

The identity of a fossil valve with a colour pattern from the Pliocene of the northern Peel district, the Netherlands (Bivalvia, Pectinidae)

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The identification of a fossil valve as *Pseudamussium (Palliolium) gerardi* (Nyst, 1835) with a colour pattern (Van der Burg, 1995: 29-30) has been questioned by Janssen & Dijkstra (1996: 107-113), who are of the opinion that the valve belongs to *Palliolium tigrinum* (Müller, 1776). It could, however, be shown that "a light-coloured part near the umbo" on *P. gerardi*, thought by these authors to be the specific colour pattern of this species, is not a colour pattern but the image of a corrosion remnant of the inner layer of the valve, visible through the thin transparent outer layer. This peculiarity is encountered in a number of valves, but, of course, not in dark-coloured ones as the valve in question.

In addition, the types of colour patterns on shells of Recent *P. tigrinum* (cf. Janssen & Dijkstra, 1996: 110) cannot contribute to the identification of our fossil, since they are widespread among living bivalves of unrelated species.

Finally, the identity of our valve as *P. gerardi* could be confirmed by using the table "Comparison between *Palliolium tigrinum* and *Palliolium gerardi*", recently published by the same authors who questioned this identity.

Key words: Bivalvia, Pectinidae, *Pseudamussium (Palliolium)*, taxonomy, Pliocene, the Netherlands.

Janssen & Dijkstra (1996: 107-113) question the identification of the valve published as *Pseudamussium (Palliolium) gerardi* (Nyst, 1835) (Van der Burg, 1995: 29-30). These authors claim that this valve belongs to the species *Palliolium tigrinum* (Müller, 1776) and base their identification apparently on the nature of its colour pattern and the comparison with that of Recent *P. tigrinum* valves shown in their figures 1a-8. In addition, these authors give a table entitled "Comparison between *Palliolium tigrinum* and *Palliolium gerardi*" (table 1 on p. 112) as a diagnostic tool by which the identification should be carried out.

We shall discuss both aspects, the colour patterns and the results of the differential diagnoses using their table.

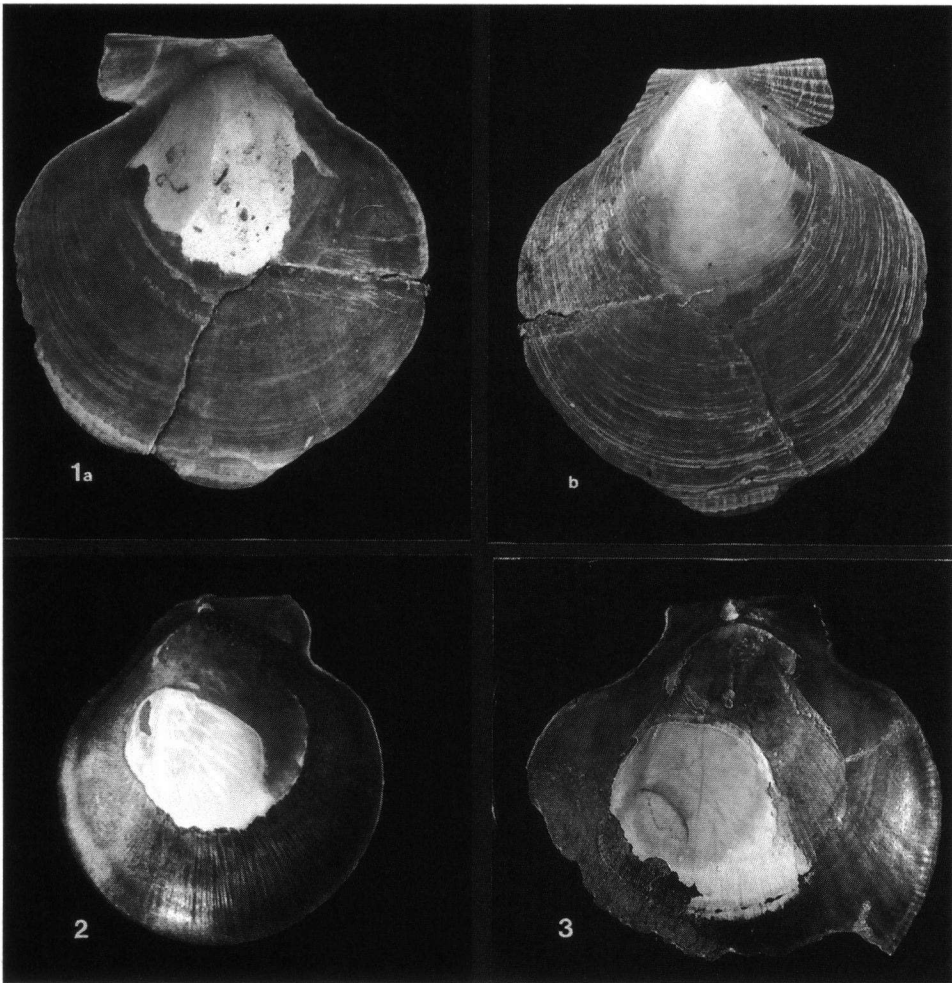
(1) The colour patterns.

(a) The nature of the "central light-coloured part".

