genera led Raymond (1913, p. 139) to place them in a separate family Condylopygida (= now Condylopygoidea RAYMOND, 1913) which was later elevated to a superfamilial level by Kobayashi (1962).

According to Shergold et al. (1990) and Shergold and Laurie (1997, p. 332) “the concept of the superfamily Condylopygoidea RAYMOND, 1913 is stable and goes back to the first attempted generic subdivision of *Agnostus* by Hawle and Corda (1847)”. This small superfamily is based only

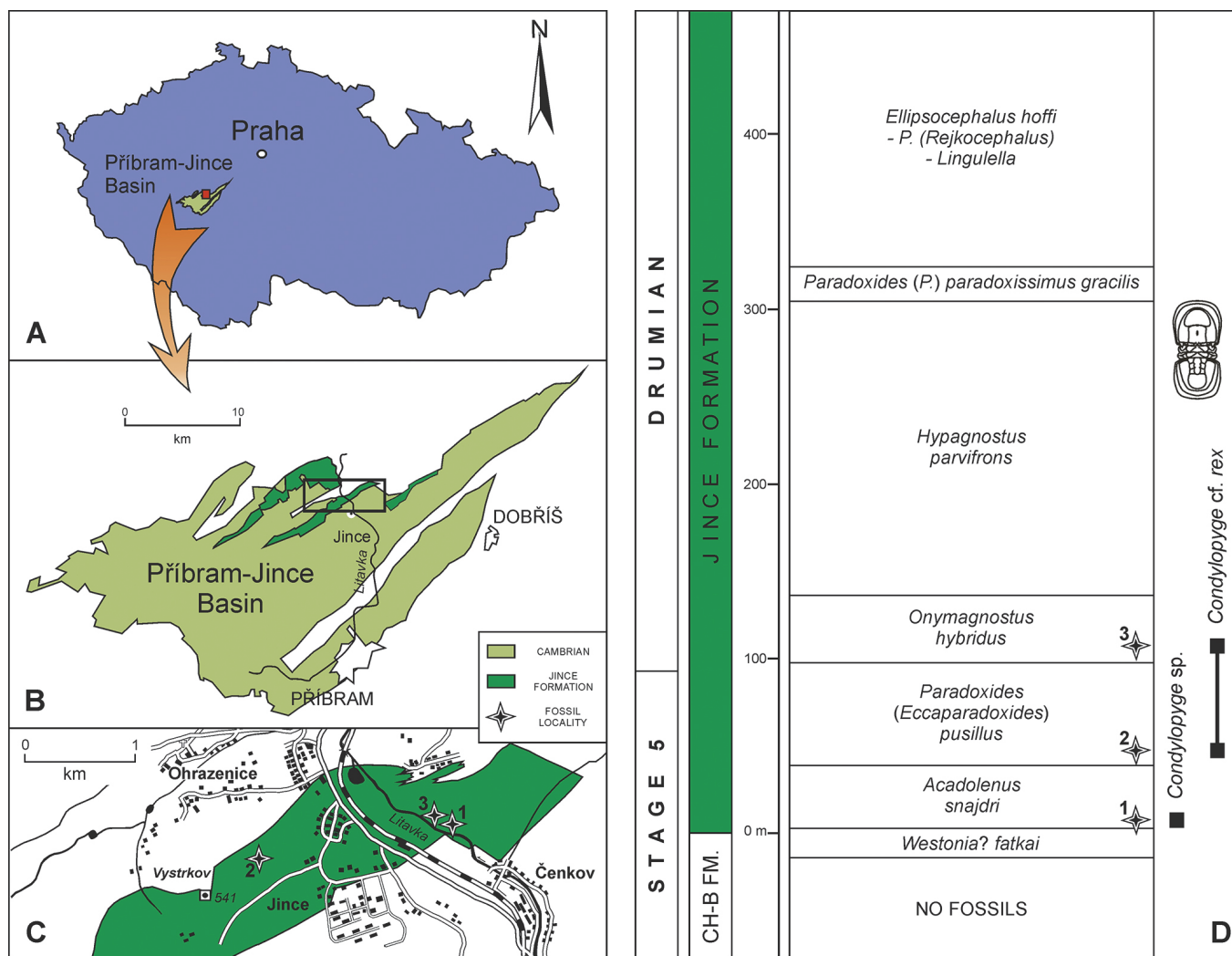
on the Condylopygidae RAYMOND, 1913, which includes *Condylopyge* and *Pleuroctenium*, while the position of the recently established *Tyragnostus* VALÍČEK, 2006 is unresolved; all type species of these genera originate from the Buchava Formation of the Skryje-Týřovice Basin.

