

New Late Cretaceous cirripede records from the Liège-Limburg basin (northeast Belgium)

by Joe S.H. COLLINS & John W.M. JAGT

Abstract

Two cirripede faunules comprising five species, viz. the scalpellomorphs *Cretiscalpellum striatum* (DARWIN, 1851), *C. obtusum* JAGT & COLLINS, 1989, *Arcoscalpellum* cf. *fossula* (DARWIN, 1851), *A. dortangsi* nov. sp. and the brachylepdomorph *Brachylepas fallax* (DARWIN, 1851), are described from the early Early Campanian Vaals Formation (*lingua/quadrata* Zone *sensu germanico*) as exposed at the Ciments Portland Liégeois SA quarry (Haccourt, Liège, Belgium).

Key-words: Cirripedia, Late Cretaceous, Belgium, new species.

Résumé

Deux faunules de cirripèdes provenant de la Formation de Vaals (Campanien inférieur, zone à *lingua/quadrata*) affleurant dans la carrière Ciments Portland Liégeois SA (Haccourt, Liège, Belgique) sont décrites. Elles comprennent cinq espèces: les scalpellomorphes *Cretiscalpellum striatum* (DARWIN, 1851), *C. obtusum* JAGT & COLLINS, 1989, *Arcoscalpellum* cf. *fossula* (DARWIN, 1851), *A. dortangsi* nov. sp. et le brachylepdomorphe *Brachylepas fallax* (DARWIN, 1851).

Mots-clés: Cirripedia, Crétacé supérieur, Belgique, espèce nouvelle.

Introduction

In 1857, BOSQUET recorded three cirripede taxa from the so-called "Hervien", viz. (in original nomenclature) *Scalpellum maximum*, *S. maximum* var. *elongatum* and *Mitella glabra*, in southern Limburg and contiguous areas of northeast Belgium. This unit corresponds to the Vaals Formation in current terminology, but may also have included the Benzenrade Member of the Gulpen Formation (FELDER & BOSCH, in press). If so, strata referred to as "Hervien" by BOSQUET and his contemporaries would have ranged in age from the early Early to the early Late Campanian. Of note in this respect is that in the overlying Zeven Wegen Member (Gulpen Formation) of early Late Campanian age, two of the above taxa are common (JAGT, 1994), namely *Arcoscalpellum maximum* (J. DE C. SOWERBY, 1829) and *Cretiscalpellum glabrum* (ROEMER, 1841).

A few years later, BOSQUET (1860) listed for the "Herfsch" (= "Hervien") only two cirripede species,

namely "*S. max.* var. *elongatum* B." and "*S. solidulum* St. sp.", and later still (BOSQUET, 1868) only a single taxon was recorded from this unit, i.e. "*Scalpellum solidulum*, Darwin. (*Pollicipes solidulus*, Steenstr.)". Although these records obviously are in need of revision, they do show that cirripede diversity in the Vaals Formation is low. In fact, when we (JAGT & COLLINS, 1989) described a new species of calantacid (*Cretiscalpellum obtusum*) from this formation as exposed at the Ciments Portland Liégeois SA quarry (Haccourt, Liège), the cirripede assemblage appeared to be monospecific.

However, recent collecting at this locality has considerably augmented the number of species represented. A total of five taxa are now known, including a new species of the genus *Arcoscalpellum* HOEK, 1907, which is apparently closely related to the Aptian-Cenomanian group of *A. arcuatum* (DARWIN, 1851) as described by WITHERS (1935) and COLLINS (1965).

One lot (NHMM JJ 9400 and IRScNB 10776-10778, *ex* JAGT Colln) was collected *c.* 4 m below the Loën Horizon, which separates the Vaals Formation from the overlying Zeven Wegen Member of the Gulpen Formation (Fig. 1), in November 1994. The other lot (NHMM MB 917/1-58) comprises specimens collected from the highest metre of the Vaals Formation between November 1992 and November 1993.

Geographic and stratigraphic setting

At the Ciments Portland Liégeois SA (CPL) quarry, a large portion of which is now rapidly being filled with refuse, some 10 to 12 metres of the so-called smectite facies of the Vaals Formation (*sensu* FELDER, 1975) were exposed during recent years (1992-1995). At present, accessibility of these strata is poor.

