

An additional record of *Oichnus excavatus* Donovan & Jagt from the Maastrichtian (Upper Cretaceous) of southern Limburg, The Netherlands

S.K. Donovan & J.W.M. Jagt

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Stephen K. Donovan, Department of Palaeontology, Nationaal Natuurhistorisch Museum, Darwinweg 2, Postbus 9517, NL-2300 RA Leiden, The Netherlands (donovan@naturalis.nnm.nl); John W.M. Jagt, Natuurhistorisch Museum Maastricht, de Bosquetplein 6, NL-6211 KJ Maastricht, The Netherlands (John.Jagt@maastricht.nl).

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A single example of *Oichnus excavatus* Donovan & Jagt, infesting the holasteroid echinoid *Hemipneustes striatoradiatus* (Leske), is reported from the upper Meerssen Member, Maastricht Formation (uppermost Maastrichtian), of the former Blom quarry, Berg en Terblijt, southern Limburg, The Netherlands. This is the first evidence that *O. excavatus* may be more widely distributed in the type area of the Maastrichtian than previously assumed. The embedment structure occurs just below the ambitus and close to the peristome, suggesting that the producing organism may have been ingesting detritus from the sea floor rather than filter feeding, the more usual interpretation of its behaviour.

Contents

Introduction	147
Systematic ichnology	148
Acknowledgements	149
References	149

Introduction

The type horizon and locality of the circular embedment structure *Oichnus excavatus* Donovan & Jagt, 2002, infesting the holasteroid echinoid *Hemipneustes striatoradiatus* (Leske, 1778), are the upper 5-10 m of the Meerssen Member (Maastricht Formation) in the type area of the Maastrichtian (Upper Cretaceous), as exposed temporarily along the Albertkanaal at Vroenhoven-Riemst (Limburg, Belgium). Other published occurrences, of slightly different morphology, but still broadly assignable within *O. excavatus*, are from the Miocene of Jamaica (Blissett & Pickerill, 2003), infesting the gastropod *Conus* sp., and the Turonian-Coniacian (Upper Cretaceous) Chalk of northern France (Donovan & Jagt, 2005), using the holasteroid echinoid *Echinocorys scutata* Leske, 1778, as a substrate.

Hitherto, no other occurrences of this highly distinctive ichnofossil have been noted in the type area of the Maastrichtian. Herein, we record *O. excavatus* from a second locality

in the Meerssen Member. The specimen is deposited in the Nationaal Natuurhistorisch Museum, Leiden, The Netherlands (RGM).

Systematic ichnology

***Ichnogenus Oichnus* Bromley, 1981**

Type ichnospecies — *Oichnus simplex* Bromley, 1981, p. 60, by original designation.

Diagnosis — (After Donovan & Pickerill, 2002, p. 87). "Small, circular, subcircular, oval or rhomboidal holes or pits of biogenic origin in hard substrates, commonly perpendicular to subperpendicular to substrate surface. Excavation may pass directly through substrate as a penetration, most commonly where the substrate is a thin shell, or may end within the substrate as a shallow to moderately deep depression or short, subcylindrical pit, commonly with a depth:width ratio of ≤ 1 , with or without a central boss."

Remarks — Bromley (2004, p. 466) recently noted that *Oichnus* may be a junior synonym of *Sedilichnus* Müller, 1977.

***Oichnus excavatus* Donovan & Jagt, 2002**

Pl. 1.

Synonymy — See Donovan & Jagt (2004, p. 121).

Material — A single specimen, RGM 216 091 (Pl. 1), in a fragment of test of the holasteroid echinoid *Hemipneustes striatoradiatus*.

Locality and horizon — From the former Blom quarry, Berg en Terblijt (southern Limburg, The Netherlands) (50°51'23.55" - 50°51'32.26"N 5°47'21.64" - 5°47'39.83"E; Leloux, 2004, p. 314). For locality maps and a measured section of the Maastricht Formation at this locality, see Felder & Bosch (2001, figs 3.49, 4.1, 4.5). Maastricht Formation, Meerssen Member. Collected loose from scree, but judging from both the preservation and size of echinoid (cf. Jagt, 2000; Donovan & Jagt, 2002), this was most likely derived from the uppermost part (IVf-6) of that member.

