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Morphological differences between two species of Palliolum (Bivalvia: Pectinidae)

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The Miocene to Recent bivalve *Palliolum tigerinum* (Müller, 1776) and the Pliocene *P. gerardi* (Nyst, 1835) have utterly different colour patterns. Morphological differences between these taxa are described and summarised in a table to facilitate easy identification.

Key words: Bivalvia, Pectinidae, *Palliolum*, taxonomy, colour pattern.

INTRODUCTION

Van der Burg (1995: 29) described and illustrated a pectinid from the Pliocene of Oss (The Netherlands, Noord-Brabant province) demonstrating an unusually clear colour pattern. In his short contribution Van der Burg stated that 'fossil molluscs rarely show a (colour)pattern' and '... have so far not been reported for bivalves from the Pliocene of the Netherlands or elsewhere in Europe.'.

There are several good examples of colour patterns being preserved, even for bivalves as old as Palaeozoic or Mesozoic. In Tertiary molluscs this phenomenon occurs more frequently, as for instance in the genus *Volutispina* from the Eocene (Lutetian) of the Paris Basin (especially the locality Daméry, RGM collections in Nationaal Natuurhistorisch Museum, Leiden), or in the Miocene (Badenian) of Rumania, where such patterns were used to discriminate between species of Conidae (Hoernes & Auinger, 1879: 16), and even in the Miocene of The Netherlands (Janssen, 1986). Sometimes colour patterns are apparently absent, but appear clearly when seen under UV light (Nuttall, 1969, figs. 58-59). Good examples of these are given by this author for Tertiary venerids, and are also found to occur in various gastropod and bivalve genera from the Miocene of Turkey (Karaman Basin; RGM and Van der Voort collections).

Restricting ourselves to the Pliocene of the North Sea Basin, we maintain the opinion, contrary to Van der Burg, that colour patterns are frequently preserved, both in gastropods (*Gibbula*, *Solariella*, *Natica*, *Mangelia*, *Unedogemmula*, etc.), as well as in bivalves (*Nuculoma*, *Similipecten*, *Palliolum*, *Ensis*, *Mactra*, *Angulus*, etc.). For an illustration of e.g. *Similipecten similis* (Laskey, 1811) the reader is referred to Van Regteren Altena et al. [1966, pl. 6 fig. 30a-b; as *Cyclopecten (Delectopecten)*].

In the genus *Palliolum* it is especially *P. gerardi* (Nyst, 1835) from the Pliocene of the Antwerp area in which almost invariably the colour pattern is preserved (see for instance Van Regteren Altena et al., 1969, pl. 11 fig. 42a), albeit that this pattern is much less conspicuous and strongly different from the one illustrated under that name by Van der Burg (fig. 1). It follows that we question Van der Burg's identification of the specimen, which in our opinion belongs to *Palliolum tigerinum* (Müller, 1776), a species well-known

from the NE.-Atlantic Neogene to Recent, and demonstrating a colour pattern basically the same as the one illustrated by Van der Burg.

Although the morphological differences between the highly polymorph *Palliolum tigerinum* (see Nyst, 1878, pl. 15 fig. 4a-s; Glibert, 1945, pl. 5 fig. 2a-n) and the much less variable *P. gerardi*, although briefly, were decisively described by Van Regteren Altena et al. (1969: 20) it is apparently useful and necessary to give a more extended description and a detailed comparison between these taxa, as even an experienced student of the North Sea Basin's Pliocene molluscs as Mr. van der Burg insists on his erroneous identification when confronted with our opinion.

SYSTEMATICS

Family Pectinidae Wilkes, 1810 (emend. Waller, 1978)
Subfamily Palliolinae Korobkov in Eberzin, 1960
Tribe Palliolinini Waller, 1993
Genus *Palliolum* de Monterosato, 1884

Palliolum de Monterosato, 1884: 5. Type species (subsequent designation by Crosse, 1885): *Pecten incomparabilis* Risso, 1826; Late Eocene-Recent, Europe.