The age assignment of the uppermost 4-6 metres of the Vaals Formation at this locality has relied primarily on ammonites (JAGT, 1989; KENNEDY & JAGT, 1995, 1998), which are typical of the Early (though not earliest) Campanian in ammonite terms (*Placenticerias bidorsatum* Zone). Associated coleoid species corroborate such an assignment, the two species recorded, viz. *Belemnitella*

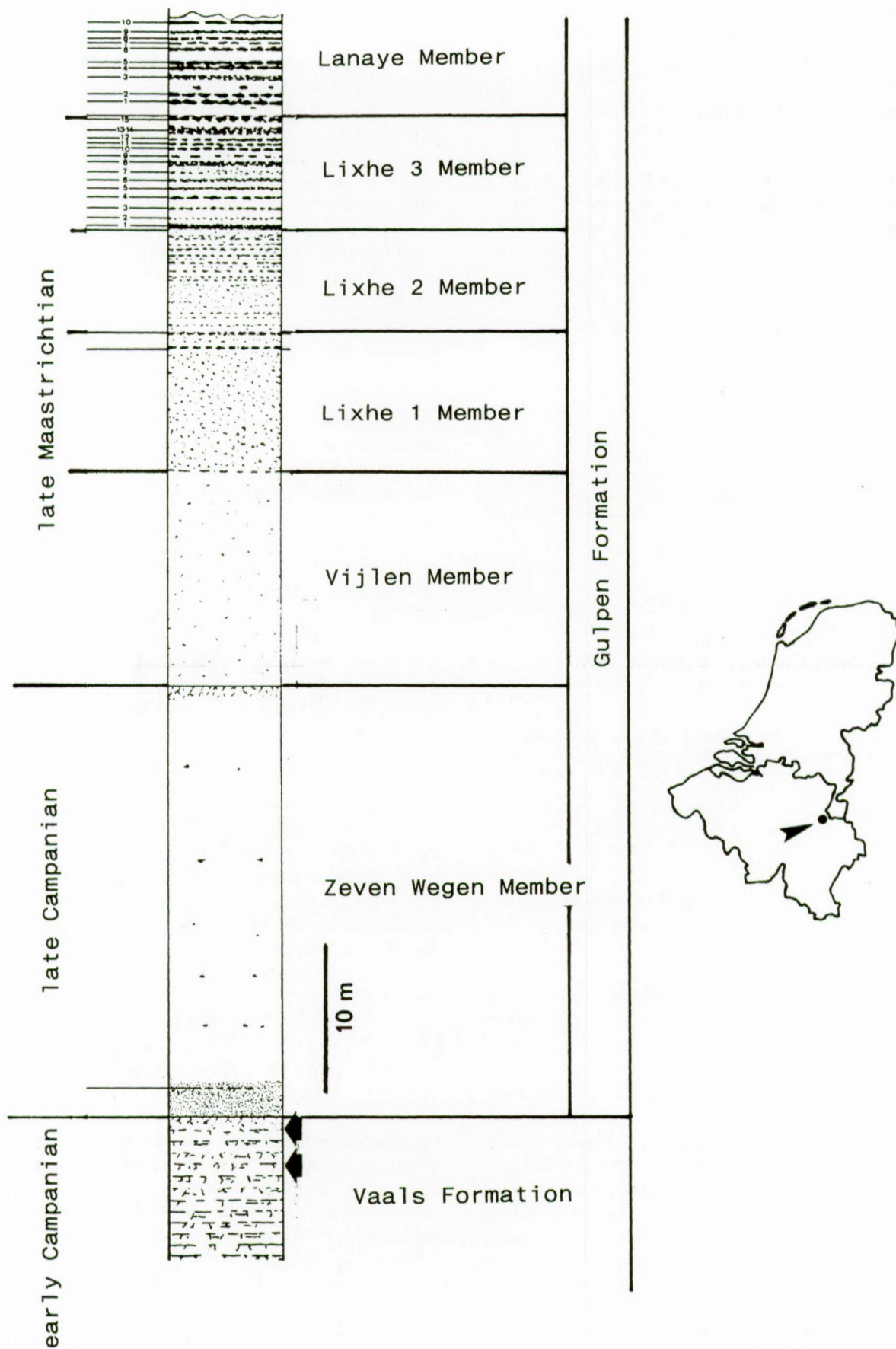


Fig. 1 – Map showing the location of the Ciments Portland Liégeois SA quarry and chrono- and lithostratigraphy of strata exposed there. Arrows denote the provenance of the cirripede faunules described herein.

praecursor STOLLEY, 1897 and *Goniot euthis quadrata quadrata* (DE BLAINVILLE, 1827), having been considered typical of the upper part of the *lingua/quadrata* Zone *sensu germanico* by CHRISTENSEN & SCHMID (1987). KENNEDY & JAGT (1995) noted that material of the scaphitid ammonite *Scaphites hippocrepis* (DEKAY, 1828) from Haccourt was comparable to COBBAN's (1969) form II and included transitions to form III. This part of the Vaals Formation was thus shown to span the upper *granulataquadrata* to lower *lingua/quadrata* zones *sensu germanico* (= top CC17 and CC18 nannofossil zones; see MCARTHUR *et al.*, 1994).

