A new representative of the lichid genus Ohleum (Trilobita) from the Eifelian (Middle Devonian) of southern Belgium

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ABSTRACT. Trilobites of the family Lichidae are relatively poorly diversified within the Eifelian mixed siliciclastic-carbonate succession of the southern margin of the Dinant Synclinorium (Belgium). Until now, they were only represented by species belonging to the genera Ceratarges and Eiffiarges. The recent discovery of a well-preserved specimen within the Eifelian-aged Jemelle Formation in the Couvin area led us to propose the first detailed description of a representative of the genus Ohleum (O. magreani sp. nov.) in the Ardennes.

KEYWORDS: trilobites, Lichida, Devonian, Ardennes.

RESUMÉ. Un nouveau représentant du genre lichidé Ohleum (Trilobita) de l’Eifélien (Dévonien moyen) du Sud de la Belgique. Les trilobites de la famille des Lichidae sont relativement peu diversifiés au sein de la succession eifélienne du bord sud du Synclinorium de Dinant (Belgique) qui est caractérisée par une sédimentation mixte silicoclastique à carbonatée. Jusqu’à présent, ils étaient seulement représentés par des espèces appartenant aux genres Ceratarges et Eiffiarges. La découverte récente d’un spécimen bien conservé au sein de la Formation de Jemelle d’âge eifélien dans la région couvinoise nous amène à proposer la première description détaillée d’un représentant ardennais du genre Ohleum (O. magreani sp. nov.).

MOTS-CLES: trilobites, Lichida, Dévonien, Ardennes.

1. Introduction

Trilobites rank among the first invertebrates which were reported and illustrated in the Devonian of southern Belgium (e.g. Davreux, 1833; de Koninck, 1841). Several authors cited and/or described trilobites from the Middle Devonian (Eifelian and Givetian) succession exposed in this area, notably Gooselot (e.g. 1860, 1880, 1888), Stainier (1887), Kayser (1895), Fournier (1897), Maillieux (1904, 1908, 1919, 1922, 1933, 1938), Richter & Richter (1919), Asselberghs (1923), van Tuinj (1927), Monseur (1958), Lessuise (1979), and Struve (1985). After a long period during which the trilobite faunas from the considered stratigraphic interval have received scant attention from specialists, the beginning of the 21st century is marked by a renewed interest in these emblematic fossils (e.g. Magrean, 2006; van Viersen & Prescher, 2010 and references herein).

Within the Devonian succession of southern Belgium, the diversity of the trilobites reached a peak during the Eifelian (Crônier & van Viersen, 2007), which is part of major transgressive sequence starting in the late Emsian (Bultynck et al., 2000). The latter permitted the development of mixed siliciclastic-carbonate environments favourable to the emergence of new taxa belonging to the genera Ceratarges and Eiffiarges. The oldest occurrences of lichids are recorded in the Upper Ordovician of the Brabant Massif and the Sambre-Meuse strip (e.g. Richter & Richter, 1919; Lessuise, 1979, and Struve, 1985). After a long period during which the trilobite faunas from the considered stratigraphic interval have received scant attention from specialists, the beginning of the 21st century is marked by a renewed interest in these emblematic fossils (e.g. Magrean, 2006; van Viersen & Prescher, 2010 and references herein).

2. Geological setting

The material (a single specimen!) described in this paper comes from the Couvin area (see below for more details), which is located on the southern margin of the Dinant Synclinorium (Fig. 1). This Variscan structural unit was part of the Namur-Dinant Basin, which was located on the south-eastern margin of Laurussia during Devonian time (e.g. Torsvick & Cocks, 2004).