Remarks. — Hertlein (1969: N354) placed *Palliolum* in the *Eburneopecten* group. Waller & Marincovich (1992: 219) separated *Palliolum* and other genera from the subfamily Camptonectinae, in which Habe (1977) placed the present genus. Waller (1991: 35) treated *Palliolum* as a supragenus (*Palliolum* group), probably derived from a more coarse-sculptured ancestor, and subsequently (Waller, 1993: 198) as a tribe Palliolinini, including the following species: *Placopecten magellanicus* (Gmelin, 1791), *Pseudamussium septemradiatum* (Müller, 1776), *Pseudamussium sulcatum* (Müller, 1776) and *Palliolum tigerinum* (Müller, 1776).

Palliolum tigerinum (Müller, 1776)
figs. 1-8

Pecten tigerinus Müller, 1776: 248.

Pecten tigerinus Müller. — Nyst, 1878: pl. 15 fig. 4a-s; 1881: 152 (synonymy, references, discussion).

Pecten (Pallium) tigerinus Müller, 1776. — Glibert, 1945: 79, pl. 5 fig. 2a-n (description, variability, biometry, discussion).

Pseudamussium (Palliolum) tigerinum (Müller, 1776). — Van Regteren Altena, Bloklander, Pouderoyen & Van der Slik, 1969: 20, pl. 11 fig. 41a-b, text-fig. 2c-e (description, variability).

Camptonectes tigrinus [sic] (Müller). — Lucas, 1979: 9, text-figs. (synonymy, description).

Palliolum tigerinus [sic] (Müller). — Wagner, 1991: 10, text-fig. 4, pl. 2 fig. 5 (synonymy, references, description, discussion); Poppe & Goto, 1993: 67, pl. 10 fig. 1a-f.

Description. — Shell small (height up to c. 34 mm, commonly 20-25 mm), moderately solid, sometimes bulbous, suborbicular to triangular oval, inequilateral, nearly equivalve, left valve slightly more convex than the right valve, umbonal angle 80-86°, auricles strongly unequal, antimarginal microsculpture (sometimes also commarginal in early growth stage) distinctly present.

Both valves smooth, covered with numerous fine radial riblets, or prominently sculptured with 3-5 primary radial costae and many irregularly arranged secondary radial riblets on the entire disc. Anterior auricles with 4-5 radial riblets, near disc flank

concentric lamellae. Posterior auricles more delicately sculptured with a few more squamose radial riblets. Byssal notch fairly shallow. Ctenolium present with 4-6 active teeth. Hinge line straight. Resilial insertion triangular oval. Inside of ventral margin somewhat plicated. Colour pattern strongly variable, frequently with significant irregular maculations on the left valve, right valve less abundantly coloured, frequently with Λ-shaped pattern.

Geographic distribution. — Boreal to tropical eastern Atlantic (c. 70°N - c. 15°N). Living on muddy or muddy sand bottoms with gravel and/or rocks at sublittoral depths (boreal region) to bathyal depths (subtropical to tropical region).

Stratigraphical distribution. — *Palliolum tigerinum* occurs abundantly in the late Early Miocene (Hemmoorian, Behrendorfian) Edegem Sand Member of the Berchem Formation in Belgium. In younger Miocene deposits it is largely replaced by *Pseudamussium lilli* (Pusch, 1837), but in the Pliocene deposits of the North Sea Basin it is again more common.

Remarks. — Examined Recent material in various Dutch collections from Norway and the northern North Sea is rather strongly sculptured and sometimes bulbous. Material from the Irish Sea is nearly smooth and somewhat larger in size. The wide variation described from Recent material can likewise be observed in the fossil record (e.g. Glibert, 1945). This polymorphy affects exclusively the external macrosculpture, shell form and antimarginal sculpture hardly show any variation at all (Glibert, 1945: 80).

Palliolum gerardi (Nyst, 1835)
fig. 9

Pecten gerardii Nyst, 1835: 19, pl. 3 fig. 75; 1878: pl. 15 fig. 5a-f; 1881: 153 (synonymy, references, description, discussion).