Systematic palaeontology

The following abbreviations are used to indicate the repositories of specimens mentioned in the text: BMNH - Natural History Museum, London; NHMM - Natuurhistorisch Museum Maastricht (JJ = J.W.M. JAGT Colln, MB = M.J. VAN BIRGELEN Colln).

Higher-order classification of pedunculate barnacles follows NEWMAN (1987, 1996).

Order Thoracica DARWIN, 1854
Suborder Scalpellomorpha NEWMAN, 1987
Family Calanticidae ZEVINA, 1978
Genus *Cretiscalpellum* WITHERS, 1922

Type species: *Pollicipes unguis* J. DE C. SOWERBY, 1836, p. 335, pl. 11, fig. 5, by original designation.

Cretiscalpellum obtusum JAGT & COLLINS, 1989
(Fig. 4D)

* 1989 *Cretiscalpellum obtusum* JAGT & COLLINS, p. 187, figs. 3, 4a-c, f, h.

TYPES

Holotype is carina BMNH In. 63628, illustrated by JAGT & COLLINS (1989, fig. 4b, c); paratypes are BMNH In. 63629-63631 (tergum, carinal latus and inframedian latus, respectively), all from the Vaals Formation of the CPL SA quarry (Haccourt, Liège).

MATERIAL

Four incomplete carinae (NHMM MB 917/1-4), eight terga (NHMM MB 917/5-12; IRScNB 10776-10778, *ex* JAGT Colln, nos 9396-9398), one scutum (NHMM JJ 9399) as well as a carinal latus (NHMM MB 917/13) and an inframedian latus (NHMM MB 917/14) which may belong here.

DESCRIPTION

Amongst the isolated valves in the present faunules assigned to *C. obtusum* is a scutum (NHMM JJ 9399) with characters consistent with the species, and the original description of the species is augmented as follows. Scutum trapezoidal, strongly convex transversely, apicobasal

ridge flatly rounded, steep sided on the tergo-lateral side and with a weaker ridge on the occludent side reaching the basal margin a little nearer the basi-lateral angle than the rostral angle. Between these ridges the surface is flat; it is steeply inclined on the tergal side and more gently curved on the occludent side. Tergal margin thickened, straight, not much shorter than the straight lateral margin. The tergo-lateral angle is acute and the basi-lateral angle slightly produced. The occludent margin is concave. Fine apicobasal striae occur on the occludent side, or may be confined to the flattened area or to the tergal side. On the inner surface, apical growth lines of the larger valve are interrupted by a ridge inclined towards the tergal side and, on the occludent side, by a groove extending the length of the margin. The adductor muscle pit is fairly deep.

DISCUSSION

Cretiscalpellum obtusum, particularly the carina, has been compared with *C. vallum* COLLINS, 1973 (p. 358, pl. 1, figs. 14-22; pl. 2, figs. 1-12; text-fig. 1) from the