Careful investigation shows the following. Valves of *P. gerardi* of the northern Peel district are generally rather well preserved. They are composed of a very thin outer layer which is more or less transparent and consists of calcite crystals. The inner layer is, however, composed of aragonite crystals, opaque white, more brittle and usually only partly preserved. From the outside, through the outer layer, the inner layer (or the remnant of it) is visible (fig. 1a, b). This phenomenon can also be observed in the figures of a right valve of *P. gerardi* in Van Regteren Altena et al. (1969: fig. 42a, b). Though not mentioned by these authors, it is in this case that the remnant of the inner layer (fig. 42b) is likewise visible through the outer layer (fig. 42a) as its mirror image.

Since aragonite is more readily soluble in CO₂-containing water than calcite, the inner, porous and opaque, layer has often largely disappeared by dissolution and

crumbling. The part near the umbo, where the aragonite is the thickest, is usually preserved as is doubtless the case with the specimen described and figured by Janssen & Dijkstra (1996: fig. 9a, b). It follows that the "lighter central zone near the umbo" mentioned by these authors has, contrary to their opinion, nothing to do with a colour pattern.



Figs. 1-3. Shells of *Pseudamussium (Palliolium) gerardi*(Nyst). 1a, right valve (height 24 mm) from the inside, showing the white remnant of the inner layer (Boring X, Macharen, 58.50-60 m deep); 1b, the same valve from the outside, showing the corrosion remnant through the transparent outer layer as its mirror image; 2, the inside of the dark-coloured left valve as published earlier (Van der Burg, 1995: fig. 1); 3, the inside of the dark-coloured and partly damaged adult valve (width 40 mm, Boring III, Berghem, 51.60-54 m deep). All specimens in W.J. van der Burg colln.

Table 1 of Janssen & Dijkstra (1996:112)

Comparison between <i>Palliolium tigrinum</i> and <i>Palliolium gerardi</i>		Application of the table of Janssen & Dijkstra to a valve of Van der Burg (1995: 30, fig. 1)
<i>Palliolium tigrinum</i>	<i>Palliolium gerardi</i>	
1 Shell moderately solid	1 Shell extremely fragile	1 Shell extremely thin and fragile
2 Sculpture absent to prominent with primary and secondary radial riblets	2 Sculpture absent or fine radial riblets toward ventral margin	2 Sculpture: very fine radial riblets more conspicuous toward the ventral margin
3 Left valve slightly more convex than right one	3 Left valve distinctly more convex than right one	3 Valve distinctly more convex than right ones of specimen of <i>P. gerardi</i> of the same size
4 Height up to c. 30 mm	4 Height up to c. 48 mm	4 Height (juvenile) 18.3 mm
5 Anterior auricle 2.4-2.7 times longer than posterior one	5 Anterior auricle 1.8-2.0 times longer than posterior one	5 Posterior auricle not complete
6 Anterior auricle with 4-5 radial riblets	6 Anterior auricle with 4-7 radial riblets	6 Anterior auricle: already 5 radial riblets
7 Posterior auricle with 5-8 radial riblets	7 Posterior auricle with 5-8 radial riblets	7 Not relevant, no difference between the species
8 Umbonal angle 80-86°	8 Umbonal angle 90-100°	8 Umbonal angle 102°
9 Ctenolium well developed with 4-6 active teeth	9 Ctenolium weakly developed with 0-3 active teeth	9 No teeth (left valve)
10 Colour pattern frequently with coarse maculations on the left valve and a finer, A-shaped or more uniform pattern on the right valve	10 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	10 No maculations and no lighter central zone near the umbo (See however section 1a, this paper)

Our fossil valve of *P. gerardi* (see Van der Burg 1995, fig. 1) does not show a lighter central part shining through the outer layer. This, however, is due to the fact that both the outer and the inner layer are dark blueish gray. Ferrous compounds have apparently infiltrated the shell in a reducing environment during a period of time. In addition, the state of preservation is remarkably good. Nothing of the inner aragonite layer has disappeared and a white adductor scar is nicely preserved (fig. 2). An adult valve (fig. 3) is in a similar state of preservation.

(b) Real colour patterns.

Real colour patterns are often of no use for identification purposes. This is demonstrated by the type of pattern on the valve in question as well as the patterns on Recent *P. tigrinum* valves figured by Janssen & Dijkstra (1996: figs. 1a-8), since such patterns are widespread among other bivalves. One only has to look in a collectors handbook, e.g. Abbott & Dance (1991: 304-315, 354). It follows that the colour patterns on the fossil valve and on Recent *P. tigrinum* valves are of no significance for the identification of our fossil specimen.

(2) Results of a differential diagnosis, using table 1 of Janssen & Dijkstra (1996: 112). The table has been reproduced for the sake of convenience and the ten distinguishing

features numbered. A third column describing the features of the fossil valve has been added.

Of the features mentioned in the table no. 4 can only be applied to full-grown specimens. No. 5 cannot be used in this case because a piece of the posterior ear is broken off. No. 7 is of no use because the two species do not differ in this respect. No. 9 is only applicable to right valves. No. 10 cannot be used for reasons discussed above.

Thus four out of nine relevant features could not be used. The remaining features, nos. 1, 2, 3, 6, and 8 do not lead to *P. tigrinum*, but are in perfect agreement with *P. gerardi*.

It is remarkable that Janssen & Dijkstra did not use their own identification table. Apparently their identification was erroneously based on the colour patterns of Recent valves of *P. tigrinum* and a misinterpretation of the nature of the "light central zone near the umbo" visible on some valves of *P. gerardi*. Careful observations lead decidedly to *Pseudamussium (Palliolium) gerardi* (Nyst, 1835) as the real identity of the fossil with colour pattern from our northern Peel deposits, as was already concluded earlier by the present author (1995: 29-30).

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