

Note on a Maastrichtian cidarid echinoid from Eijsden (Limburg, The Netherlands)

by John W.M. JAGT

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Abstract

A well-preserved cidarid echinoid is recorded from Interval 5 or 6 of the Vijlen Member (Gulpen Formation, Maastrichtian), as exposed in and along the banks of the River Maas at Eijsden. In contrast to occurrences in the Zeven Wegen (Gulpen Formation, Campanian) and Nekum and Meerssen members (Maastricht Formation, Maastrichtian) in the area, the Vijlen Member has so far yielded but limited cidarid material. In addition, when specimens are found preservation is generally poor, the material consisting of isolated primary spines and test plates and/or portions of test at best. The present specimen, which is here questionably referred to *Tennocidaris (Stereocidaris) arnaudi* (LAMBERT, 1909), is of note in being complete, albeit slightly deformed, and in retaining the lantern, some primary, secondary and scrobicular spines and a few peristomial plates.

Key words: Echinoidea, Cidaridae, Maastrichtian, The Netherlands, taphonomy.

Résumé

Un échinoïde cidaridé bien préservé a été récolté dans l'intervalle 5 ou 6 du Membre de Vijlen (Formation de Gulpen, Maastrichtien), affleurant le long des rives de la Meuse à Eijsden. Contrairement aux trouvailles effectuées, dans la région, dans les Membres de Zeven Wegen (Formation de Gulpen, Campanien), de Nekum et de Meerssen (Formation de Maastricht, Maastrichtien), le matériel de cidaridés récolté dans le Membre de Vijlen est limité. De plus, les spécimens récoltés sont dans un état de conservation généralement peu satisfaisant et consistent en épines primaires isolées ainsi qu'en plaques de test et/ou, au mieux, en parties de test. Le spécimen considéré ici et déterminé avec doute *Tennocidaris (Stereocidaris) arnaudi* (LAMBERT, 1909) est remarquable: bien que légèrement déformé, il est complet et a conservé la lanterne, quelques épines primaires, secondaires et scrobiculaires ainsi que quelques plaques péristomiales.

Mots-clés: Echinoidea, Cidaridae, Maastrichtien, Pays-Bas, taphonomie.

Introduction

To date, at least eleven species of cidarid echinoid are known from Campanian and Maastrichtian strata (Appendix) in the extended type area of the Maastrichtian

Stage (JAGT, 2000). Cidarid diversity is highest in the Meerssen Member (of late Late Maastrichtian age), and in the Zeven Wegen Member (of early Late Campanian age), as exposed in the Maastricht-Bemelen area (southern Limburg, The Netherlands) and in the Heure-le-Romain/Haccourt/Lixhe area (Liège, NE Belgium), respectively. Preservation varies considerably, from rare whole tests (some retaining most primary spines, lantern and portions of peristomial and apical disc plating) to isolated primary and scrobicular spines and interambulacral test plates. Usually, only 1/5 portions of the tests are found.

JAGT (2000, p. 210) has recently noted that the Vijlen, Lanaye, Valkenburg, Gronsveld, Schiepersberg and Emael members yielded virtually no cidarid echinoids; in contrast, overlying Paleocene strata show a marked increase in cidarid diversity, with at least seven species known to date.

Records in the literature of cidarids from the Vijlen Member (VAN DER HAM & VAN BIRGELEN, 1992; KEUTGEN, 1996; JAGT *et al.*, 1995; SMITH & JEFFERY, 2000; JAGT, 2000) comprise, in addition to indeterminate interambulacral plates (JAGT, 2000, p. 210, pl. 2, fig. 8; pl. 3, fig. 2) and isolated primary spines, the following taxa:

* *Tennocidaris (T.) nigelliensis* (LAMBERT, 1909)?; this record is based on VAN DER HAM & VAN BIRGELEN'S (1992, p. 143, pl. 4, figs. 1, 2) *Tennocidaris* sp. 1, from the Vijlen Member at Aachen-Schneeberg (Germany). Those authors noted a similarity of their material to *Tennocidaris schlueteri* SALAH, 1982; SMITH & JEFFERY (2000, p. 24) synonymised that taxon with *T. nigelliensis*, a view accepted here.

* *Tennocidaris* sp. 2, *sensu* VAN DER HAM & VAN BIRGELEN (1992, p. 143, pl. 4, fig. 3) (= *T. (S.)* sp. 3 in Appendix here), also from the Vijlen Member at Aachen-Schneeberg. This material may be conspecific with *Tennocidaris (S.) arnaudi*, as interpreted by SMITH & JEFFERY (2000, p. 27).