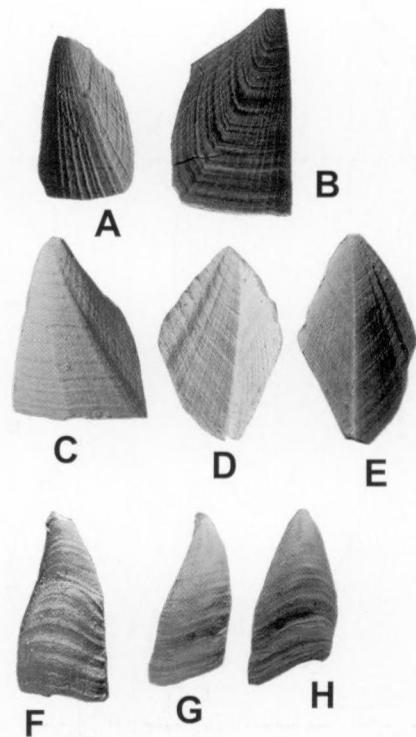
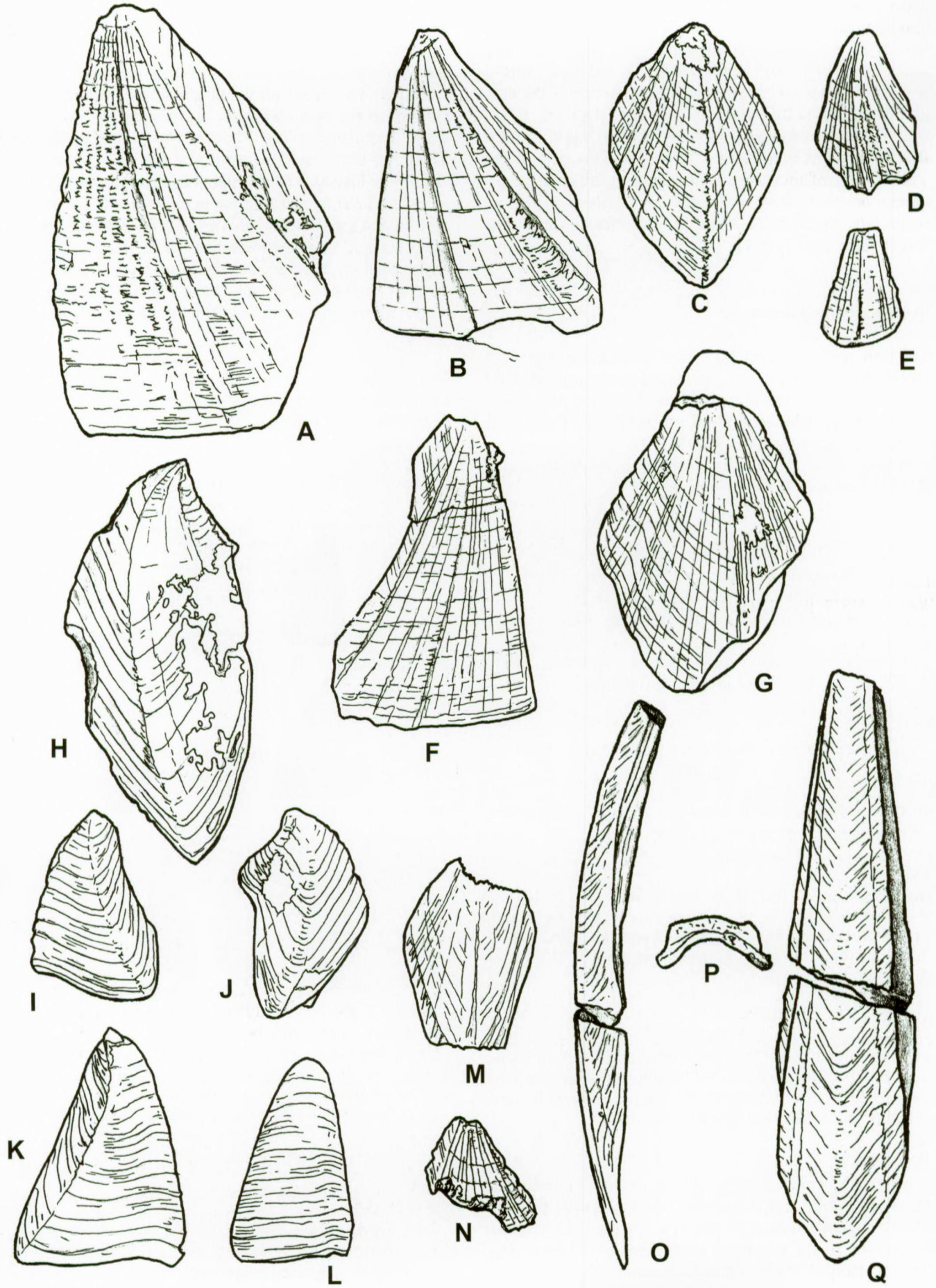


Fig. 2 - Cirripedes from the early Early Campanian Vaals Formation, CPL SA quarry (Haccourt, Liège):

A, B: *Arcoscalpellum dortangsi* nov. sp., scuta NHMM MB 917/34 (paratype, x 3) and NHMM JJ 9400 (holotype, x 3), respectively (compare Fig. 4A, B).

C-E: *Cretiscalpellum striatum* (DARWIN, 1851), scutum NHMM MB 917/19 (x 3) (compare Fig. 3B), tergum NHMM MB 917/23 (x 3) and tergum NHMM MB 917/24 (x 3), respectively.