The specimen was recovered from the Eifelian-aged Jemelle Formation (Fig. 2). In the Jemelle area, where the latter was defined originally by Godefroid (1991a), three members can be distinguished (from bottom to top): La Station, Cimetière and Chavées members. However, in the Couvin area, which is located about 50 km west of Jemelle, only the Chavées Member can be recognized above the underlying limestones of the Couvin and Middle Devonian of Belgium (Dinant and Neufchâteau synclinoria). Lichid trilobites, which are characterized by their peculiar glabellar lobation, relatively large hypostome, and tuberculate and spinose exoskeleton (Thomas & Holloway, 1988), appeared, depending on the systematic applied, in the middle Cambrian (Thomas & Holloway, 1988) or in the Ordovician (early Tremadoc) (e.g. Whittington, 2002) and became extinct in the course of the middle Givetian (Feist, 1991). In Belgium, the oldest occurrences of lichids are recorded in the Upper Ordovician of the Brabant Massif and the Sambre-Meuse strip (e.g. Richter & Richter, 1951; Lespérance & Sheehan, 1987).

Figure 1. Schematic geological map of southern Belgium (modified from de Béthune, 1954) with location of the localities that yielded Lower and Middle Devonian lichid trilobites.
A new representative of the lichid genus *Ohleum* (Trilobita) from the Eifelian

### 3. Systematic palaeontology

Order Lichida Moore, 1959  
Superfamily Lichoidea Hawle & Corda, 1847 (*sensu* Fortey, 1997)  
Family Lichidae Hawle & Corda, 1847  
Subfamily Trochurinae Phleger, 1936  
Genus *Ohleum* Basse, 1998

**Type species.** *Ohleum eurydice* Basse, 1998 (*= gen. nov. ex Trochurinae eurydice* sp. n. [nom. nud.] in Basse [1996]), from the Ohle Formation, middle Eifelian, Gummersbach, Oberbergisches Land, Germany.

**Diagnosis.** As the holotype of *Ohleum magreani* sp. nov. includes the first comprehensive evidence of the librigenae of *Ohleum* since those of the only previously known cranium are damaged and the genal and metafixigenal spines broken off [M. Basse, pers. com. 2011]), it permits us to emend the generic diagnosis given by Basse (1998, p. 71) (see also Basse [in Basse & Müller, 2004, p. 111]): small-sized Trochurinae with posterolateral crinoidal lobe markedly larger than the bullar lobes; palpebral lobes directed externally, smaller than the bullar lobes; librigena small, triangular and with large genal spine curved posteriorly; holochroal eye on a stalk-like socle; posterior border of cranium prolonged by prominent metafixigenal spine; pygidium sharply differentiated; number of marginal spines seeming to increase in postlarval stage; rachis limited by almost parallel margins, with pronounced thoron postmedianly located; posterior part of rachis well-developed; pleural fields very narrow; 2 5 lateral projections mainly developed as long spines; both elements of the median attachment either merged (then relatively long) or separated (then short) and not dorsally erected.

**Discussion.** Until now, the genus *Ohleum* included, besides the type species, a second species left in open synonymy, i.e. *O*. sp. n. A *sensu* Basse (1998) (*= gen. nov. ex Trochurinae sp. n. A* in Basse [1996]). Both taxa were recovered from the Eifelian-aged Ohle Formation in the Rhenish Massif, east of the river Rhine, and represented by a limited number of disarticulated specimens.

Although the Eifelian trilobite fauna from the Oberbergisches Land (e.g. Basse, 1996, 1998) is very similar to that discovered within the Ahrdorf Formation at Hillesheim (Gees) (e.g. Basse & Müller, 2004), not a single occurrence of *Ohleum* is reported in the Eifel Synclines until now. A possible explanation for this situation may be the tiny size of the representatives of this genus, their rarity and their probable confusion with species of *Ceratarges* Gürich, 1901, though the pygidium of the representatives of the latter are devoid of the typical median terminal projection present in *Ohleum*.

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**Figure 2.** Eifelian lithostratigraphy of the Couvin area (modified from Bultynck et al., 2000). Abbreviation: St., stratigraphy.