* *Tennocidaris* sp. 3, *sensu* VAN DER HAM & VAN BIRGELEN (1992, p. 143, pl. 4, fig. 4), from the Vijlen Member at Aachen-Schneeberg as well. JAGT (2000, p. 203) was of the opinion that this was conspecific with *T. (Stereocidaris) herthae*.

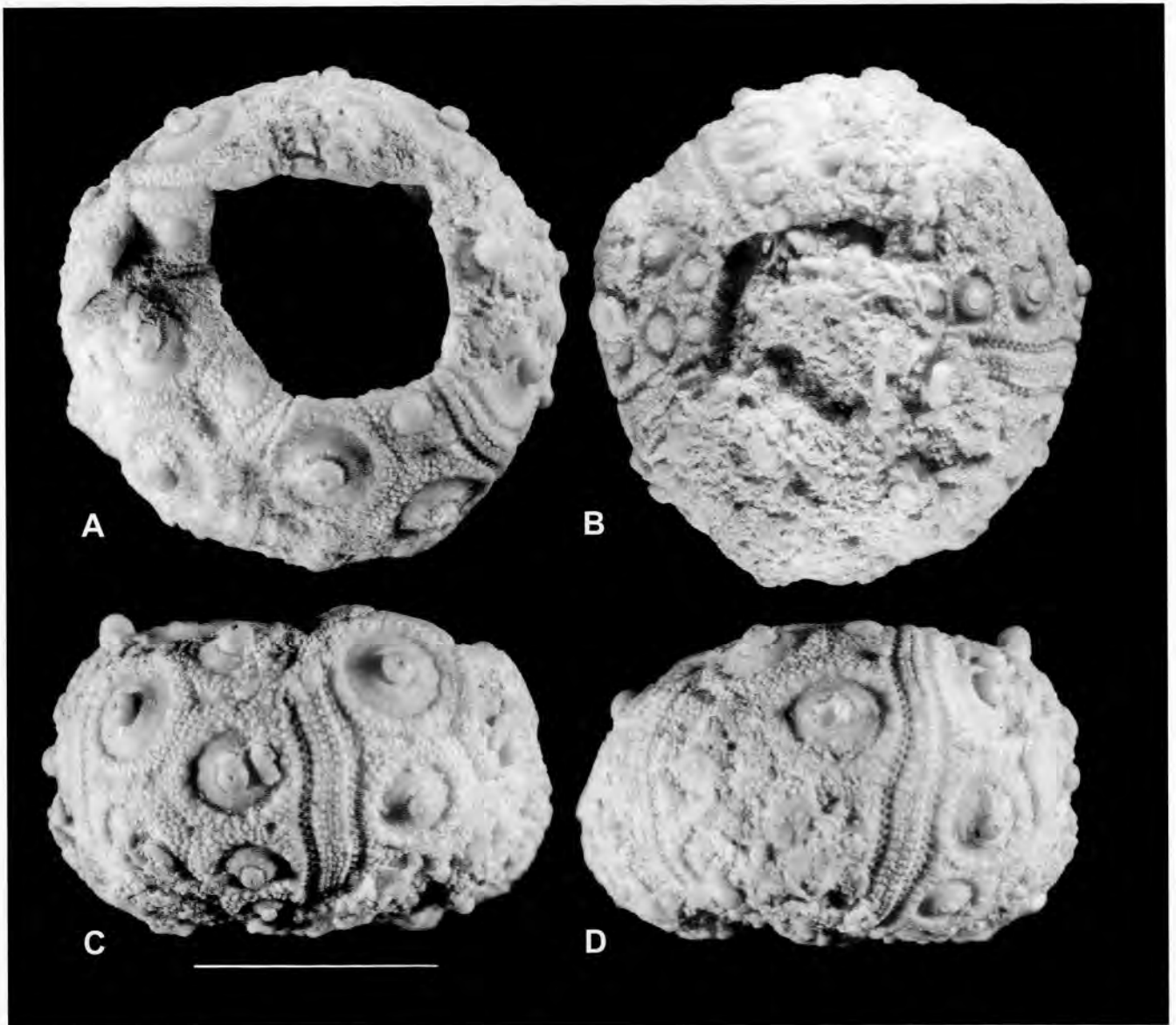


Fig. 1 — Adoral (A), oral (B) and lateral (C, D) views of *Temnocidaris (Stereocidaris) aff. arnaudi* (LAMBERT, 1909), NHMM 2002 070, Gulpen Formation, Vijlen Member (Interval 5 or 6), Eijsden, southern Limburg (The Netherlands). Scale bar equals 10 mm.