F-H: *Brachylepas fallax* (DARWIN, 1851), carinae NHMM MB 917/49 (F, x 3) and NHMM MB 917/50 (G, H, x 3), respectively.



upper Coffee Formation or basal Annona Formation of Clay County (Mississippi) and of Sumter County (Alabama). CANIS & ZULLO (1986, fig. 1) correlated MELLEEN'S (1973) "Zone of *Cretiscalpellum vallum*" with the middle part of the Demopolis Chalk. KENNEDY *et al.* (1997) have recently shown the basal Demopolis Chalk to be of middle Campanian, *Baculites taylorensis* Zone, age (see also ZULLO, 1987, fig. 2).

The scuta of the two species have the flattened area on the occludent side, but the tergal side is wider in *C. vallum*, and on the inner surface the apical ridge is vertical. A similar flattened area occurs on the scutum of *C. striatum* (DARWIN, 1851), but that species has a much wider tergal part, the tergal margin being concave and the tergo-lateral angle more acute. In addition, the apicobasal striae generally are more prominent.

Cretiscalpellum striatum (DARWIN, 1851)
(Figs. 2C-E, 3A-G)

- * 1851 *Pollicipes striatus* DARWIN, p. 70, pl. 4, fig. 5a-c.
1935 *Cretiscalpellum striatum* (DARWIN) - WITHERS, p. 183, pl. 20, figs. 1-5, 15-21; pls. 21, 22 (with additional synonymy).

TYPE

WITHERS (1912, p. 311) designated lectotype the scutum illustrated by DARWIN (1851, pl. 4, fig. 5c), housed in the collections of the Norwich Museum (Fitch Colln. no. 2154).

MATERIAL

A single, incomplete carina (NHMM MB 917/15), five scuta (NHMM MB 917/16-20) and eight terga (NHMM MB 917/21-28).

DISCUSSION

Material illustrated by WITHERS (1935, pl. 20, figs. 15-21; pl. 21, figs. 1-18; pl. 22, figs. 1-12) shows *C. striatum* to be a variable species, which ranges from the Early Cen-



Fig. 3 – Cirripedes from the early Early Campanian Vaals Formation, CPL SA quarry (Haccourt, Liège):

A-G: *Cretiscalpellum striatum* (DARWIN, 1851), terga NHMM MB 917/16 (A, x 7), NHMM MB 917/19 (B, x 7) (compare Fig. 2C), NHMM MB 917/17 (D, x 7) and NHMM MB 917/18 (F, x 7); scuta NHMM MB 917/22 (C, x 7) and NHMM MB 917/21 (G, x 7) and incomplete carina NHMM MB 917/15 (E, x 7).

H-L: *Brachylepas fallax* (DARWIN, 1851), terga NHMM MB 917/36 (H, x 7) and NHMM MB 917/37 (J, x 7); scuta NHMM MB 917/41 (I, x 7) and NHMM MB 917/42 (K, x 7); carina NHMM MB 917/45 (L, x 7).

M, O-Q: *Arcoscalpellum cf. fossula* (DARWIN, 1851), incomplete tergum NHMM MB 917/33 (M, x 7) and carina NHMM MB 917/32 (O-Q, x 14).

N: *Arcoscalpellum dortangsi* nov. sp.?, upper latus NHMM MB 917/35, x 7.

omanian to the latest Maastrichtian. Especially, there is much variation in the number and strength of longitudinal ridges on the scuta and terga. Specimens from the Vaals Formation illustrated here correspond well to material collected from the overlying Zeven Wegen Member (Gulpen Formation) in particular.

Family Scalpellidae PILSBRY, 1907
Subfamily Arcoscalpellinae ZEVINA, 1978
Genus *Arcoscalpellum* HOEK, 1907

TYPE SPECIES: *Scalpellum velutinum* HOEK, 1883, p. 96, pl. 4, figs. 10, 11; pl. 9, figs. 7-9, by original designation (= *S. michelottianum* SEGUENZA, 1876, p. 381, pl. 6, figs. 15-25; p. 464, pl. 10, fig. 26).

Arcoscalpellum cf. fossula (DARWIN, 1851)
(Fig. 3M?, O-Q)

compare:

- * 1851 *Scalpellum fossula* DARWIN, p. 24, pl. 1, fig. 4a-h.
1935 *Scalpellum (Arcoscalpellum) fossula* (DARWIN) - WITHERS, p. 23, pl. 26, figs. 2-10; pl. 27, figs. 2-6; text-fig. 30 (with additional synonymy).
1983 *Arcoscalpellum fossula* (DARWIN, 1851) - COLLINS in VIAUD *et al.*, p. 330, pl. 4, figs. 4, 6-8.

