

Flosculichnus tectus, an etched attachment scar from the Upper Cretaceous (Maastrichtian) of The Netherlands

by Stephen K. DONOVAN & John W.M. JAGT

DONOVAN, S.K. & JAGT, J.W.M., 2005. — *Flosculichnus tectus*, an etched attachment scar from the Upper Cretaceous (Maastrichtian) of The Netherlands. *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre* 75: 207-210, 2 figs; Bruxelles-Brussel, March 31, 2005 – ISSN 0374-6291.

Abstract

A single example of a rosette-shaped embedment structure on the carina of a scalpellid cirripede (Bosquet Collection) from the basal portion of the Valkenburg Member (Maastricht Formation) at St Pietersberg (Maastricht, southern Limburg, The Netherlands) is described as a new ichnogenus and species, *Flosculichnus tectus*. It differs from other rosetted traces in calcareous hard substrates, which consist of slender, radiating borings, in having a scalloped, cyclic structure surrounding a central depression. The most probable producing organisms are either an unidentified, sessile, unmineralised invertebrate or, perhaps more likely, a scalpellid cirripede.

Key-words: Trace fossils, embedments, new taxa, Cretaceous, Maastrichtian, The Netherlands.

Résumé

Dans la collection Bosquet, sur la carène d'un cirripède scalpellidé se trouve une structure d'enfouissement, en forme de rosette. Ce cirripède provient de la partie basale du Valkenburg Member (Formation de Maastricht) de la Montagne Saint-Pierre (Maastricht, Zuid-Limburg, Pays-Bas). Cette structure est décrite comme *Flosculichnus tectus*, représentant un nouvel ichnogenre et une nouvelle espèce. D'autres traces connues en formes de rosettes dans des substrats calcaires durs forment de fines perforations radiales. *F. tectus* consiste en une structure écaillée, cyclique, entourant une dépression centrale. L'origine de cette structure est ou bien un invertébré marin non-identifié, sessile, non minéralisé, ou bien – et ceci est plus probable – un cirripède scalpellidé.

Mots-clés: Traces fossiles, 'enfouissement', taxa nouveaux, Crétacé, Maastrichtien, Pays-Bas.

Introduction

To the growing list of trace fossils known from Upper Cretaceous (Campanian-Maastrichtian) strata in the type area of the Maastrichtian Stage (see JAGT, 2003; DONOVAN & JAGT, 2004) can now be added a distinctive, rosette-shaped form, described below as a new ichno-

genus and species. The sole specimen available to date has recently been recognised amongst cirripede lots in the Bosquet Collection (see BOSQUET, 1854, 1857) at the Institut royal des Sciences naturelles de Belgique (IRScNB, Brussels).

Within the framework of the 'Access to Belgian Collections (ABC)' grant scheme in November/December 2003, JWMJ started a revision of cirripede collections held at IRScNB. The aim was twofold; to redescribe type material and to determine in more detail the stratigraphic provenance as based on preservational type, adhering matrix and personal fieldwork experience. This should ultimately result in a robust taxonomy and, based on detailed stratigraphic ranges, a regional cirripede zonation modelled upon earlier work by, for example, COLLINS & MELLEN (1973), ZULLO (1984) and CANIS & ZULLO (1986).

One of the lots in the Bosquet Collection preserves three labels which read:

Scalpellum maximum J. Sow.
(carina)

Loc. S^t Pierre m.19

Doubles

I.G. 4285 Coll. Bosquet

87. Arthr. Sec. I. Crét.

Et. Maestrichtien (inf.)

Loc: St. Pierre (Maestricht)

Coll. Bosquet. I.G. 4285.

25 ex.

Determd T H Withers. 1935

Sc. (Arcoscalpellum) maximum (J. De C. Sow.)

carinae

10.

Re-examination by JWMJ (November 2003) has shown that three fragmentary carinae in this lot should be assigned to *Arcoscalpellum gracile* (BOSQUET, 1854), while the remainder (44 carinae, plus fragments) is referable to *A. maximum* var. Preservation (colour, adhering matrix)

of most, but not all, specimens, shows them to have come from the coarse-grained fossil hash which directly overlies the Lichtenberg Horizon (= basal portion of Valkenburg Member, Maastricht Formation; Late Maastrichtian, *Belemnitella junior* Zone of authors).

