

GOLDIUS ANGUSTICALIX SP. NOV. (TRILOBITA, SCUTELLUIDAE) FROM THE COUVIN FORMATION (MIDDLE DEVONIAN) IN BELGIUM, WITH A PRELIMINARY LIST OF SCUTELLUID SPECIES FROM THE ARDENNES

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(3 figures, 1 plate)

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ABSTRACT Scutelluids are rare trilobites in the Devonian of the Ardennes (Belgium, France). *Goldius angusticalix* sp. nov. and *Scabriscutellum* sp. A are recorded from the Couvin Formation (lower Eifelian) in Nismes, Belgium. An overview is given of the regional distribution in the Eifelian of *Goldius* de Koninck (= *Brontes* Goldfuss; *Bronteus* Goldfuss; *Goldfussia* Bronn; *Calycoscutellum* Archinal), *Scabriscutellum* Richter & Richter, *Septimopeltis* Přibyl & Vaněk and *Scutellum* Pusch. Additionally, analogies between the early Eifelian trilobite faunas of Nismes and Üxheim (Germany) are briefly discussed.

KEYWORDS: Trilobita, Scutelluidae, Devonian, Ardennes, Eifel, biostratigraphy.

RESUME. *Goldius angusticalix* sp. nov. (Trilobita, Scutelluidae) de la Formation de Couvin (Dévonien moyen) en Belgique, avec une liste préliminaire d'espèces scutelluidées de l'Ardenne. Les trilobites scutelluidés sont rares dans le Dévonien de l'Ardenne (Belgique, France). *Goldius angusticalix* sp. nov. et *Scabriscutellum* sp. A sont décrits dans la Formation de Couvin (Eifélien inférieur) de Nismes. Un aperçu est présenté de la répartition régionale dans l'Eifélien de *Goldius* de Koninck (= *Brontes* Goldfuss; *Bronteus* Goldfuss; *Goldfussia* Bronn; *Calycoscutellum* Archinal), *Scabriscutellum* Richter & Richter, *Septimopeltis* Přibyl & Vaněk et *Scutellum* Pusch. En outre, les analogies entre les faunes trilobites contemporaines de Nismes et Üxheim (Allemagne) sont brièvement discutées.

MOTS-CLÉS: Trilobita, Scutelluidae, Dévonien, Ardenne, Eifel, biostratigraphie.

1. Introduction

In the summer of 2006, a fairly rich trilobite fauna (both in species and individuals) was recovered by the authors from early Eifelian limestones in a small quarry near the village of Nismes, Belgium. Among the collected material are two scutelluid species which are assigned to *Goldius* and *Scabriscutellum*. The occurrence of *Goldius* in Middle Devonian strata in Belgium has long been known (see, e.g., Maillieux, 1907) but records usually went by the name of its type species, *Brontes flabellifer* Goldfuss, 1839, regardless of their age and morphology. The present note aims to bring up to date some of the obsolete nomenclature of scutelluids from Belgium and is part of a necessary review of the Devonian trilobites in the Ardennes (see Magrean & van Viersen, 2005).

2. Overview of Scutelluidae in the Ardennes

The stratigraphically oldest and sole Early Devonian representatives of Scutelluidae (gen. et sp. indet.) known in the Ardennes come from the Longlier Formation (Pragian to possibly lowermost Emsian) in southeast Belgium, where they occur along with other trilobites of "Bohemian" type (van Viersen & Prescher, 2009). The

earliest Middle Devonian members are found along the southern border of the Dinant Synclinorium, more particularly in the early Eifelian parts of the Jemelle and Couvin formations. During the Eifelian, *Scutellum* seems to be considerably rarer than *Scabriscutellum* and *Goldius* while only this last genus persists here at least until the Givetian boundary. Scutelluidae is not known with certainty from middle to upper Givetian strata but reappears in Frasnian bioherms where it is represented by at least two species (see, e.g., Richter & Richter, 1926; Maillieux, 1927; Basse in Basse & Müller, 2004; Basse *et al.*, 2007; van Viersen & Prescher, 2007) which require further investigation.