Remarks — This specimen provides the first evidence that *O. excavatus* may be more widely distributed in the type area of the Maastrichtian than was recognised hitherto. Both the type series and the specimen discussed herein are from the upper part of the Meerssen Member, suggesting that they are of some value in stratigraphy, tempered by their rarity away from the type locality. *Hemipneustes striatoradiatus* shows a reduction in size from the underlying Nekum Member to the upper Meerssen Member (Jagt, 2000, p. 283), but is only found infested with pits of *O. excavatus* in the uppermost part of the latter unit. *Oichnus excavatus* has yet to be recognised from any other substrate in the type area.

The position of the Blom quarry *O. excavatus* on the echinoid test is worthy of note.

Specimens of the type series mainly occur in the supra-ambital part of the echinoid test. The Blom specimen occurs just below the ambitus, in interambulacrum 2, close to the peristome (Pl. 1, fig. 1). The close association with an internal calcite 'blister' (Pl. 1, fig. 2) confirms that the echinoid was alive when infested (Donovan & Jagt, 2002, p. 73). The palaeoecological implication is thus that the trace fossil was formed while the echinoid was alive and principally acted as a domicile (domichnia) for the producer. It would have been at or close to the sediment surface, *H. striatoradiatus* being an epifaunal to shallow infaunal (partially buried?) taxon. Supra-ambital members of the type series are interpreted as following a filter-feeding habit, but the Blom specimen may have been better situated to ingest detritus from the sea floor. It is regretted that the specimen is not more complete and that the distribution of *O. excavatus* on the rest of the test, if present at all, cannot be determined.

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References

- Blissett, D.J. & Pickerill, R.K. 2003. *Oichnus excavatus* Donovan & Jagt, 2002, from the Moneague Formation, White Limestone Group, Jamaica. *Caribbean Journal of Science*, **39**: 221-223.
- Bromley, R.G. 1981. Concepts in ichnotaxonomy illustrated by small round holes in shells. *Acta Geológica Hispánica*, **16**: 55-64.
- Bromley, R.G. 2004. A stratigraphy of marine bioerosion. In: McLroy, D. (ed.), *The Application of Ichnology to Palaeoenvironmental and Stratigraphic Analysis*. Geological Society, London, Special Publication, **228**: 455-479.
- Donovan, S.K. & Jagt, J.W.M. 2002. *Oichnus* Bromley borings in the irregular echinoid *Hemipneustes* Agassiz from the type Maastrichtian (Upper Cretaceous, The Netherlands and Belgium). *Ichnos*, **9**: 67-74.
- 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. & Jagt, J.W.M. 2005. Site selectivity of pits in the Chalk (Upper Cretaceous) echinoid *Echinocorys* Leske from France. *Bulletin of the Mizunami Fossil Museum*, **31** (for 2004): 21-24.
- Donovan, S.K. & Pickerill, R.K. 2002. Pattern versus process or informative versus uninformative ichnotaxonomy: reply to Todd and Palmer. *Ichnos*, **9**: 85-87.
- Felder, W.M. & Bosch, P.W. 2001. *Geologie van Nederland, deel 5. Krijt van Zuid-Limburg*. Nederlands Instituut voor Toegepaste Geowetenschappen TNO, Delft/Utrecht: 192 pp.
- Jagt, J.W.M. 2000. Late Cretaceous-Early Palaeogene echinoderms and the K/T boundary in the southeast Netherlands and northeast Belgium - Part 4: Echinoids. *Scripta Geologica*, **121**: 181-375.
- Leloux, J. 2004. Notes on taxonomy and taphonomy of two Upper Maastrichtian (Upper Cretaceous) scleractinian corals from Limburg, The Netherlands. *Scripta Geologica*, **127**: 313-339.
- Leske, N.G. 1778. *Iacobi Theodori Klein naturalis dispositio echinodermatum, edita et descriptionibus novisque inventis et synonymis auctorum et aucta a N. G. Leske*. G.E. Beer, Lipsiae: xxii+278 pp.
- Müller, A.H. 1977. Zur Ichnologie der subherzynen Oberkreide (Campan). *Zeitschrift für geologische Wissenschaften, Berlin*, **5**: 881-897.