The aim of this contribution is to revise and figure three specimens of *Condylopyge* from the Příbram-Jince Basin of the Barrandian area (the Czech Republic; Text-fig. 1) which are housed in institutional collections.

For comparison, three specimens of *Condylopyge rex* (BARRANDE, 1846), from the Buchava Formation of the Skryje-Týřovice Basins are figured (Text-fig. 2.d–2.f). These specimens come from the collection of the late V. Kordule recently deposited in the National Museum Prague. One of them comes from the Karáskovská rokle - nad chatami locality (Text-fig. 2.d), the other two specimens were collected from Lůmek u Týřovic (= small quarry near Týřovice; Text-fig. 2.e and Text-fig. 2.f).

Condylopyge in the Barrandian area

Condylopyge was for a long time known only from the Skryje-Týřovice Basin (summary Šnajdr 1958, Fatka 2005). Disarticulated exoskeletal remains of this large agnostid are usually quite abundant in fossil associations characterizing the middle and higher stratigraphical levels of the Buchava Formation (Šnajdr 1958). It commonly occurs together with



Text-fig. 1. The Czech Republic with the position of the Příbram-Jince Basin (A), distribution of Cambrian rocks of the Jince Formation in the Příbram-Jince Basin (B), geographic position of discussed localities (C), stratigraphic ranges of *Condylopyge* in the Jince Formation of the Příbram-Jince Basin (D).

1. foot of the slope known as Vinice near Jince (locality 15 in Fatka and Kordule 1992); lowermost levels of the *Acadolenus snajdri* Zone sensu Fatka and Szabad (2014).
2. locality Potůček near Rejkovice (= locality 12 in Fatka and Kordule 1992); lower levels of the *Paradoxides (Eccaparadoxides) pusillus* Zone sensu Fatka and Szabad (2014). Specimens CGS CW 17 and CGS FK 63.
3. foot of the slope known as Vinice near Jince (locality 20 in Fatka and Kordule 1992); lower levels of the *Onymagnostus hybridus* Biozone sensu Fatka and Szabad (2014). Specimen CGS CW 18.

several other agnostids such as *Phalagnostus nudus*, *Pleuroctenium granulatum granulatum*, *Skryjagnostus pompeckji*, *Peronopsis* div. sp., *Phalacroma bibullatum*, *Diplorrhina triplicata* and is usually associated with remains of paradoxidid, conocoryphid and solenopleurid trilobites, cinctan echinoderms and hyoliths (see Prantl 1947, Fatka 2005).