**Figure 3.** Reconstruction of *Ohleum magreani* sp. nov. based on the holotype (ULg-2011-11-16) and assuming the presence of 11 thoracic segments.
**Ohleum magreani** sp. nov.

Figs 2-4

2010 *Ohleum* *cf.* *eurydice* (Basse, 1998) (*sic*); Bonino & Kier: p. 426, fig. a.

2011 *Ohleum* *cf.* *eurydice* (Basse, 1998) (*sic*); Magrean & Taghon: pp. 88-89, fig. 7.

**Derivation of name.** Named after Benedikt Magrean, who discovered the holotype during fieldwork in 2006 and kindly put it at our disposal for description.

**Holotype.** An articulated exoskeleton, broken in two parts, probably lacking one thoracic segment. It is deposited in the collections of the Geology Department of the Liège University and registered as ULg 2011-11-16.

**Type locality and horizon.** A temporary outcrop (Magrean, 2007), open in 2006 during the foundation works for a new house, along of the road from Couvin to Petigny (road N99) (southern border of the Dinant Synclinorium, see Marion & Barchy [1999] for geological setting); grid references (Belgian Lambert system) (East–North): 160.803–82.763 (IGN map 57/7-8). Chavées Member of the Jemelle Formation, Eifelian (see Bultynck [1970] and Godefroid [1995] for correlations between the southern margin of the Dinant Synclinorium and the Eifel). In the absence of conodont data for the type locality and on the basis of its geological context, we can reasonably admit that the holotype is most probably from the *Tortodus kockelianus australis* conodont Zone (Fig. 2), but this needs confirmation.

**Material.** Only the holotype.

**Diagnosis.** Cephalon with genal and metafixigenal spines; genal spines bearing secondary spines; pleural ribs and terminal spines of thorax with some sparse and irregular granulations; only the first two axial rings of the pygidium developed; no further rings or pleurae on the posterior part of the pygidium; two parallel sagittal rows of four pustules and smaller pustules randomly dispersed on posterior part of the rachis: elements of the long median ‘thorn’ merged and distally forked into two spines.

**Description.** Cranidium with strongly convex glabella overhanging the very narrow and convex anterior border; glabella consisting of an elongate middle lobe and a pair of rounded, subtriangular bullar lobes; presence of an inflated and rounded postero-lateral cranial lobe behind each bullar lobe, extending towards the palpebral lobes; postero-lateral cranial lobes two times wider than the bullar ones; central part of the cranidium (glabella, bullar lobes and postero-lateral cranial lobes) ornamented with prominent pustules of varying size distributed randomly; palpebral lobes elevated, directed externally, only slightly granulated and 0.8 times smaller than the bullar lobes; holochroal eye raised above the rest of the librigena on a stalk-like socle bearing small pustules; occipital ring broad but short, granulated and ornamented with five tiny pustules; no trace of an occipital spine; pair of tiny, rounded, and slightly inflated preoccipital glabellar lobes lying between the occipital ring and the middle glabellar lobe; longitudinal glabellar and occipital furrows firmly impressed; librigena consisting of a tiny subtriangular portion merging with the eye socle; the large genal spine and the posterior border; genal spine curved posteriorly, covered with granulation and small pustules and bearing at least four smaller anteriorly directed secondary spines; posterior border continuing into a prominent metafixigenal spine approximately as long as, but coarser than the first pleural spines of the thorax.

Thorax composed of ten visible segments (most probably 11, see discussion below), all ending in long terminal pleural spines; no trace of granulation or ornamentation on the convex axial rings; pleural ribs and terminal spines showing some sparse and irregular granulation; anterior axial thoracic ring almost as broad as the posterior one, resulting in almost parallel axial furrows; pleura slightly convex with posterior band inflated; no trace of a pleural furrow; pleural spines slightly curved posteriorly, as wide as and 2.5 times as long as the pleura; pleural...
spines situated in the middle of the thorax only slightly longer than those situated anteriorly and posteriorly.