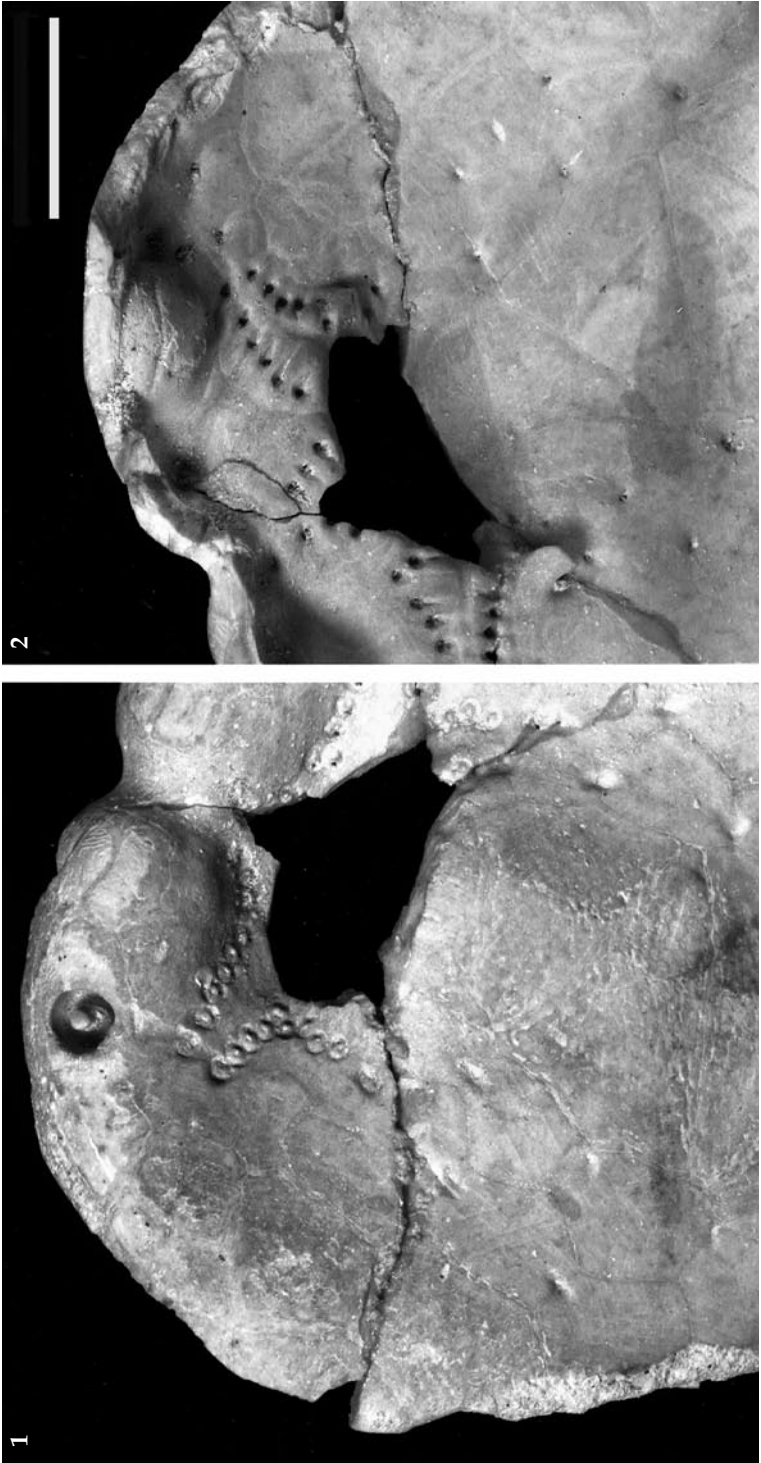


Plate 1

Fig. 1. *Oichnus excavatus* Donovan & Jagt, 2002, RGM 2116 091 (top centre), showing peristome and part of oral surface of substrate *Hemipneustes striatoradiatus* (Leske, 1778), RGM 2116 091. Internal view of oral surface, showing blister (top centre) grown in response to infestation by organism that produced *O. excavatus*. Anterior of echinoid towards top left. Scale bar represents 10 mm and is applicable to both figures.