The arcoscappelline *Arcoscappellum* is particularly well represented in the type area of the Maastrichtian Stage, with at least seven species, inclusive of formae (JAGT, 1994; COLLINS & JAGT, 1999; JAGT & COLLINS, 1989, 1999). In the Maastricht Formation (Valkenburg, Gronsveld, Emael and Nekum members), *A. gracile* (*fossula* group; *sensu* WITHERS, 1935, p. 213) is the commonest species. Associated are much rarer representatives of the group of *A. maximum* which, in details of parietes and intraparietes, differ consistently from specimens of Late Campanian age (JAGT, research in progress).

Terminology of the morphology of trace fossils follows HÄNTZSCHEL (1975).

Systematic ichnology

Ichnogenus *Flosculichnus* igen. nov.

ETYMOLOGY

From Latin, *flosculus* = diminutive of flower, a floret; and Greek, *ἵχνοσ* = track.

TYPE ICHNOSPECIES

Flosculichnus tectus igen. and isp. nov., the only ichnospecies known.

DIAGNOSIS

Small, shallow, non-penetrative, flower-like embedment structure, with a central, circular pit surrounded by nine scalloped impressions. Scalloped impressions more or less abutting.

REMARKS

We are very much aware that a new ichnogenus and ichnospecies is erected herein on the basis of a single specimen only. However, we agree with the emphatic position adopted by PICKERILL (1994, p. 15), who stated that, 'Although nomenclature should serve only as a handmaiden to the more substantive aspects of taxonomy, it is essential: the labelling of ichnotaxa provides a necessary vocabulary for writing and conversing about trace fossils ... [which] require names in order that they may be studied systematically, that they are amenable to stabilization and survival, and that they establish conformity in usage'. For a recent reiteration of this position, see DONOVAN & PICKERILL (2004).

Flosculichnus tectus igen. and isp. nov.
(Figs. 1, 2)

ETYMOLOGY

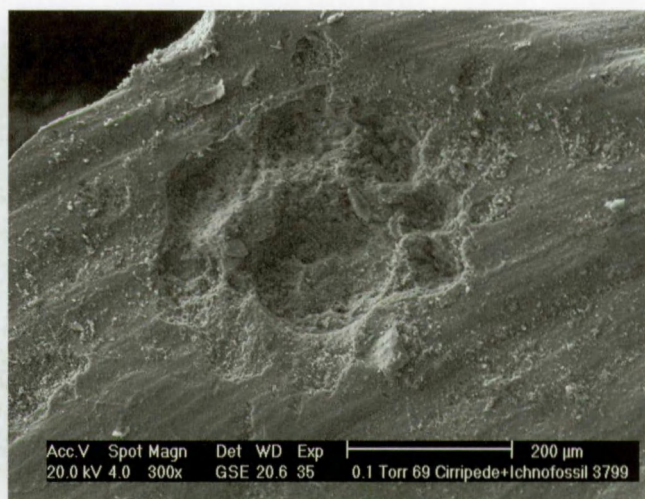
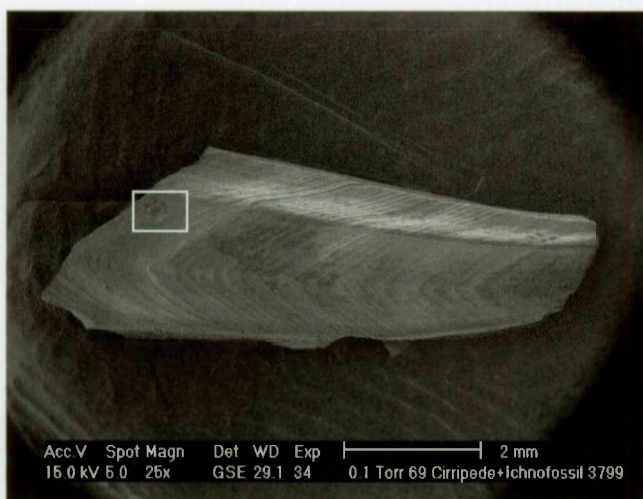
From Latin, *tectus*, in allusion to its occurrence on the tectum of a carina of a scalpellid cirripede.

MATERIAL

Holotype, and single specimen known, is IRScNB MI 11003 (Figs. 1, 2).

LOCALITY AND HORIZON

As noted above, there are no details regarding stratigraphic provenance with the cirripede lot which contained the present specimen. However, the state of preservation of most specimens (colour, adhering sediment), and the fact that they were collected from the St Pietersberg, clearly demonstrate that they must have come from the basal portion of the Valkenburg Member (Maastricht Formation). Resting directly on top of the so-called Lichtenberg Horizon is a coarse-grained, glauconitic-



Figs. 1, 2 — *Flosculichnus tectus* igen. and isp. nov. (IRScNB MI 11003), holotype. 1 - fragmentary carina of *Arcoscappellum maximum* var. in which embedment developed (top left-hand corner); 2 - enlargement of embedment structure. Scanning electron micrographs of gold-coated specimen. Scale bars represent 2 mm and 200 µm, respectively.

phosphatic fossil hash from which numerous cirripede valves can be collected to this day.