Updated stratigraphic ranges of Scutelluidae in the Eifelian in the Ardennes (Fig. 1) are available for the first time since the works by Maillieux (see, e.g., Maillieux, 1938) based on examination of museum collections, literature research (only where illustrations or type numbers were provided) and new field data. The following list of taxa is intended as a preliminary basis which allows for stepwise refinement as additional data will be published in the future: *Goldius angusticalix* sp. nov. from the Couvin Formation (lower Eifelian) in Nismes; *Scutellum*

Stages	Eifelian					Givetian
Conodont zones	partitus	partitus	costatus	australis	koekelanus	hemiansatus
Formations on the southern border of the Dinant Synclinorium (Bultynck & Coen-Aubert, 2000)	Eau Noire Fm	Couvin Fm	Jemelle Fm		Hanonet Fm	
Trilobites						
<i>Goldius angusticalix</i>						
<i>Goldius</i> sp. A						
<i>Goldius</i> sp. B						
<i>Goldius</i> spp.						
<i>Goldius goolaertsii</i>						
<i>Goldius</i> cf. <i>goolaertsii</i>						
<i>Scabriscutellum</i> sp. A						
<i>Scabriscutellum</i> sp. B						
<i>Scabriscutellum canaliculatum</i>						
<i>Septimopeltis magnispina</i>						
<i>Thysanopeltella</i> sp.						
<i>Scutellum</i> sp.						
Üxheim biota						

Figure 1.

Stratigraphic distributions of scutelluids in the Eifelian of the Ardennes and indication of the Üxheim biota (formations were based on Bultynck & Coen-Aubert, 2000).

scaber of van Tuijn (1927) (piece #147 in the Van Tuijn Coll., Natuurmuseum Nijmegen, the Netherlands) from the middle or upper Eifelian in the Erezée area (= *Goldius* sp. A); *Calycoscutellum* sp. of van Viersen & Prescher (2008) from the Jemelle Formation (middle Eifelian) in Jemelle (= *Goldius* sp. B); “*Bronteus flabellifer*” of Maillieux (1907) from the middle or upper Eifelian in the Couvin area (= *Goldius* spp.); *Goldius goolaertsii* (van Viersen, 2007) from the Hanonet Formation (upper Eifelian to lower Givetian) in Resteigne; *Calycoscutellum* cf. *goolaertsii* of van Viersen (2007) from the Hanonet Formation (upper Eifelian or lower Givetian) in Couvin (= *Goldius* cf. *goolaertsii*); *Scabriscutellum* sp. A (see below) from the Couvin Formation (lower Eifelian) in Nismes; *Scabriscutellum* of van Viersen (2006a) from the Jemelle Formation (lower Eifelian) in Vireux-Molhain (= *Scabriscutellum* sp. B); *Scabriscutellum canaliculatum* (Goldfuss, 1843) of van Viersen & Prescher (2008) from the Jemelle Formation (middle Eifelian in Jemelle);