It should be noted that, in the interest of nomenclatural stability, the view expressed by SMITH & JEFFERY (2000) that the oldest available names of cidarids should be those based on recognisable tests rather than on isolated spines, is much to be preferred. This means that such widely used names as *Cidaris hagenowi* DESOR, 1858 and *C. pistillum* QUENSTEDT, 1852, even to this day (see *e.g.*, REICH & FRENZEL, 2002, pl. 42, figs. 3, 4), are best treated as *nomina dubia*.

The present specimen, here referred to as *Temnocidaris (Stereocidaris) aff. arnaudi*, was collected by Paul Creuwels (Eijsden) from strata assigned to the Vijlen Member outcropping in and along the banks of the River Maas near Eijsden, southeast of Maastricht. It is now in the collections of the Natuurhistorisch Museum Maastricht (NHMM).

Taxonomy

Temnocidaris (Stereocidaris) aff. arnaudi
(LAMBERT, 1909)
(Figs. 1, 2)

compare

* 1909 *Dorocidaris arnaudi* LAMBERT, p. 133, pl. 1, figs. 10, 11.

2000 *Temnocidaris (Stereocidaris) arnaudi* (Lambert, 1909) - SMITH & JEFFERY, p. 27, text-fig. 8g-j (with additional synonymy).

Test (NHMM 2002 070) relatively small, diameter at ambitus 21.5 mm, height *c.* 13 mm. Diameter of apical