Pecten gerardii Nyst. — Von Teppner, 1922: 210 (synonymy, references).

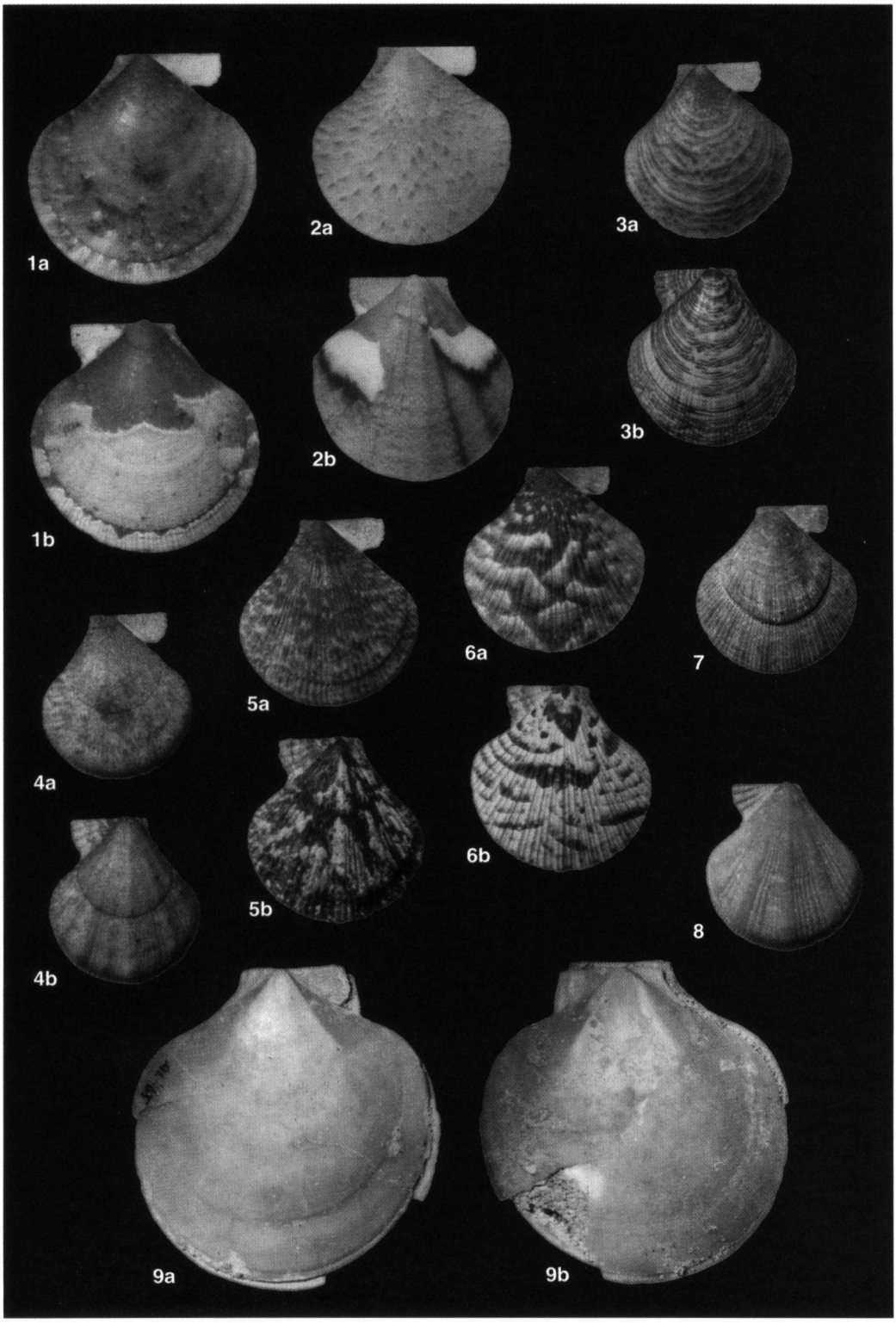
Chlamys (Camptonectes ?) gerardi (Nyst). — Glibert, 1957: 30 (references, discussion).