DIAGNOSIS

As for the ichnogenus.

DESCRIPTION

Embedment structure on a shelly substrate. Small, shallow, non-penetrative structure, flower-like, comprised of a central, circular pit surrounded by nine scalloped impressions. Floor of central pit possibly scalloped apart from central polygonal area. Walls of central pit low, vertical. Surrounding scalloped impressions not as deep as central pit, with rounded base, more or less abutting adjacent scallops, although apparently developed slightly unevenly.

REMARKS

Flosculichnus tectus is an etched attachment scar of distinctive morphology (compare with BROMLEY, 1994, p. 145, and references therein), showing some similarity in morphology to the 'encrusting sclerobiont trace' illustrated by BOTQUELEN & MAYORAL (in press, text-fig. 2J). These traces differ from other rosetted structures in lithic substrates which tend to be comprised of slender, radiating, commonly irregular and/or anastomosing borings, such as *Clinolithes* CLARKE, *Dendrina* QUENSTEDT and *Topsentopsis* DE LAUBENFELS (see HÄNTZSCHEL, 1975, p. W127, figs. 77.1, 78.7 and 82.2, respectively), and the ichnogenera erected by VOGEL *et al.* (1987, pp. 269-275). These are unlike the surface occurrence of *F. tectus* and lack its regular, lobate structure. Neither is *F. tectus*

like a chance radiate accumulation produced by a bryozoan (cf. *Leptichnus* TAYLOR *et al.*, 1999; JAGT & DORTANGS, 2003).

There is a tradition when naming a new ichnotaxon to indulge in speculation concerning the identity of the producing organism. We are pleased to perpetrate this entertaining custom and recognise two possible culprits. *Flosculichnus tectus* may have been the attachment scar of an unmineralised, sessile invertebrate. If so, the zoological identity of the producing organism is unlikely to be determinable unless a closely similar extant analogue is discovered. Perhaps more likely is that *F. tectus* represents the attachment scar of a scalpellid cirripede such as *Arcoscalpellum*. This seems at least possible, the basal Valkenburg Member being rich in cirripede remains (see above). If this interpretation is correct, then *F. tectus* represents a cirripede trace fossil of very different morphology to the much commoner borings of acrothoracians, *Rogerella* ispp. (NEWMAN *et al.*, 1969, pp. R251, R252; BROMLEY, 1994, pp. 141, 142), and attachment scars of balanids (MILLER & BROWN, 1979).

Acknowledgements

We thank the European Community-Access to Research Infrastructure action of the Improving Human Research Potential Programme (November-December 2003) for support to one of us (JWMJ). At IRScNB, Isabella Van de Velde, Annie V. Dhondt and D. Anne assisted in many ways, while E. Simon and L. Cilis prepared scanning electron micrographs. This is a contribution to SKD's Nationaal Natuurhistorisch Museum Leiden projects 'Trace fossil studies' and 'Palaeontology of the Upper Cretaceous of northwest Europe', and to BMNH project #301 'Palaeoecology of hard substrates'.