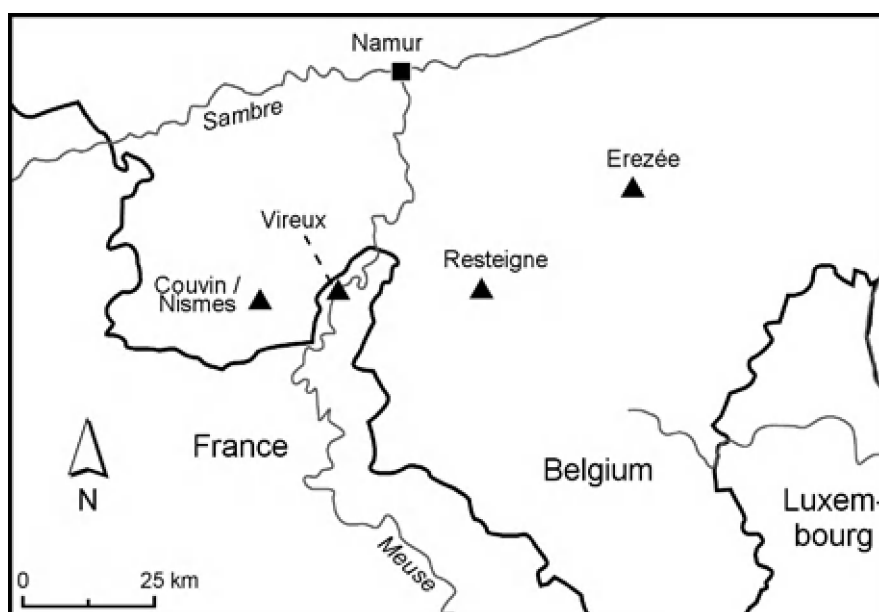
Septimopeltis magnispina (Maillieux, 1938) from the Jemelle Formation (lower Eifelian) in Vireux-Molhain; *Thysanopeltella* sp. (unpubl. data, AVV) from the Jemelle Formation (middle Eifelian) in the Couvin area; *Scutellum* sp. of van Viersen & Prescher (2008) from the Jemelle Formation (middle Eifelian) in Jemelle.

Reference is made to Basse *in* Basse & Müller (2004) for a comprehensive list of species of the above genera in the Ardenno-Rhenish Mountains.

3. Geological context

The described trilobite specimens were recovered from locality “Loc028”, a small quarry on the western outskirts of Nismes (N50°03.720', E4°32.600', according to van Viersen, 2006b), southern border of the Dinant Synclinorium, Belgium (Fig. 2). The outcropping rocks belong to the Foulerie Member of the Couvin Formation (*partitus* to *costatus* conodont zones), a biostromal unit

Figure 2. Map of the Ardennes indicating some of the trilobite-bearing localities.



that is confined to the area between Couvin and Givet (Bultynck & Dejonghe, 2001). The macrofauna is chiefly comprised of tabulate and solitary rugose corals, stromatoporoids, bryozoans, brachiopods, gastropods and trilobites.

The trilobite fauna in Nismes is characterised by frequent Proetinae (*Dohmiella dewildei* van Viersen, 2006b) and Otariinae (*Cyphaspis unguoloides belgica* van Viersen & Prescher, 2007) as well as rare Tropidocoryphinae (*Astycoryphe* sp., *Tropidocoryphe* sp.), Trochurinae (*Ceratarges* cf. *cognatus* van Viersen, 2006a) and Phacopinae (*Phacops*? sp.). Scutelluinae is represented by the moderately common *Goldius angusticalix* sp. nov. and the rare *Scabriscutellum* sp. A (see below). *G. angusticalix* sp. nov. is of particular interest because it is one of the stratigraphically oldest species of *Goldius* known and the type material among the best preserved available from lower Eifelian strata in the Ardenno-Rhenish Mountains.

Most of the trilobite material from Nismes encompasses loose sclerites that usually belong to *Cyphaspis* and *Dohmiella* and which are occasionally amassed. Complete but always slightly disarticulated exoskeletons have been recorded of *Dohmiella* (van Viersen, 2006b), *Tropidocoryphe* (priv. coll. of W. De Winter, Gent) and *Goldius* (priv. coll. of L. Blontrock, Boezinge). A disarticulated specimen of *Goldius angusticalix* sp. nov. is recorded in the present note (Pl. 1, Figs F, H, I). Its cephalon is inverted and the entire right half of the exoskeleton as well as the left edges of the pygidium are broken off. This damage and the apparently incompletely disintegrated state of the thoracic ligaments at the time of final burial suggest that the individual was transported over a small distance subsequent to its decease. A monospecific accumulation of a pygidium, an inverted pygidium, a cephalon and several nearby thoracic fragments, is also recorded (Pl. 1, Figs A-C).