TYPE

WITHERS (1912, p. 311) designated lectotype of *A. fossula* one of two incomplete capitula (Norwich Museum collections, Fitch Colln. no. 2136) on which DARWIN based this species.

MATERIAL

A single carina (NHMM MB 917/32) and an incomplete tergum (NHMM MB 917/33) which may belong here.

DESCRIPTION

The present specimens clearly belong to WITHERS'S (1935, p. 213) "group of *S. (A.) fossula*". However, a comparison with "typical" valves and incomplete capitula of *A. fossula* from the early Late Campanian Zeven Wegen Member (NHMM JJ 6040, JJ 7132, JJ 7363, JJ 8871a and JJ 11208) has revealed a number of differences.

The narrow, rather thin carina, which widens gradually downwards is only slightly bowed inwards, has an almost flat, subcarinate tectum, bordered on each side by a fairly wide, low, flat-topped ridge. The basal margin is acutely angular. Parietes fairly wide, concave; intraparietes narrow and concave, restricted to the upper part of the valve, and separated from the parietes by a strong ridge. In "typical" carinae of *A. fossula*, the ridges bordering the tectum generally are better developed, and less "splayed" outwards, and the intraparietes are wider and extend further down.

The fragmentary tergum shows a slightly curved apicobasal furrow. Bordering the occludent margin is a very weak, flattened ridge. A rather faint ridge ex-