Pseudamussium (Palliolum) gerardi (Nyst, 1835). — Van Regteren Altena et al., 1969: 20, pl. 11 fig. 42a-b, text-fig. 2f-g.

Description. — Shell rather small (height up to c. 48 mm), fragile, suborbicular to orbicular, inequilateral, nearly equivalve, not bulbous, left valve more convex than right valve, umbonal angle 90-100°, auricles unequal, antimarginal microsculpture present.

Both valves macroscopically smooth or minutely sculptured with close-set radial riblets starting below the central section of the disc and increasing in number toward the marginal area. Anterior auricles with 4-6 fine radial riblets, with overrunning concen-

Figs. 1-9. Shells of *Palliolum* species. 1-8, *P. tigerinum* (Müller, 1776); 9, *P. gerardi* (Nyst, 1835); a, right valves; b, left valves; scale bar 1 cm. Colour photographs to demonstrate variability in pattern (left page), same specimens sprayed with ammonium chloride to demonstrate variability in sculpture (right page). All photographs M. van Engelen. Details of specimens. 1, 2: Off Waterford, SE. of Ireland, trawled alive by fishing-boat at 40-50 fms. on muddy sand, May 1985; 3-6: Off Oban, Scotland, dredged alive by fishing-boat at 120 m, 1979; 7-8: Celtic Sea, 49°09'N 5°18'W, Thalassa Sta J677, dredged at 104 m, 1983, leg. R. von Cosel, ex Museum Paris; all H.H. Dijkstra collection; 9: Antwerpen, Lillo, construction pit for tunnel, Pliocene, Scaldisian, Lillo Formation, Luchtbal Sand Member; leg. D. van der Mark, 1965, RGM 395 268. Colour plate sponsored by the authors and the editors of Basteria.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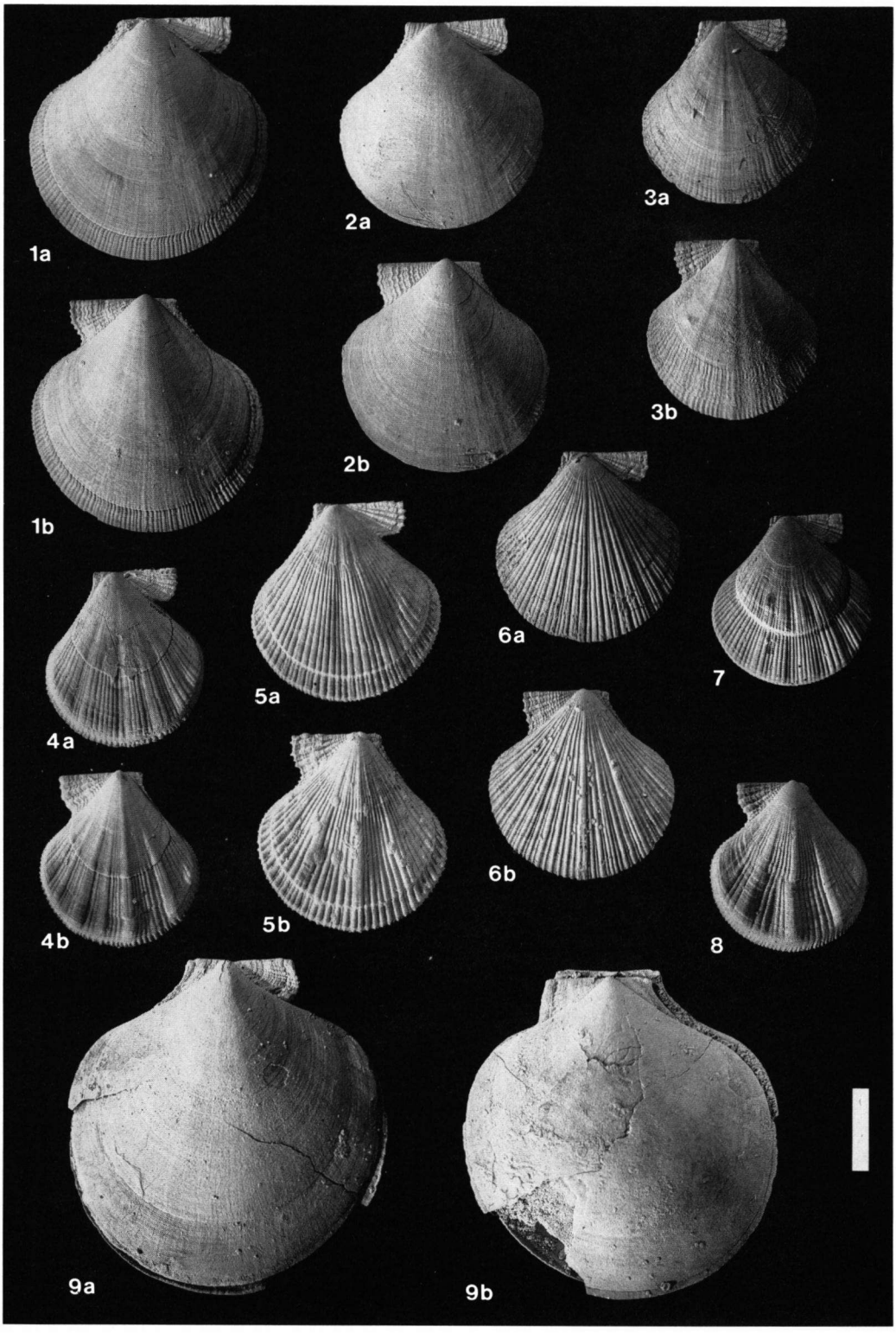
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tric lamellae. Posterior auricles with 6-8 fine radial riblets. Byssal notch fairly shallow. Ctenolium present with 3-5 active teeth. Hinge line straight. Resilial insertion somewhat triangular oval. Inside ventral margin finely plicated in specimens preserving an external radial sculpture near the margin. Colour pattern frequently preserved in the umbonal area, consisting of a central light coloured part, sharply separated from two darker areas along the posterior and anterior dorsal margins, enclosing an apical angle of ca. 60°.