The presence of *Goldius* sclerites under corals and stromatoporoids is occasionally observed in Nismes and other Middle Devonian localities in Belgium. Such cases have been associated in the literature with the life habits of these trilobites. Pedder & Feist (1998) suggested that the occurrences of especially scutelluid remains under the fringes of flat tabulate or rugose corals in the Emsian of the Montagne Noire indicate that these individuals sought shelter here during ecdysis. Parts of *Hypsipariops*? sp. of van Viersen (2007), which are locally abundant under stromatoporoids in the Hanonet Formation at Resteigne and which occasionally occur here in the Salterian mode of exuviation (sensu Richter, 1937), attest to an equivalent in phacopid trilobites.

4. Comparison to the Eifel

The trilobite fauna of the Couvin Formation in Nismes bears a striking resemblance to an early Eifelian assemblage from the Kirberg Member of the Nohn Formation in Üxheim, Eifel, that was discussed by van Viersen & Prescher (2007). The Üxheim biota (Fig. 1) comprises *Dohmiella prescheri* van Viersen, 2006b,

Cyphaspis unguoloides unguoloides (Erben, 1953), *Tropidocoryphe* sp., *Ceratarges* sp., *Phacops imitator* Struve, 1970, *Goldius sagitta* (Archinal, 1994), and *Scabriscutellum* sp. Contrary to the situation in Nismes, phacopines (*P. imitator*) are common and a second proetine occurs which belongs to *Gerastos*, whereas *Astycoryphe* is hitherto absent. The similarities between these faunas underline the potential value of trilobites for Devonian biostratigraphic correlations between the Ardennes and Eifel as was already suggested by Richter (1914, p. 89) and van Viersen *et al.* (2009, p. 47) for other, middle Eifelian localities. The trilobites from Nismes and Üxheim may be parapatric species that lived along the same coastal line on the northern margin of the Rheic Ocean.

5. Systematic palaeontology

The specimens were whitened with magnesium chloride prior to photography and are deposited in the Natuurhistorisch Museum Maastricht (abbreviated NHMM).

Family Scutelluidae Richter & Richter, 1955

Subfamily Scutelluinae Richter & Richter, 1955

Genus *Goldius* de Koninck, 1841

Synonymies. *Brontes* Goldfuss, 1839, preoccupied according to de Koninck (1841); *Bronteus* Goldfuss, 1843, junior subjective synonym of *Scutellum* according to Richter & Richter (1926) and junior objective synonym of *Goldius*; *Goldfussia* Bronn, 1848, junior objective synonym of *Goldius*; *Calycoscutellum* Archinal, 1994, junior objective synonym of *Goldius* according to Basse (2007).

Type species. *Brontes flabellifer* Goldfuss, 1839, from the Middle Devonian of Germany.

Discussion. In 1839 Goldfuss erected *Brontes*, a fateful naming which in due course gave rise to much confusion in the literature. De Koninck (1841, pp. 5, 6) (this paper has been confused with de Koninck's 1841-1844 opus on the Carboniferous fossils of Belgium) noticed that *Brontes* was preoccupied and rightly replaced it with *Goldius* even though he also assigned *Scutellum costatum* Pusch, 1833, the type species of *Scutellum* Pusch, 1833, to it. Dumont & Cantraine in Dumont (1841) briefly commented on de Koninck's work and made the inadmissible suggestion that the replacement of *Brontes* is unwarranted because the name had already been adopted by the scientific community and since the original use concerns an insect. Goldfuss (1843, p. 548) subsequently attempted to suppress *Goldius* by introducing *Bronteus* but Richter & Richter (1926, p. 116) condemned this action while considering *Goldius* a junior subjective synonym of *Scutellum*. Despite this, the use of *Bronteus* and *Goldius* in the literature continued in the following decades. According to Jell & Adrain (2003, p. 379), another replacement name *Goldfussia* was proposed by Bronn