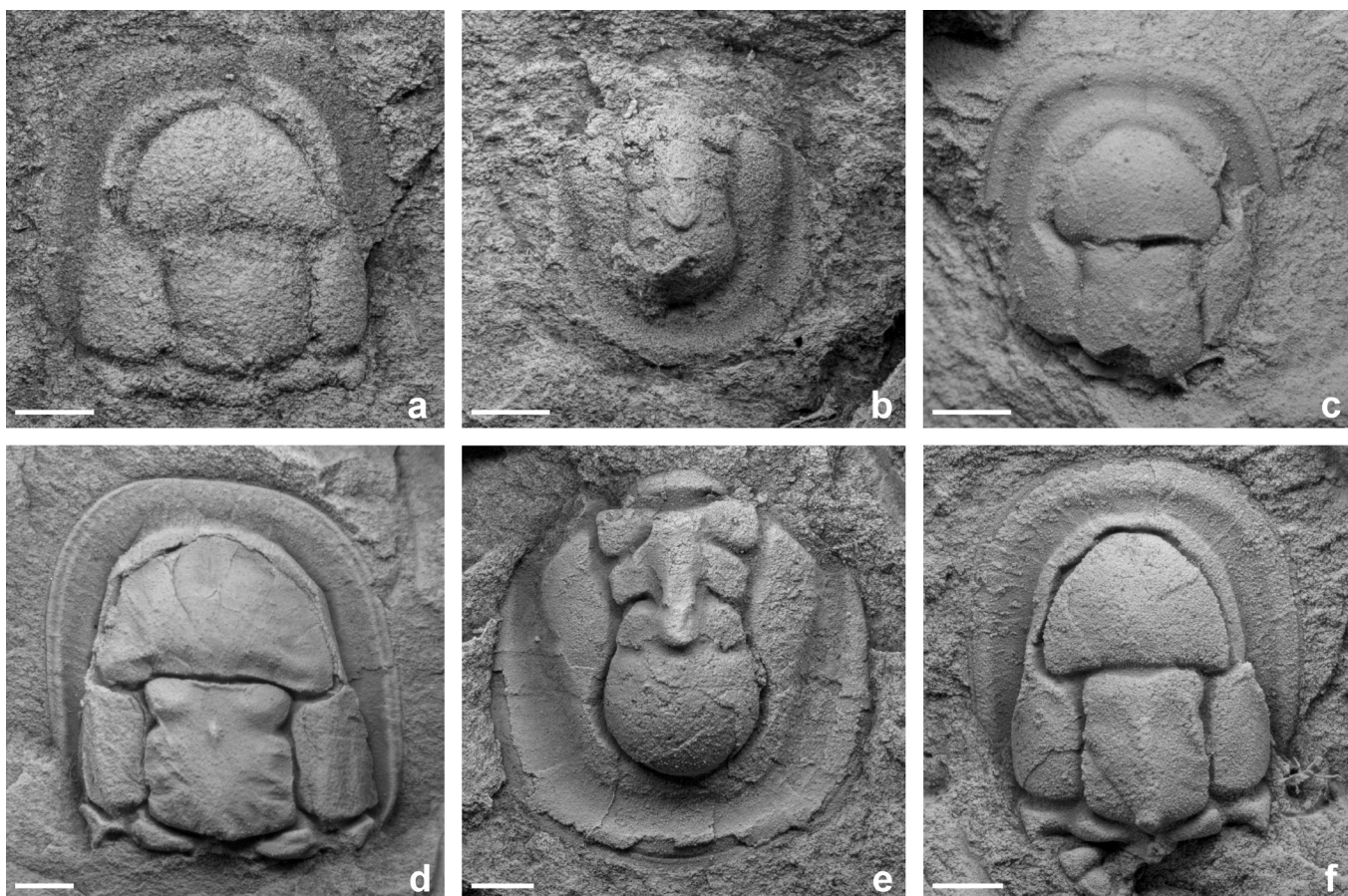
In the Příbram-Jince Basin, the presence of *Condylopyge* was published for the first time by Fatka and Kordule (1992, p. 50). Later, Valíček and Szabad (2002, pl. 1, fig. 1) figured the internal mould of a quite small isolated cephalon collected from the oldest faunal association of the Jince Formation at the foot of the slope known as Vinice near Jince (Text-fig. 1). These authors classified this specimen as *Condylopyge rex* but without any discussion.

Fatka et al. (2004, tab. 3) revised the stratigraphical ranges of taxa established in the Jince Formation, including

agnostids. The occurrence of *Condylopyge* cf. *rex* was reported from the lower stratigraphical levels of the *Eccaparadoxides pusillus* Zone as well as from the oldest layers of the *Onymagnostus hybridus* Zone.

Repository

Figured specimens from the Jince Formation of the Příbram-Jince Basin are housed in the collections of the Czech Geological Survey, Prague (inventory numbers CGS CW 17, CW 19 and FK 63, Text-fig. 2a–2c respectively). For comparison figured specimens from the Skryje-Týřovice Basins are housed in the collections of the Palaeontological Department of the National Museum, Prague (inventory numbers NM-L43011a, NM-L43014 and NM-L43013, Text-fig. 2d–2f respectively).