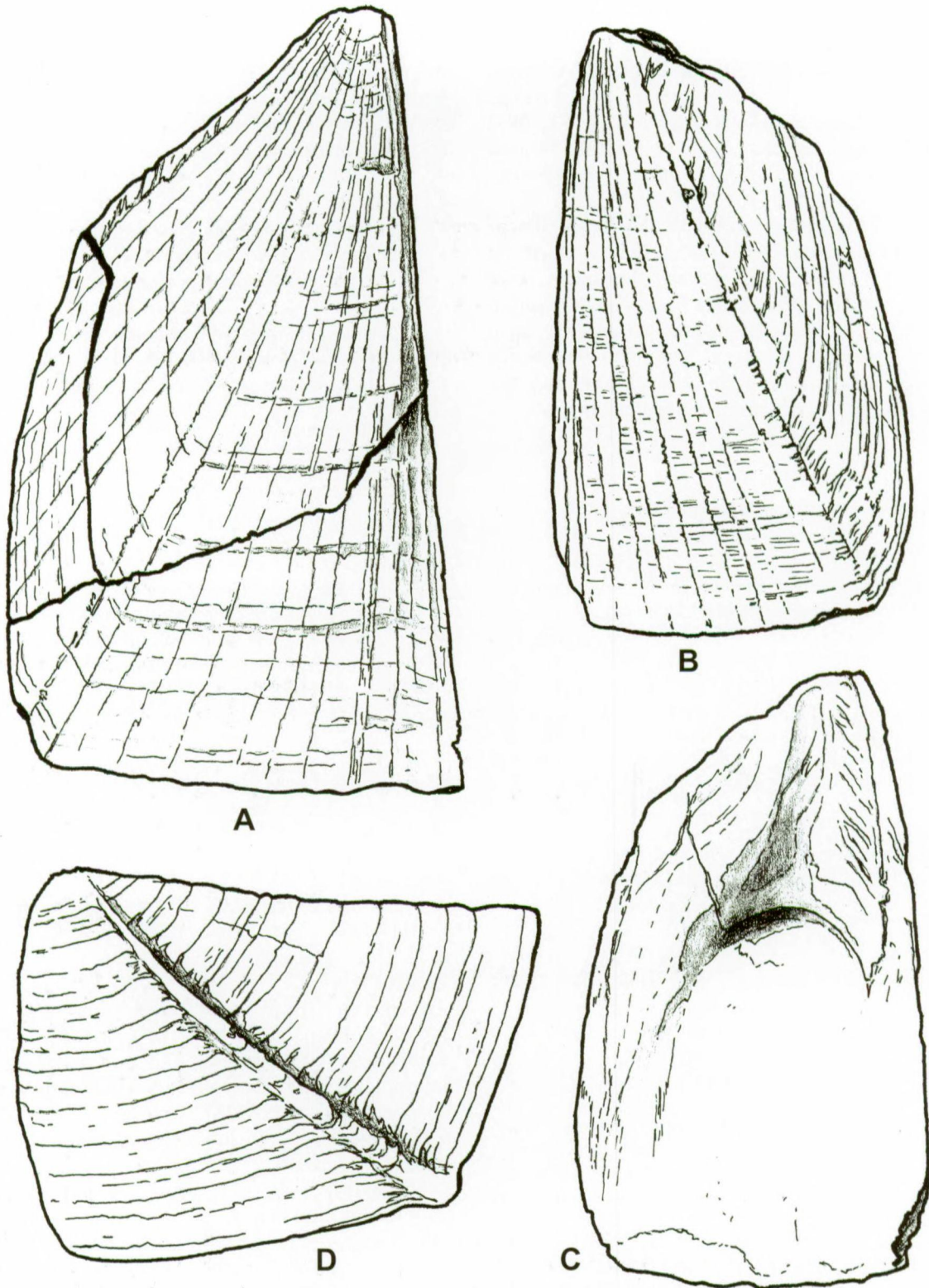


Fig. 4 – Cirripedes from the early Early Campanian Vaals Formation, CPL SA quarry (Haccourt, Liège):
 A-C: *Arcoscalpellum dortangsi* nov. sp., scuta (compare Fig. 2A, B), holotype (A, x 14) and paratype (B, C, x 14).
 D: *Cretiscalpellum obtusum* JAGT & COLLINS, 1989, carinal latus NHMM MB 917/13, x 14.

tends from the apex to the scutal margin, and between this ridge and the occludent margin is a shallow depression, ornamented by five weaker, longitudinal ridges. “Typical” terga of *A. fossula* lack such an orna-

ment on this depression of the valve.

Additional material, preferably of associated valves, is needed to determine the relationship of this form; it is here referred to *A. fossula* with a query.

Arcoscalpellum dortangsi nov. sp.
(Figs. 2A, B; 3N?; 4A-C)

TYPE

Holotype is scutum NHMM JJ 9400; paratype is scutum NHMM MB 917/34.

DERIVATION OF NAME

The species is named after Rudi W. DORTANGS (Amstenrade, the Netherlands), who collected and donated a few of the specimens described in the present paper.

MATERIAL

In addition to the holotype and paratype scuta, an upper latus (Fig. 3N; NHMM MB 917/35) may belong here.

DESCRIPTION

Scutum trapezoidal, steeply depressed on tergal side, gently curved on occludent side, divided almost equally by a weak, almost straight apicobasal ridge with a weaker ridge closely parallel on the tergal side. The basi-tergal angle barely produced. Basal, occludent and lateral margins weakly convex, the last-named slightly divergent from the occludent margin; rostral angle a little produced. Tergal margin nearly straight, the edge thickened and rounded, not produced at the tergo-lateral angle. Surface ornamented with strong apicobasal ridges, those on the tergal side leaving a distinct space from the 'parallel apicobasal ridge'.

On the inner surface, growth lines extend one third of the length of valve and slightly overhang a deep adductor muscle pit, set more or less on midline of valve; a groove, deeper apically, extends the length of the occludent margin and a broadening groove borders the tergal margin. Its inner edge, bounded by a weak ridge, extends below the tergo-lateral angle as far as a narrow flattened rim along the lateral margin.

Based mainly on the presence and style of ornament, the incomplete upper latus may also belong here. The flat valve shows a wide, low ridge bordering the convex tergal margin. Two prominent ridges border the scutal concave margin. The ornament consists of nine longitudinal ridges, varying in strength; most of these extend from the apex to the basitergal margin, others insert on the lower third of the valve. Growth lines are prominent.

DISCUSSION

Scuta of *A. fossula* may be distinguished in generally having a more strongly curved occludent margin, a sinuous lateral margin and a smoother surface. Furthermore, on the underside the tergal margin is broadly flattened and a ridge extends medially from the apex (WITHERS, 1935, pl. 26).