(1848), which they referred to Richter & Richter (1926) as being a junior subjective synonym of *Scutellum*. However, Richter & Richter (1926) only discussed *Brontes*, *Bronteus* and *Goldius* – not *Goldfussia*. Bronn's (1848, p. 175) sole assertion was that *Goldius* is a 'nomen corruptum' for *Goldfussia* and so the question might rise of whether his intentions were actually to emend *Goldius*. The present authors trust in Jell & Adrain's (2003) judgement and agree that *Goldfussia* Bronn, 1848 should, in fact, be considered available. Jell & Adrain (2003, p. 379) also stated that Barrande's (1852) emendation of *Goldfussia* to *Goldfussius* was unnecessary but we were unable to find such a designation in Barrande's work. It was Burmeister (1843, p. 139) who stated that he considers Goldfuss' (1843) emendation of *Brontes* into *Bronteus* to be more appropriate than de Koninck's (1841) corruption *Goldius* from *Goldfussius*. We believe that Burmeister did not intend to emend *Goldius* although we admit to the subjectiveness of our interpretation. The name *Goldfussius* Burmeister, 1843 is not deemed by us to be available.

In the second half of the nineteenth century *Brontes flabellifer* was commonly considered a species of *Scutellum* until Archinal (1994) selected it as the type species of her new subgenus *Calycoscutellum*. Archinal's concept was provisionally dismissed by Basse (1996, p. 125) and Feist & Talent (2000, pp. 68, 69) who expressed their doubts about the value of the pygidial outline and the morphology of the pygidial median rib as the main characters for (sub)generic distinction from *Scutellum*. *Calycoscutellum* was subsequently recognised by Jell & Adrain (2003, p. 354) and was granted generic rank in a revised form by Basse in Basse & Müller (2004, p. 31) who restricted it to taxa close to the type species. The genus has since then been used (see, e.g., Basse & Weddige, 2004; van Viersen, 2007) though we feel that intermediate forms between *Calycoscutellum* and *Scutellum* (see tentative assignments to these genera by Basse in Basse & Müller, 2004) may suggest that this classification is notional. The choice of type species renders *Calycoscutellum* a junior objective synonym and leads to the resurrection of *Goldius* (Basse, 2007, p. 224).

Goldius angusticalix sp. nov.

(Pl. 1, Figs A-I)

v 2006b *Calycoscutellum* cf. *sagitta* Archinal, 1994; van Viersen, p. 231.

Etymology. From *angustus* (Lat.) = narrow, and *calix* (Lat.) = a chalice, referring to the combined morphology of the pygidial axis and median rib.

Holotype. NHMM 2009061a+b, positive and negative moulds of a pygidium (Pl. 1, Fig. A).

Paratypes. NHMM 2009062a+b, positive and negative moulds of a partially exfoliated cephalon (Pl. 1, Fig. B); NHMM 2009063a+b, positive and negative moulds of a pygidium (Pl. 1, Fig. C); both situated on the same rock

slab as the holotype. NHMM 2009065, librigena (Pl. 1, Fig. G). NHMM 2009064a-d, disarticulated, incomplete specimen (Pl. 1, Figs F, H, I). NHMM 2009066, mostly exfoliated cranium with librigenal remains (Pl. 1, Figs D, E); NHMM 2009067, negative print of fragmentary pygidium (unfigured); both on the same rock slab. NHMM 2009068, fragmentary pygidium (unfigured). All from type locality and horizon.

Diagnosis. Lateral glabellar furrows S3 are firmly impressed. Anterolateral pygidial border is wholly smoothly rounded. Pygidial median rib is broad (tr.) distally, exceedingly narrow proximally, and rudimentary close to the axis. Pygidial pleural ribs are dorsally flattened.

Type locality and horizon. Foulerie Member of the Couvin Formation, locality "Loc028", Nismes, Belgium.