Text-fig. 2. *Condylopyge* cf. *rex* (BARRANDE, 1846), middle Cambrian, latest Cambrian Stage 5 and lower Drumian, Jince Formation, Příbram-Jince Basin.

a. internal mould of isolated cephalon (Specimen CGS CW 17), Potůček near Rejkovice locality (= locality 12 in Fatka and Kordule 1992) in lower levels of the *Paradoxides* (*Eccaparadoxides*) *pusillus* Zone.

b. latex cast of external mould of isolated pygidium (Specimen CGS FK 63), Potůček near Rejkovice locality (= locality 12 in Fatka and Kordule 1992) in lower levels of the *Paradoxides* (*Eccaparadoxides*) *pusillus* Zone.

c. internal mould of isolated cephalon (Specimen CGS CW 18), foot of the slope known as Vinice near Jince (locality 20 in Fatka and Kordule 1992) in lower levels of the *Onymagnostus hybridus* Zone.

Condylopyge rex (BARRANDE, 1846), middle Cambrian, lower Drumian, Buchava Formation, *Paradoxides* (*Eccaparadoxides*) *pusillus* Zone, Skryje-Týřovice Basin.

d. internal mould of isolated cephalon (NM-L43011a), Karáskovská rokle - nad chatami.

e. internal mould of isolated pygidium (NM-L43014), Lůmek u Týřovic.

f. internal mould of isolated cephalon (NM-L43013), Lůmek u Týřovic.

Whitened with ammonium chloride sublimate. All scale bars are 1 mm. Photographs by Martin Valent (National Museum Prague).

Systematic palaeontology

Phylum **Arthropoda** VON SIEBOLD, 1848

Order **Agnostida** SALTER, 1864

Suborder **Agnostina** SALTER, 1864

Superfamily **Condylopygoidea** RAYMOND, 1913

Family **Condylopygidae** RAYMOND, 1913

Remarks. Like numerous earlier authors, we follow Kobayashi (1962) in recognizing the Condylopygoidea at the level of superfamily, while the family concept is that of Raymond (1913). Condylopygoidea differs from Agnostoidea M'COY, 1849 by (1) the characteristic expansion of the anterior glabellar lobe, (2) the apparent presence of occipital structures instead of basal lobes, (3) the presence of three anterior segments in an otherwise axiolobate pygidium, and (4) the supposed retention of a cephalothoracic aperture

(see Rushton 1979, p. 45). Condylopygoidea are therefore the most distinctive members of the Agnostina (see Shergold et al. 1990, Shergold and Laurie 1997).

Genus ***Condylopyge*** HAWLE et CORDA, 1847

Type species: *Battus rex* BARRANDE, 1846, p. 17; middle Cambrian, Drumian, *Paradoxides* (*Eccaparadoxides*) *pusillus* Zone, Buchava Formation, Skryje-Týřovice Basin, Barrandian area, the Czech Republic.

Diagnosis. See Shergold and Laurie (1997, p. 383).

Discussion. The type species was briefly described by Barrande (1846, p. 17) as *Battus Rex*. In the following year, Hawle and Corda (1847, p. 50, tab. 3, fig. 24) provided a German diagnosis of their new genus *Condylopyge*, which was based on morphology of the only one known specimen.

At the end of the 19th century, three other species and one subspecies were described, namely *Agnostus cambriensis* HICKS, 1871; *Agnostus regius* SJÖGREN, 1872; *Agnostus regulus* MATTHEW, 1886 and *Agnostus rex* var. *transectus* MATTHEW, 1896.

The study by Hawle and Corda (1847) was repeatedly cited by Jaekel (1909, p. 380), but this author did not mention the genus *Condylopyge* and surprisingly established a new genus *Paragnostus* with type species *Agnostus rex*. This approach was rejected by Raymond (1913, p. 138) and all subsequent authors with the argument that the same species is the type of *Condylopyge* HAWLE et CORDA, 1847. *Condylopyge* was briefly discussed by Kobayashi (1939, p. 107, table), who listed six species and two subspecies, all ranging from the early to mid middle Cambrian. Shergold et al. (1990, p. 57) and Shergold and Laurie (1997, p. 383) give the stratigraphic range of *Condylopyge* from the *Protolenus* Zone of Avalonia to the *Ptychagnostus punctuosus* Zone of Baltica.