Amongst Late Cretaceous arcoscaltellines, the scuta of *A. trilineatum* (DARWIN, 1851) (p. 38, pl. 1, fig. 5a-d; see also WITHERS, 1935, p. 208, pl. 24, figs. 2-18) most closely resemble those of *A. dortangsi* nov. sp., but in the absence of a carina it is considered unwise to spec-

ulate continuation of the group of *A. arcuatum* (DARWIN, 1851) (see WITHERS, 1935, p. 204, pl. 23, figs. 9-15; pl. 24, fig. 1; COLLINS, 1965, p. 629, pl. 90, figs. 12-17, 19; 1974, p. 384, pl. 11, fig. 10). The scutal outline of *A. toulmini* WEISBORD, 1977 (p. 147, pl. 20, figs. 1-8; Early Palaeocene of Alabama, USA) (see also ZULLO & PERREAULT, 1991) agrees with that of *A. dortangsi* nov. sp., and there is a remarkable similarity in the inner apical structure. The scutum of *A. toulmini*, however, lacks an apicobasal ridge and has an almost smooth outer surface.

The corresponding valves in e.g. *A. fossula* (WITHERS, 1923; COLLINS & RADWAŃSKI, 1982; COLLINS *in* VIAUD *et al.*, 1983) and *A. gracile* (BOSQUET, 1854) (see WITHERS, 1935, p. 230, pl. 27, figs. 7-16) are quite different, in being less ornamented. The scutum of the former, 'is distinguished by a shallow depression almost parallel with the occludent margin and a furrow bordering the tergal margin' (COLLINS & RADWAŃSKI, 1982, p. 44).

Although only two scuta (and an upper latus?) are known to date, we consider it justified to introduce a new name for these valves, and record the occurrence of this group of species in the early Early Campanian of northeast Belgium.

Suborder Brachylepadomorpha WITHERS, 1923
Family Brachylepadidae WOODWARD, 1901
Genus *Brachylepas* WOODWARD, 1901

TYPE SPECIES: *Pyrgoma cretacea* WOODWARD, 1866, p. 321 = *Emarginula* (?) *Naissantii* HÉBERT, 1855, p. 374, pl. 29, fig. 10, by original designation.

Brachylepas fallax (DARWIN, 1851)
(Figs. 2F-H; 3H-L)

- * 1851 *Pollicipes fallax* DARWIN, p. 75, pl. 4, fig. 8a, b.
- 1935 *Brachylepas fallax* (DARWIN) - WITHERS, p. 367, pl. 48, figs. 1-24 (with additional synonymy).
- 1953 *Brachylepas fallax* (DARWIN) - CARLSSON, p. 25, pl. 6, figs. 3-6.

TYPE

WITHERS (1912, p. 310) designated lectotype the scutum illustrated by DARWIN (1851, pl. 1, fig. 8a), housed in the collections of the Norwich Museum (Fitch Colln, no. 2153).

MATERIAL

Five terga (NHMM MB 917/36-40), four scuta (NHMM MB 917/41-44), four rostra (NHMM MB 917/45-48), eight carinae (NHMM MB 917/49-56) and a single imbricating plate (NHMM MB 917/57) which may belong here.

DESCRIPTION

Most of the terga and scuta available lack the prominent transverse ridges so typical of this species (see WITHERS, 1935, pl. 48, figs. 2, 4, 7, 9); however, this may be a preservational matter. In all other features, specimens before us are closely comparable to material illustrated

in the literature, and to material from the early Late Campanian Zeven Wegen Member (Gulpen Formation), in which *B. naissantii* (HÉBERT, 1855) is commoner.

DISCUSSION

This is the first record of *B. fallax* from the early Early Campanian in the extended type area of the Maastrichtian Stage. BOSQUET (1857, p. 17, pl. 2, figs. 1-12; pl. 3, figs. 1, 2) recorded it from the "craie blanche sans silex" at Gulpen, Pesaken and between Benzenraderhof and Keerberghof near Heerlen. This unit appears to correspond to the Zeven Wegen Member and its lateral equivalents (Benzenrade Member), of Late Campanian age.

The third species, *B. guascoi* (BOSQUET, 1857) (p. 11, pl. 1, figs. 8-10; see also WITHERS, 1935, p. 383, pl. 49, figs. 3-14), appears to be typical of (extremely) shallow settings, such as represented by the late Early Campanian of southern Sweden (CARLSSON, 1953) and the latest Maastrichtian of the Maastrichtian type area. The highest

occurrence (NHMM JJ 8685) of this species is in the uppermost part of section IVf-6 of the Meerssen Member (Maastricht Formation) (see JAGT, 1994).

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Joe S.H. COLLINS
8 Shaw's Cottages
Perry Rise, Forest Hill,
London SE23 2QN, United Kingdom

John W.M. JAGT
Natuurhistorisch Museum Maastricht
P.O. Box 882
NL-6200 AW Maastricht, The Netherlands
E-mail: mail@nhmmaastricht.nl

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