Discussion. As has been suggested by van Viersen (2007) and implicitly also by other authors (e.g. Archinal, 1994), species of this genus are often similar enough for descriptions to be restricted to diagnostic features only. Therefore, *Goldius angusticalix* sp. nov. is only diagnosed and contrasted with other species.

Goldius sagitta, to which the new species was previously tentatively assigned, was established upon a type series of specimens of early to middle Eifelian age (Lauch, Nohn and Ahrdorf formations) from several localities in the Eifel. The holotype incomplete pygidium from the Nohn Formation at Üxheim was figured by Archinal (1994, Pl. 5, Fig. 29) and accidentally switched by Basse in Basse & Müller (2004) with a paratype in their illustrations (*ibid.*, Pl. 1, Fig. 1, vs. Pl. 1, Fig. 2) (pers. comm. with M. Basse). Feist & Talent (2000, p. 68) already noticed that there is much variation among the paratype pygidia of *G. sagitta*. Judging from Archinal's illustrations of the paratypes we believe that their assignment to *G. sagitta* may in fact be precarious. The holotype of *G. sagitta* shares several features with *G. angusticalix* sp. nov. such as the indistinct lobation of the pygidial axis and the straightened, proximally broad pleural ribs, yet is distinct in having more vaulted (tr.) pygidial pleural ribs, a median rib that narrows abruptly and closer to the axis, and a markedly curved anterolateral pygidial border (the anterolateral corner is situated lateral to the center (sag.) of the axis as against indeterminately posterior to the axis in *G. angusticalix* sp. nov.).

The type species of *Goldius* shows some resemblances to *G. angusticalix* sp. nov. but is principally different in having a pygidium with wider interpleural furrows, a median rib that disappears well before reaching the axis, and a more angular anterolateral border.

The distally widened pygidial pleural ribs of *G. angusticalix* sp. nov. are a common feature among late Eifelian to Givetian scutelluines including species from the Rhenish Mountains assigned to *Calycoscutellum* with question by Basse in Basse & Müller (2004) and taxa from England assigned to *Scutellum* by Selwood (1966).



Figure 3. Pygidium of *Scabriscutellum* sp. A (NHMM 2009082) from the Foulerie Member of the Couvin Formation (lower Eifelian) in Nismes. Scale bar represents 5 mm.

Conversely, the pygidial median rib of these taxa is usually broad proximally.

Genus *Scabriscutellum* Richter & Richter, 1956

Type species. *Bronteus scaber* Goldfuss, 1843, from the Middle Devonian of Germany.

Scabriscutellum sp. A

(Fig. 3)

v 2006b *Scabriscutellum* sp.; van Viersen, p. 231.

Material. NHMM 2009082, partially exfoliated fragment of a pygidium from the Foulerie Member of the Couvin Formation, locality “Loc028”, Nismes, Belgium.

Discussion. One fragmentary pygidium of *Scabriscutellum* was recovered from Nismes, which does not permit a detailed comparison with congeners from the Ardennes and Eifel.

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PLATE 1

Goldius angusticalix sp. nov. from the Foulerie Member of the Couvin Formation (lower Eifelian) in Nismes.

A. holotype pygidium, NHMM 2009061a.

B. paratype partially exfoliated cephalon, NHMM 2009062a.

C. paratype pygidium, NHMM 2009063a.

D, E. paratype mostly exfoliated cranidium with librigenal remains, NHMM 2009066, in dorsal (D) and oblique anterior (E) views.

F. thorax and pygidium of paratype disarticulated incomplete specimen, NHMM 2009064a, in dorsal view.

G. paratype librigena, NHMM 2009065, in dorsal view.

H, I. left part of cephalon and negative print of thorax of paratype distarticulated incomplete specimen, NHMM 2009064b, in obliquely lateral (H) and dorsal (I) views.

Scale bars represent 5 mm. Symbols are α = anteriormost point of preocular suture; gc = genal corner.