Hitherto sixteen species are assigned to *Condylopyge*:

Condylopyge amitina RUSHTON, 1966, Purley Shale, Britain;

Condylopyge antiqua ELICKI et PIOLLA, 2004, Campo Pisano Formation, Sardinia, Italy;

Condylopyge cambrensis (HICKS, 1871), Newgale Formation, Wales, Britain;

Condylopyge carinata WESTERGÅRD, 1936, Alum Shale Formation, Sweden and Chamberlains Brook Formation, Newfoundland, Canada;

Condylopyge carinata vicina EGOROVA in SAVITSKIY et al., 1972, Siberian Platform, Russia;

Condylopyge cruzensis LIÑÁN et GOZALO, 1986, Valdemiedes Formation, Spain and Tröbitz Formation, Germany;

Condylopyge eli GEYER, 1998, Jbel Wawrmast Formation, Morocco;

Condylopyge globosa (ILLING, 1916), Abbey Shales, Britain;

Condylopyge imperator HOWELL, 1935, Couloma Formation, France;

Condylopyge matutina DEAN, 2005, Çal Tepe Formation, Turkey;

Condylopyge regia (SJÖGREN, 1872), Alum Shale Formation, Sweden;

Condylopyge rex (BARRANDE, 1846), Buchava Formation, Barrandian area, Czech Republic;

Condylopyge regulus (MATTHEW, 1886), Handford Brook Formation, Massachusetts, the U.S.A.;

Condylopyge spinigera WESTERGÅRD, 1946, Alum Shale Formation, Sweden and possibly also Chamberlains Brook Formation, Newfoundland, Canada;

Condylopyge transectus (MATTHEW, 1896), Chamberlain's Brook Formation, Massachusetts, U.S.A.

Nomina nuda

Condylopyge ishensis PERF. (ex Korzhev 2012);

Condylopyge etaerus in FLETCHER, 1972.

Condylopyge cf. *rex* (BARRANDE, 1846)

Text-fig. 2a–c

1992 *Condylopyge* cf. *rex*; Fatka and Korule, p. 50.

2004 *Condylopyge* cf. *rex*; Fatka et al., p. 377.

Material and locality. The internal mould of a broken cephalon (CGS CW 17, Text-fig. 2a) and an external mould of a pygidium (CGS FK 63, Text-fig. 2b), preserved in purple-brown fine greywacke. Both specimens were collected at the locality Potůček near Rejkovice (= locality 12 in Fatka and Kordule 1992) in lower levels of the *Paradoxides* (*Eccaparadoxides*) *pusillus* Zone sensu Fatka and Szabad (2014).

The internal mould of a cephalon (CGS CW 18, Text-fig. 2c) preserved in green-grey mudstone and collected by one of the authors (V.K.) from the man-made excavation at the foot of the slope known as Vinice near Jince (locality 20 in Fatka and Kordule 1992) in lower levels of the *Onymagnostus hybridus* Zone sensu Fatka and Szabad (2014).

Description. Cephalon roughly rectangular, gently rounded in front with slightly medially flattened surface. Postero-lateral sides slightly diverging. Axis convex, well vaulted, reaching about 80 percent of the total cephalic length and more than half the cephalon width. Anteroglabella triangular in outline with rounded anterior and postero-lateral margins, sagittal length of anteroglabella about three-quarters of the width. Posteroglabella slightly longer (sag.) than wide (tr.), reaching slightly more than two-thirds the width of the anteroglabella. A small median tubercle developed in the centre of the posteroglabella, a more massive spine is present at the posterior end of the posteroglabella. Border furrow relatively wide, shallow, border moderately wide.

Pygidium without marginal spines, slightly longer than wide. The convex border of uniform width, anteriorly narrower. The axis long with an expanded rounded posterior lobe. Axis bears a distinct elongated keel ending at the posterior lobe. F1 and F2 orientated forward, F3 bent slightly backward.