References

- BOSQUET, J., 1854. Les Crustacés fossiles du Terrain Crétacé du Limbourg. *Verhandelingen uitgegeven door de Commissie belast met het vervaardigen eener geologische beschrijving en kaart van Nederland*, 2: 1-127 [10-137]. Haarlem, A.C. Kruseman.
- BOSQUET, J., 1857. Notice sur quelques Cirripèdes récemment découverts dans le Terrain Crétacé du Duché de Limbourg. *Natuurkundige Verhandelingen uitgegeven door de Hollandische Maatschappij voor Wetenschappen te Haarlem*, (2)13: ii + 1-36.
- BOTQUELEN, A. & MAYORAL, E., in press. Lower Devonian bioerosion activities in the Rade de Brest, Armorican Massif, France. *Palaeontology*
- BROMLEY, R.G., 1994. The palaeoecology of bioerosion. In: DONOVAN, S.K. (Editor), *The Palaeobiology of Trace Fossils*: 134-154. Wiley, Chichester.
- CANIS, W.F. & ZULLO, V.A., 1986. New barnacle records from the Upper Cretaceous of Alabama. *Journal of Paleontology*, 60: 186-189.
- COLLINS, J.S.H. & JAGT, J.W.M., 1999. New Late Cretaceous cirripede records from the Liège-Limburg basin (northeast Belgium). *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre*, 69: 155-163.
- COLLINS, J.S.H. & MELLEN, F.F., 1973. Cirripedes from the Upper Cretaceous of Alabama and Mississippi, eastern Gulf region, U.S.A. I. Paleontology. II. Geology. *Bulletin of the British Museum (Natural History), Geology*, 23: 351-380, 381-388.
- DONOVAN, S.K. & JAGT, J.W.M., 2004. Taphonomic and ethologic aspects of the ichnology of the Maastrichtian of the type area (Upper Cretaceous, The Netherlands and Belgium). *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre*, 74: 119-127.
- DONOVAN, S.K. & PICKERILL, R.K., 2004. Traces of cassid snails predation upon the echinoids from the Middle Miocene of Poland: Comments on Ceranka and Zlotnik (2003). *Acta Palaeontologica Polonica*, 49: 483-484.
- HÄNTZSCHEL, W., 1975. Trace fossils and problematica. Second edition (revised and enlarged). In: TEICHERT, C. (Editor), *Treatise on Invertebrate Paleontology, Part W, Miscellaneous, Supplement 1*. Geological Society of America, Boulder, and University of Kansas Press, Lawrence, xxi + 269 pp.
- JAGT, J.W.M., 1994. Nogmaals Joseph de Bosquet en zijn cirripts. *Natuurhistorisch Maandblad*, 83: 140-144.
- JAGT, J.W.M., 2003. The ichnofossil genera *Radulichnus* and *Renichnus* in the Maastrichtian of The Netherlands and Bel-

- gium. *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre*, **73**: 175-184.
- JAGT, J.W.M. & COLLINS, J.S.H., 1989. Upper Cretaceous cirripedes from N.E. Belgium. *Proceedings of the Geologists' Association*, **100**: 183-192.
- JAGT, J.W.M. & COLLINS, J.S.H., 1999. Log-associated late Maastrichtian cirripedes from northeast Belgium. *Paläontologische Zeitschrift*, **73**: 99-111.
- JAGT, J.W.M. & DORTANGS, R.W., 2003. Opmerkelijke Luiks-Limburgse Krijtfossielen. Deel 6. Mosdiertjes vermist. *Natuurhistorisch Maandblad*, **92**: 28-29.
- MILLER, W., III & BROWN, N.A., 1979. The attachment scars of fossil balanids. *Journal of Paleontology*, **53**: 208-210.
- NEWMAN, W.A., ZULLO, V.A. & WITHERS, T.H., 1969. Cirripedia. In: MOORE, R.C. & TEICHERT, C. (Editors), *Treatise on Invertebrate Paleontology, Part R, Arthropoda 4(1)*: R206-R295. Geological Society of America, Boulder, and University of Kansas Press, Lawrence.
- PICKERILL, R.K., 1994. Nomenclature and taxonomy of invertebrate trace fossils. In: DONOVAN, S.K. (Editor), *The Palaeobiology of Trace Fossils*: 3-42. Wiley, Chichester.
- TAYLOR, P.D., WILSON, M.A. & BROMLEY, R.G., 1999. A new ichnogenus for etchings made by cheilostome bryozoans into calcareous substrates. *Palaeontology*, **42**: 595-604.
- VOGEL, K., GOLUBIC, S. & BRETT, C.E., 1987. Endolith associations and their relations to facies distribution in the Middle Devonian of New York State, U.S.A. *Lethaia*, **20**: 263-290.
- WITHERS, T.H., 1935. Catalogue of fossil Cirripedia in the Department of Geology, II. Cretaceous. xiii + 535 pp., London, Trustees of the British Museum [Natural History].
- ZULLO, V.A., 1984. Cirriped assemblage zones of the Eocene Claibornian and Jacksonian Stages, southeastern Atlantic and Gulf Coastal Plains. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **47**: 167-193.

Stephen K. DONOVAN
 Department of Palaeontology
 Nationaal Natuurhistorisch Museum (Naturalis)
 Postbus 9517
 NL-2300 RA Leiden
 The Netherlands
 E-mail: donovan@naturalis.nnm.nl

John W.M. JAGT
 Natuurhistorisch Museum Maastricht
 de Bosquetplein 6
 NL-6211 KJ Maastricht
 The Netherlands
 E-mail: John.Jagt@maastricht.nl

Typescript submitted: November 8, 2004
 Revised typescript received: December 1, 2004