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A NOTE ON *ECHINOCARDIUM CORDATUM* (PENNANT, 1777) (ECHINOIDEA, LOVENIIDAE) FROM THE LATE PLIOCENE OF NIEUW NAMEN (THE NETHERLANDS)

JOHN W.M. JAGT
Natuurhistorisch Museum
Maastricht, The Netherlands

and

J.J. DE VOS
Terneuzen, The Netherlands

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A well-preserved complete test and a test fragment of the loveniid echinoid species *Echinocardium cordatum* (Pennant, 1777) are recorded from late Pliocene strata (Upper North Sea Group, Oosterhout Formation) as exposed at the de Kauter locality at Nieuw Namen. The complete test preserves parts of its spine canopy, suggesting but limited post-mortem transport, and may represent the first complete echinoid to be recorded from outcropping late Pliocene strata in the SW Netherlands.

Key words — Echinoidea, Loveniidae, late Pliocene, Oosterhout Formation, Nieuw Namen, The Netherlands.

J.W.M. Jagt, Natuurhistorisch Museum Maastricht, Postbus 882, 6200 AW Maastricht, The Netherlands; J.J. de Vos, Marijkestraat 20, 4532 BM Terneuzen, The Netherlands.

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INTRODUCTION

The echinoid faunas from Miocene, Pliocene and Pleistocene deposits of NW Belgium and the SW Netherlands are still poorly known and in need of a modern revision. Although a number of recent papers describing additions to the fauna have appeared (Geys & Marquet, 1979; Geys, 1989), the rich material collected from innumerable temporary exposures especially in the Antwerp city area and in the dock works on the west Scheldt bank remain undescribed to this day. Cotteau (1880) is still the most extensive work available; it comprises the whole Cainozoic but is of course largely outdated. From various Dutch boreholes, Engel (1941, 1953, 1958) described a limited number of Pliocene, Pleistocene and Holocene echinoid species, amongst which *Echinocardium cordatum*. For English Cainozoic echinoid faunas reference is made to Forbes (1852); quite a number of the specimens he described and illustrated have recently been updated taxonomically (Lewis, 1986).

From the renowned late Pliocene succession exposed at the de Kauter quarry at Nieuw Namen (Janssen, 1983a, b), assigned to the Oosterhout Formation (Upper North Sea Group), a test with spines attached of *E. cordatum* discovered by Mr R. Bleyenberg, a private collector, may represent the first complete echinoid to be recorded.

DESCRIPTION

The complete test (Pl. 1) measures 37 mm in overall length, 31.5 mm in width and 21 mm in height, and is thus of small to moderate size for the species. The specimen preserves parts of its spine canopy, especially on A II, A IV and on IA 4, IA 5 around the periproct, and on the plastron. In these areas the spines are held together by numerous cemented sand grains, while other test areas are denuded and

show features of ambulacral pores and 'internal' fasciole and reveal a slight abrasion of the tubercles. This suggests but limited post-mortem transport; the test may even have been preserved within its burrow (compare Bromley & Asgaard, 1975), but this has unfortuntely not been noted during collection. Periproctal and peristomial plating are not preserved. The labrum and adjacent ambulacral columns are broken (Pl. 1, Fig. 3), which may be an indication of predation, but may equally well be taphonomy-related. Spine form and arrangement correspond exactly to what has been described in the literature for Recent and fossil representatives of this species, which has been exhaustively studied in almost every respect (see *e.g.* Moore, 1936; Nichols, 1959; Buchanan, 1966; Ernst *et al.*, 1973; Smith, 1980a, b, 1984; David & Laurin, 1991 and Kanazawa, 1992).

This complete test was collected from the sandy unit between 1,95 and 3,25 m below surface in Janssen's (1983a, b) section, and has subsequently been deposited in one of the authors' (JJV) private collection. It will be donated to the Hulst municipal museum.

The second specimen (Fig. 1), collected in 1959 by Mr G. de Zeeuw (Zaamslag), is but a fragment and does not preserve test material. However, the upper side preserves enough detail of ambulacral and interambulacral plate structure and arrangement for it to be confidently assigned to *E. cordatum*. The inside of this fragment shows numerous single calcite crystals each of which represents a single test plate, slightly different from but otherwise comparable with hemiasterid and nucleolitid echinoid crystals occurring in the late Maastrichtian Lanaye Member (Gulpen Formation) as exposed at the ENCI NV quarry, south of Maastricht (The Netherlands). This fragmentary test was also collected below the indurated dark brown limonitic sandstone occurring between 1,70 and 1,80 m below surface in Janssen's (1983a, b) lithologic log.

Fig. 1. Test fragment of *Echinocardium cordatum* (Pennant, 1777), late Pliocene Oosterhout Formation, Nieuw Namen-de Kauter, province of Zeeland, The Netherlands, collected in 1959 by G. de Zeeuw, x 3.5.

Discussion

There can be no doubt as to the identity of these two echinoids from Nieuw Namen. Amongst representatives of the genus *Echinocardium* Gray, 1825, *E. cordatum* is the type and probably best known species. The fossil record of the genus extends back to the Oligocene (Fischer, 1966, p. U613), and numerous fossil and modern species have been recorded in the literature (*e.g.* Cooke, 1959; Kier & Lawson, 1978; Maczyńska, 1979, 1988). *E. cordatum* has been recorded from the Coralline Crag by Forbes (1852), an age-equivalent deposit (Jenkins & Houghton, 1987; Balson, 1990; Balson *et al.*, 1993) of the Oosterhout Formation from which the present material has been collected. In modern echinoid faunas, the species is widely distributed and in fact truly cosmopolitan (Mortensen, 1927[1971]; Ghiold & Hoffman, 1989).

From the fossil record either tests or test fragments or the highly typical bioturbation traces have been described (Bromley & Asgaard, 1975; Raven, 1982; Ekdale *et al.*, 1984; Colella & d'Alessandro, 1988; Bromley, 1990).

The strata exposed at the Nieuw Namen-de Kauter locality are assigned to the Oosterhout Formation (Janssen, 1983a, b; Rijks Geologische Dienst, 1988) and are considered coeval with the NW Belgian Merksem Sands Member of the Lillo Formation. In benthic foraminifer terms (Willems *et al.*,

1988; Doppert, 1988) these strata represent zone B 12, the Elphidiella hannai-Cribrononion excavatum Assemblage Zone (BFN 6 Zone) of de Meuter & Laga (1976). The Kruisschans and Merksem Sands Members (Lillo Formation) as exposed in the Antwerp and northern Kempen areas, as well as the Walton Member of the Red Crag of the London Basin and east Anglia were referred by Hinsch (1988) to the late Pliocene (Merksemian/Waltonian) benthic molluscan zone BM 22 C (Laevicardium parkinsoni-Spisula inaequilatera-Nucella lapilla incrassata Zone), which corresponds to Sliggers & van Leeuwen's (1987) molluscan zone C.

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PLATE 1

Figs 1-4. *Echinocardium cordatum* Pennant, 1777), complete test preserving spines. Late Pliocene Oosterhout Formation, 1,95-3,25 m below surface, Nieuw Namen-de Kauter, province of Zeeland, The Netherlands. Hulst municipal museum collections (*ex* J.J. de Vos Coll., leg. R. Bleyenberg). 1 - oblique left lateral view; 2 - oblique right lateral view; 3 - oblique aboral view; 4 - periproctal area, x 2.4 (1 and 2), x 2.5 (3) and x 2.9 (4).

PLATE 1