Thoracic segments unknown.

Discussion. The lectotype of *Condylopyge rex* was selected by Šnajdr (1958, p. 52) from Barrande's original collection housed in the National Museum Prague (coll. Barrande ČC 237, No. 1034, NM-L16556), and was figured by Barrande (1852, pl. 49, fig. 5a, b), Šnajdr (1958, pl. 2, fig. 1), Horný and Bastl (1970, pl. 1, fig. 2), Shergold et al. (1990, fig. 19.2) and Shergold and Laurie (1997, fig. 240.3).

For comparison, three specimens of *Condylopyge rex* from the Skryje-Týřovice Basin are presented here (Text-fig. 2d–2f). The *C. cf. rex* pygidium is morphologically identical to that of the type species (compare Text-fig. 2b and 2e). Morphology of both cephalons from the Jince Formation of the Příbram-Jince Basin agree with topotype specimens of *C. rex* from the Buchava Formation of the Skryje-Týřovice Basin. However, the median tubercle is situated in the middle of the posteroglabella, while in specimens of *C. rex* from the Skryje-Týřovice Basin this tubercle is located more anteriorly (compare Text-fig. 2a and 2c with 2d and 2f). This morphological feature excludes a definitive assignment to the type species.

Distribution. *Condylopyge rex* (BARRANDE, 1846) was originally described from the “Pod hruškou” locality near Týřovice (Šnajdr 1958, Fatka 2005). It is one of the abundant agnostids occurring in the higher stratigraphical levels of the Buchava Formation in the Skryje-Týřovice Basin of the Barrandian area (Šnajdr 1958, Fatka 2005). This large agnostid has subsequently been found in Baltica, Avalonia and several areas in West Gondwana.

Baltica. *C. rex* has been reported from southern Sweden (Tullberg 1880, Westergård 1946, Ahlberg et al. 2009, Weidner and Nielsen 2014), the Oslo area of Norway (Høyberget and Bruton 2008) and from Pleistocene erratic boulders of northern Germany (Rudolph 1990, 1994, Buchholz 2004).

Avalonia. *C. rex* has been known from Britain (Illing 1916, Rushton 1979, Rees et al. 2013) and from south-eastern Newfoundland (Howell 1925, Hutchinson 1962, Fletcher 2007).

West Gondwana. This agnostid species is documented from areas assigned to the Armorican Terrain Assemblage, namely in the Iberian Chains of Spain (Sdzuy 1961, Liñan and Gozalo 1986, Chirivella et al. 2009, Gozalo et al. 2011), in Montagne Noire of France (Courtesolle 1973, Álvaro et al. 1998), and in the Franconian Forest and Leipzig area of Germany (Elicki 1997, Sdzuy 2000, Elicki and Geyer in Heuse et al. 2010, Geyer 2010).

Condylopyge sp.

2002 *Condylopyge rex* (BARRANDE, 1846); Valíček and Szabad, p. 75–76, pl. 1, fig. 1.

Material and locality. Internal moulds of two cephalic shields preserved in fine yellow decalcified concretion. These specimens have not been housed to date in an official collection. They allegedly come from the foot of the slope known as Vinice near Jince (locality 15 in Fatka and Kordule 1992) in the lowermost levels of the *Acadolenus snajdri* Zone sensu Fatka and Szabad (2014).

Remarks. A description of these two specimens was not published by Valíček and Szabad (2002). The one small figure of a cephalon does not provide sufficient information for species determination. Consequently, determination of the species is not followed and classification in open nomenclature is preferred for this poorly documented and inaccessible material.

Conclusions

The exoskeleton of the cephalic shield does not show morphological characters decisive for determination of species in *Condylopyge*; reliable species assignment should be based on morphology of both pygidial and cephalic shields. Rare and poorly preserved specimens are to be left in open nomenclature. Consequently, the oldest cephalic shields of agnostids established in the Jince Formation are determined as *Condylopyge* sp., rare specimens established in higher stratigraphical levels are classified as *Condylopyge* cf. *rex*.

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