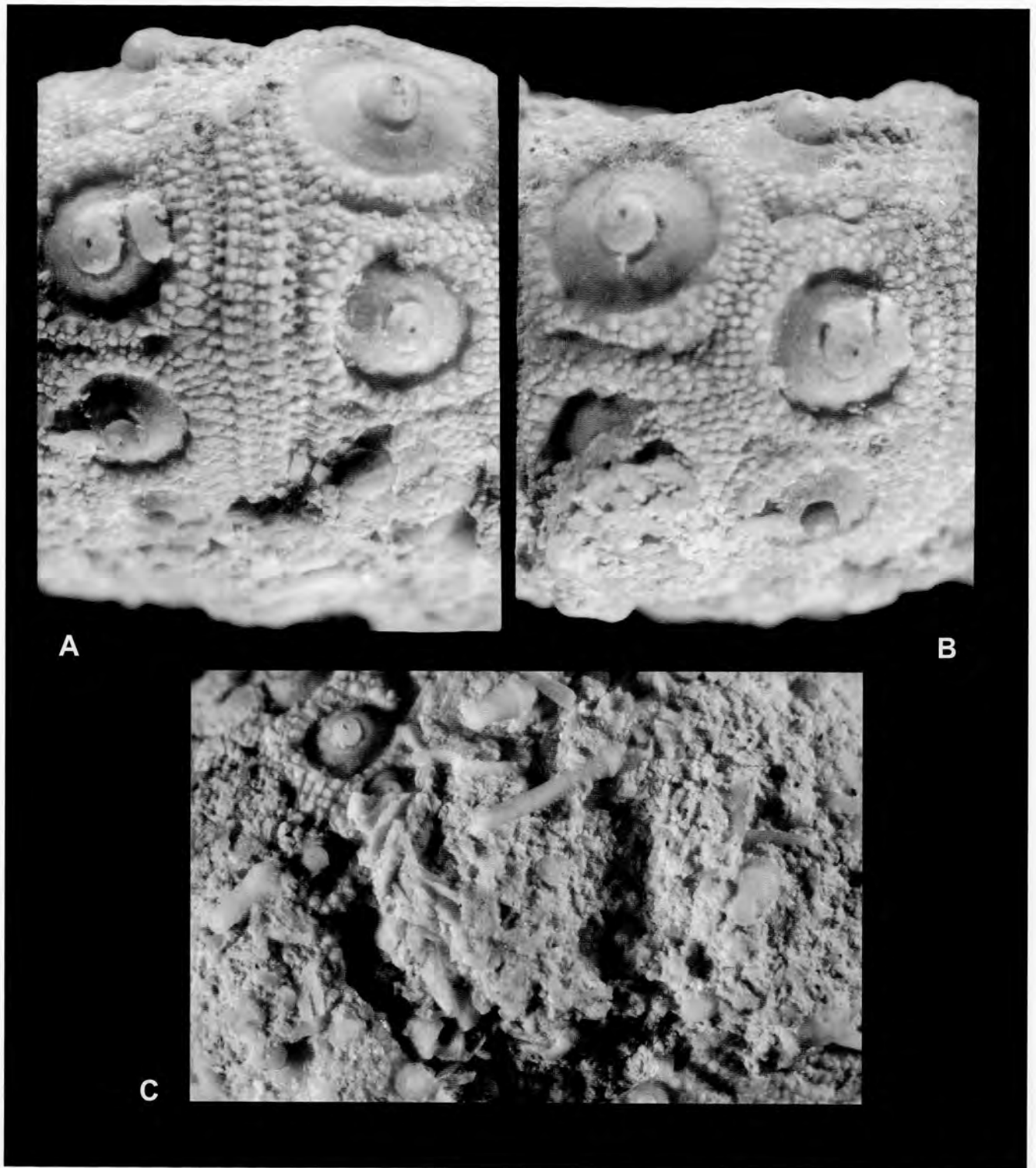


Fig. 2 — Details of ambulacral (A) and interambulacral (B) plating and of peristomial area (C) with fragmentary primary and scrobicular spines of *Temnocidaris* (*Stereocidaris*) aff. *arnaudi* (LAMBERT, 1909), NHMM 2002 070, Gulpen Formation, Vijlen Member (Interval 5 or 6), Eijsden, southern Limburg (The Netherlands), all x 8.

disc and peristome *c.* 54% and *c.* 43% of test diameter, respectively; width at ambitus of ambulacral zones *c.* 23% of that of interambulacra, pore zones rather narrow and comprising nonconjugate isopores, and raised interporal partition narrower than or of the same width as

individual pore. Each ambulacral plate has a single large, marginal tubercle, corresponding to the full height of the plate and arranged in a contiguous series along the entire ambulacrum. Adjacent to that is a perradial band of smaller miliary tubercles; on some plates, the inner

one of these tubercles may equal two-thirds the size of the marginal tubercle, on other plates two subequal tubercles are seen. Miliaries are two or three abreast, and are generally arranged into one horizontal row on the plate with adjoining smaller miliaries; 12-13 ambulacral plates opposite an ambital interambulacral plate.

There are five interambulacral plates in a column; except for the most adapical plate in each zone, all have a functional primary tubercle. Tubercles perforate and generally noncrenulate, except for adapical plates which may show coarse crenulations. Areoles large, sunken, (sub)circular in outline, and 65-66% of plate width ambilaterally. Scrobicular circle consisting of 15-17 tubercles, moderately prominent only. Miliary tubercles are of uniform size, fairly coarse and densely packed; no neural grooves. Adoral plates have contiguous scrobicular circles, while ambital and adapical plates have zones of miliary tubercles (2-4 in number) separating successive scrobicular circles. Scattered amongst miliary tubercles there are well-developed, deep pits along interrational margins and adradial margins of horizontal sutures.

Preserved scrobicular spines are of the general type, flattened, tapering and ornamented with fine striations. Ambulacral spines are comparable in ornament, but generally are narrower and have straighter sides. Only the basal portions of adoral primary spines survive; these are slender, are clearly striated and appear to have been ornamented by widely spaced rows of thorns. Only a few elements of the peristomial plating and the lantern are visible; the remainder appears to have collapsed into the test.

Locality and stratigraphy:

The present specimen was collected loose from the banks of the River Maas near Eijsden, where strata assigned to the Vijlen Member outcrop. Associated macrofossils found include a nautiloid (P. Creuwels Colln) and various coleoid cephalopods, which have found their way to unknown private collections (W.M. Felder, pers. comm., July 2002).

Determining the level that yielded the cidarid echinoid within the Vijlen Member is difficult, and only indirect evidence can be furnished at this time. In borehole 61H-56 at Oost Maarland, less than two kilometres north of Eijsden, P.J. FELDER (1997, fig. 5) assigned the highest 10-15 metres of Vijlen Member strata to Intervals 5 and 6 (*sensu* P.J. FELDER & BLESS, 1994). Compared to data supplied for outcrops nearby (*e.g.*, quarries CPL SA-Haccourt and CBR-Lixhe) by KEUTGEN (1996), these intervals are of late Early Maastrichtian age (equivalents of *Belemnella cimbrica* and *B. fastigata* zones). Other authors consider Interval 6 to be of early Late Maastrichtian age (see JAGT, 1999, for a brief discussion). Despite many years of collecting at the CPL SA and CBR-Lixhe quarries, cidarid echinoids from Interval 6 exposed there have remained extremely rare, thus underscoring the importance of the present find.