Stratigraphic distribution. — *P. gerardi* is exclusively known from the Pliocene (Kattendijkian and Scaldisian) of the North Sea Basin. In Belgium it is found in the Kattendijk and Lillo Formations (upper part of the Kattendijk Sands, Luchtbal Sands and, probably reworked, in the Oorderen Sands). In Great Britain this species is locally abundant in the Coralline Crag.

Table 1: Comparison between *Palliolum tigerinum* and *Palliolum gerardi*

Palliolum tigerinum	*Palliolum gerardi*
- Shell moderately solid	- Shell extremely fragile
- Sculpture absent to prominent with primary and secondary radial riblets	- Sculpture absent or fine radial riblets toward ventral margin
- Left valve slightly more convex than right one	- Left valve distinctly more convex than right one
- Height up to c. 30 mm	- Height up to c. 48 mm
- Anterior auricle 2.4-2.7 times longer than posterior one	- Anterior auricle 1.8-2.0 times longer than posterior one
- Anterior auricle with 4-5 radial riblets	- Anterior auricle with 4-7 radial riblets
- Posterior auricle with 5-8 radial riblets	- Posterior auricle with 5-8 radial riblets
- Umbonal angle 80-86°	- Umbonal angle 90-100°
- Ctenolium well-developed with 4-6 active teeth	- Ctenolium weakly developed with 0-3 active teeth
- Colour pattern frequently with coarse maculations on the left valve and a finer, Λ-shaped or more uniform pattern on the right valve	- Colour pattern on both valves demonstrating a lighter central zone near the umbo, sharply separated from two darker zones along the anterior and posterior dorsal margins.

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