Pygidium without spines or terminal thorn, 1.2 times wider than long, and with large border (c. half of the rachis width) consisting of an outer, elevated and semi-cylindrical ring and an inner flat one; rachis equadimensional with length and width corresponding to 65 per cent and to 50 per cent of those of the pygidium, respectively; only the first axial ring clearly visible and extended onto the posterior pleural band ending in a long marginal spine; posterior pleural band slightly orientated posteriorly and differentiated from the axial ring by a sharper angle; posterior margin of the rachis separated from the posterior border of the pygidium by a postrachial elevation running across that portion of the pleural field; pleural furrows sharp; anterior pleural band of the first pleural segment short and almost flat; second axial ring seeming faded away (only the base of the ring on the rachis flanks are raised and extended by the posterior pleural spine or a marginal spine); second marginal spine as long as the first one; second posterior pleural band more sharply directed posteriorly and flatter than the first one; posterior pleural band bearing a pustule; no further rings or pleurae on the posterior part of the pygidium, but 2 x 3 spines on the posterolateral border (the length of these spines decreases towards the terminal thorn and corresponds to c. 60 per cent of the length of the two first pygidial spines); posterior part of the rachis characterized by two parallel sagittal rows of four pustules and smaller, pustules randomly dispersed on a granulated bottom; both elements of the median attachment merged and end in a fork; attachment shorter (x 0.75) than the two first marginal spines; two small spines projecting posteriorly at mid-length of the attachment extending towards the rachis by a convex elevation; two sharp pustules present where the thorn meets the pygidial border; two short but sharp thorns just posterior to the pygidial border.

Discussion. Although the thorax of the holotype of Ohleum magreani sp. nov. is broken in two parts, and only ten segments were preserved, we see no reason to doubt of the number of thoracic segments (11) proposed by Basse (1998) for Ohleum. The eleventh segment may lie hidden somewhere within the calcareous matrix. There are some records of lichids with only ten segments (Basse 1998, p.74; Kowalski 1992, fig. 151) but as stressed by Whittington (2002), these are all small specimens. They may not be holaspids or the anterior segment may be concealed beneath the posterior edge of the cephalon.

O. magreani shows some similarities with other lichids. Characteristic for O. magreani seem its prominent metaxifugal spines. Only very few species like Akantharges sp. (Thomas & Holloway, 1988: pl. 14, figs 300, 303), and Mephiarges mephisto (Richter & Richter, 1918) (see Basse & Müller, 2004: figs 704–705) possess such spines.

The general outline of O. magreani resembles that of the type species of the genus Ohleum (O. eurydice Basse, 1998). Typical for the new species are the small spines with secondary and metaxifugal ones. The presence (or otherwise) of a metaxifugal spine in O. eurydice is unknown as related to the ornamentation of its cephalon, thorax and pygidium is clearly distinct. J. bifida bears small spines on the axial ring whereas O. magreani has no pustules or spines on its thorax. Pygidia of both species are similar as they bear two large spines and three short terminal ones, but those of O. magreani are longer, especially the last three. Furthermore, the pygidium of J. bifida has a stronger ornamentation. Both species also share a postmedian prosomal thorax but in O. magreani it is not lowered but forked. The posteralateral cranial lobes of J. bifida are hardly bigger than the bullar lobes. J. duplicispinata (Kaneko, 1984) from the Middle Devonian of the Kitakami Mountains (north-east Japan) resembles O. magreani in its general outline, but there are also clear differences between these species. J. duplicispinata has prominent spine pairs on the median glabellar lobe and a prominent spine pair on the posteralateral cranial lobe; the ornamentation on the cephalon of O. magreani consists of a combination of small and more prominent pustules. J. duplicispinata has more or less well-developed occipital spines contrary to O. magreani. The pygidium of J. duplicispinata has two prominent marginal spines, five small irregularly sized spines on its posteralateral margin and a prominent, upturned marginal spine at the posterior end; O. magreani has only five marginal spines and a bicomposite median attachment bearing thorns and knots.