In view of the glauconite content of the Vijlen Member strata at Eijsden, W.M. Felder (pers. comm., July 2002) considers it likely that the level exposed there corresponds to part of the section around the Zonneberg Horizon (*sensu* W.M. FELDER & BOSCH, 2000) as exposed at the ENCI-Maastricht bv, a few kilometres to the northwest. Additional lithostratigraphic logging there and a study of associated macrofaunal elements from the Eijsden outcrop are needed to test this.

Discussion:

Although there are only five interambulacral plates in a column, the present specimen is closer to *T. (S.) arnaudi* as understood by SMITH & JEFFERY (2000) than to *T. (S.) herthae*, with which it co-occurs in northern Germany and Norfolk (England; see SMITH & WRIGHT, 1989). *Temnocidarid herthae* was originally described from the "Schreibkreide der Insel Rügen" (SCHLÜTER, 1892, pl. 16, figs. 1-4, as *Dorocidarid herthae*). In current terminology, that would mean upper Lower Maastrichtian, *Belemnella sumensis* to *B. fastigata* zones (see REICH & FRENZEL, 2002). It has five, rarely six, interambulacral plates in a column, and relatively small primary tubercles with wide extrascrobicular zones (particularly interrally [6-9 granules abreast] and adapically [4-6 granules abreast]), so that successive scrobicular circles on ambital and adapical plates are widely separated. In addition, extrascrobicular tuberculation is dense and fine, mostly well aligned (neural grooves interrally); sutural pits are seen on horizontal sutures close to the adradial margin.

Temnocidarid (S.) arnaudi, on the other hand, has six to eight interambulacral plates in a column, relatively large areoles which cause successive scrobicular circles to be (almost) contiguous ambilaterally, and with extrascrobicular granulation mostly restricted to adradial and interrally sides and rather coarse [4-6 granules abreast interrally]. An important distinguishing feature is that adapical plates lack wide extrascrobicular zones on the upper side, and that sutural pits are found on horizontal sutures close to the adradial margin and interrally.

Although NHMM 2002 070 has but five interambulacral plates in a column, the size of the areoles and the fact that the extrascrobicular granulation lacks the wide zones extrascrobicular areas on adradial plates as well as neural grooves, favour assignment of this specimen to *T. (S.) arnaudi*. The differences may be age related, because throughout ontogeny (inter)ambulacral plates are added apically and existing plates grow in all directions.

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Appendix

Cidarid echinoids known to date from Upper Cretaceous (Campanian-Maastrichtian) strata in the extended type area of the Maastrichtian Stage

Temnocidaris (T.) nigelliensis (LAMBERT, 1909)?
(= *Temnocidaris* sp. 1 *sensu* VAN DER HAM & VAN BIRGELEN, 1992)
Vijlen Member

Temnocidaris (T.) sp. 1
(= *T. baylei sensu* GEYS, 1990, *partim?*)
basal Meerssen Member

Temnocidaris (T.) sp. 2
(= *T. baylei sensu* GEYS, 1990, *partim?*)
Kunrade limestone facies, Nekum and Meerssen members

Temnocidaris (Stereocidaris) gigas (SCHLÜTER, 1892)
upper Maastricht Formation (?Nekum and Meerssen members)

Temnocidaris (S.) herthae (SCHLÜTER, 1892)
Zeven Wegen and Vijlen members

Temnocidaris (S.) serrata (DESOR, 1858)
Zeven Wegen Member

Temnocidaris (S.) sp. 1
close to *Cidaris? arenata* LAMBERT, 1911
Zeven Wegen Member

Temnocidaris (S.) sp. 2
Kunrade limestone facies, Schiepersberg and Meerssen members

Temnocidaris (S.) sp. 3
(= *Temnocidaris* sp. 2 *sensu* VAN DER HAM & VAN BIRGELEN, 1992)
Vijlen Member

Temnocidaris (S.) ubaghsi (GEYS, 1987)
Zeven Wegen Member

Goniocidaris? sp.
sensu SMITH & JEFFERY (2000, p. 16, fig. 4a, b)
Meerssen Member