4. Lichid trilobites from the Devonian of Belgium

In the Devonian of Belgium, the oldest representatives of the family Lichidae are known from the upper part of the Pragian-aged Longlier Formation in the Neufchâteau Synclinorium (e.g. Godefroid, 1994; Bultynck et al., 2000), where they were firstly reported as a rather common species of Lichas by Maillieux (1914) and subsequently assigned to an unidentified species of the genus Belenopyge Pek & VanéK, 1991 by van Viersen & Prescher (2009). The occurrence of the latter in the Pragian is considerably earlier than its generally accepted first appearance (in the latest Emsian) in the Ardennes and the Rhenish Massif, west of the river Rhine (van Viersen & Prescher, 2009 and references herein).

Lichias became more abundant in the Middle Devonian (Eifelian), where they were frequently reported on the southern
border of the Dinant Synclinorium. Maillieux (1904) was the first to report their occurrence by recording *Acidaspis cf. vesiculosa* Beyrich, 1845 from Eifelian rocks in the Courain area. Later, Maillieux (1919, 1933, 1938) corrected his identification to *Ceratarges armatus* (Goldfuss, 1839), and his lists of trilobites did not any longer record *A. cf. vesiculosa*, which is assumed to not occur in the Ardennes. Maillieux (1938) mentioned the presence of *C. armatus* in the old stratigraphic units Co2a and Co2c (Maillieux & Demanet, 1929), which are both included now in the Jemelle Formation (Godefroid, 1991a). As the concept of *C. armatus* has been restricted by Basse (in Basse & Müller 2004) and van Viersen (2006), a revision of Maillieux’s material would be necessary to assess its conspecificity (van Viersen, 2007), but this is well beyond the scope of this work. Van Viersen (2006) described *C. cognatus* from the famous ‘Mur des douaniers’ (Crónier & van Viersen, 2006) in Vireux-Molhain (Ardennes, France), near the Belgian border, where it occurs within the Vieux Moulin Member of the Jemelle Formation (Eifelian). Van Viersen (2007) also described *C. cf. armatus*, from the Jemelle Formation near the railway station in Jemelle.

Basse & Müller (2004) reported the presence of the genus *Eifilarges* within the Jemelle Formation in the Courain area on the basis of a single specimen. They noted that the latter, left in open nomenclature, shows similarities with *E. caudimirus* (Richter & Richter, 1917). Furthermore, Magrean (2006) subsequently reported this species within the Jemelle Formation in Jemelle.

5. Conclusions

In the Eifelian succession of southern Belgium (Dinant Synclinorium), the Lichidae are represented by the genera *Ceratarges, Eifilarges* and *Oleium* (van Viersen, 2007; Magrean, 2006; Basse, 2006; Basse & Müller, 2004; this paper) which are only known from the essentially shaly Jemelle Formation.

In his study of the late Emsian and Eifelian mixed siliciclastic-carbonate succession exposed on the southern margin of the Dinant Synclinorium, east of the river Meuse, Godefroid (1968) underlined the role that may be played by trilobites in biostratigraphy although he noticed that they were generally poorly represented in the sections that he studied. Nevertheless, after the last decade, which was rich in descriptions of new Eifelian trilobite taxa (see references above), we believe that new collects of material by the bed-by-bed method, in conjunction with conodont analyses complemented by brachiopods and conodonts of the type couple of the Couvinien. Mémoires of the Institut Géologique de l'Université de Louvain, 26, 1-152.


Gürich, G., 1901. Über eine neue Lichas-Art aus dem Devon von Neu Süd-Wales und über die Gattung Lichas überhaupt. Neues Jahrbuch für Mineralogie, Geologie und Paläontologie, Beilagebände, 14, 519-539.


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