

A new species of *Vasticardium* (Bivalvia: Cardiidae) from Queensland, Australia

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ABSTRACT A new species of *Vasticardium* from tropical Queensland, Australia, is described based on morphological differences with known taxa from that region. The new species differs in having acute ribs, a character it shares only with *Vasticardium angulata* Lamarck, 1819, which typically has coarser ribbing and which lacks colour within the shell interior.

INTRODUCTION

The family Cardiidae Lamarck, 1809, represents an ancient historical clade that can trace its lineage back into the late Triassic (Schneider, 1995). Within the cardiums there have been significant contributions to the advancement and understanding of the taxonomy and diversity of the subclade *Trachycardiinae* Stewart, 1930 leading to a solid resolution of the complex as a whole within Cardiidae (Vidal, 1999; Coan and Valentich-Scott, 2012; Herrera *et al.*, 2015; Hylleberg, 2015; Schneider, 1992). The internal resolution of *Trachycardiinae* remains contentious. The *Vasticardium* and *Acrosterigma* have historically been combined and treated as synonyms (Lamprell and Whitehead, 1992; Wilson and Stevenson, 1977). *Vasticardium* has also been treated as a subgenus of *Acrosterigma* by some authors (Hylleberg, 1994). *Vasticardium* can be differentiated from *Acrosterigma* by the posterior and anterior being more distinctly sculptured than the dorsum and posteriorly notched as well as other structural characteristics, which may not be mutually exclusive (Vidal, 1999). Genetic evidence has current assigned *Vasticardium* forming a well

nested exclusive clade apart from those assigned to *Acrosterigma*, while the cladistic resolution of the remaining *Trachycardiinae* is somewhat problematic (Herrera *et al.*, 2015). We treat here *Vasticardium* and *Acrosterigma* as distinct genera.

The new species is found in tropical Queensland, and is described as a morphological species. Comparative members of *Trachycardiinae* used in the description were restricted to *Vasticardium*. The list of comparative species was primarily guided by current distribution records and maximum size and general structure as presented in Lamprell and Whitehead (1992). Three primary characters were used in the determination of taxonomic difference: shape of the radial ribs; the interstices; and the colour of the interior. The radial ribs and interstices were described in terms of the cross-section of the mid-dorsal rib.

SYSTEMATICS

Class: Bivalvia
Subclass: Heterodonta
Order: Cardiidae

Superfamily: Cardioidea
 Family: Cardiidae
 Subfamily: Trachycardiinae
 Genus: *Vasticardium* Iredale, 1927

***Trachycardiinae* Stewart, 1930**

Shell asymmetrical with well-developed ribs over surface; ornamentation on the anterior and posterior divergent; cardinal teeth are unequal; posterior margin notched to digitate (Hylleberg, 1994).

***Vasticardium* Iredale, 1927**

Shell higher than long; ribs variable with ornamentation on top of ribs may or not be present; posterior and anterior differing distinctly in sculpture to the rest of the dorsum; cardinals in right valve separated.

Vasticardium swanae Maxwell, Congdon & Rymer, 2016,
 new species (Figures 1 and 2G)

Description: The moderately strong equivalved shell is ovate to quadrate; dorsum with 40-50 radial angulate smooth ribs; interstices with fine uniform arcuate ridges that diminish becoming absent anteriorly, posteriorly increasing in size to the top of the ridges; anterior ribs with strong spines that dorsoventrally increase in size; ligament fine; anterior and posterior teeth fine and well developed; cardinal teeth unequal; margin straight, serrated and interlocking, becoming elongated at the anterior dorsal margin and diminishing on the posterior margin; lunacle concave and smooth; umbones white; dorsum with dark to light brown blotches and flecks, the larger of these are evidenced through the shell as a purple stain ventrally. (see Figure 1).

Type Material: Holotype measuring 45.8mm - Queensland Museum Registration (MO85748), collected by Beverly Swan.

Type Locality: Bramble Reef, off Lucinda, Queensland, Australia.

Distribution: This new species is known only from the type locality, Bramble Reef, off Lucinda, Queensland, Australia.

Ecology: This new *Vasticardium* species is found intertidally in sand.

Etymology: This new species is named in honour of Beverly Swan from Townville, Queensland, Australia, who discovered the specimens in the type lot. Ms. Swan is an avid amateur malacologist, an active shell collector, and member of the Townville Shell Club who has supported molluscan research for many decades.

Discussion: The new species has a distinctive shell that is rather colourful for a member of the larger *Vasticardium* (see Figure 2). The new species differs in rib morphology with *Vasticardium coralense* Vidal 1993, *V. elongata* Brugière, 1789, *V. luteomarginata* Voskuil & Onverwagt, 1991, *V. mendanaense* Sowerby, 1896 and *V. wilsoni* Voskuil & Onverwagt, 1991 which are non-angulate. *V. angulata* Lamarck 1819, is very similar to the new species as it has similar structural morphology of both ribs and interstices. *Vasticardium swanae* can be differentiated by its much coarser ribbing and the lack of colour in the aperture, which is typically found in *V. angulata*. Finally, *V. swanae* can be distinguished from *V. vertebrata* Jonas, 1844 by the lack of rib coarseness and the colour blotches in the aperture.



Figure 1. Holotype of *Vasticardium swanae*, n sp., collected by Beverly Swan on Bramble Reef, off Lucinda, Queensland, 45.8 mm.

As indicated above, *Vasticardium* and *Acrosterigma* have been treated as synonyms in the past, and a comparison should be made to a similar looking *Acrosterigma* species. While having structural differences peculiar to their differing genera, *Acrosterigma variegata* Sowerby, 1841 shows some similarities to the new species (see Vidal, 1999). The *A. variegata* syntype differs from *Vasticardium swanae* in having a curved margin and shell which is distinctly more ovate (Vidal, 1999; see Figure 3). Additionally, the new species lacks the tinged yellow internal margin of *A. variegata*. It is highly probable that many collections may contain specimens of *V. swanae* labeled under the name *A. variegata* due to the above stated superficial similarities in size and internal colouration.

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REFERENCES

- Coan, E.V. & P. Valentich-Scott 2012.** Bivalve Seashells of Tropical West America: Marine Bivalve Mollusks from Baja California to Northern Perú. Santa Barbara Museum of Natural History Monographs Number 6: Studies in Biodiversity Number 4, Santa Barbara Museum of Natural History, Santa Barbara. 764 pp.
- Herrera, N.D., J.J. ter Poorten, R. Bieler, P.M. Mikkelsen, E.E. Strong, D. Jablonski, & S.J. Stepan. 2015.** Molecular phylogenetics and historical biogeography amid shifting continents in the cockles and giant clams (Bivalvia: Cardiidae). *Molecular Phylogenetics and Evolution* 93:94-106.
- Hylleberg, J. 1994.** Indo-Pacific cockles (Bivalvia: Cardiidae) part 1: Generic diagnoses and an overview of species with

mention of taxonomic problems encountered in Thailand. Phuket Marine Biological Centre Special Publication 13: 113-136.

Hylleberg, J. 2015. Revision and morphometric characteristics of the *Vasticardium fidele* group (Bivalvia: Cardiidae) in the Indo-Pacific with description of three new species. *Novapex* 16:81-94.

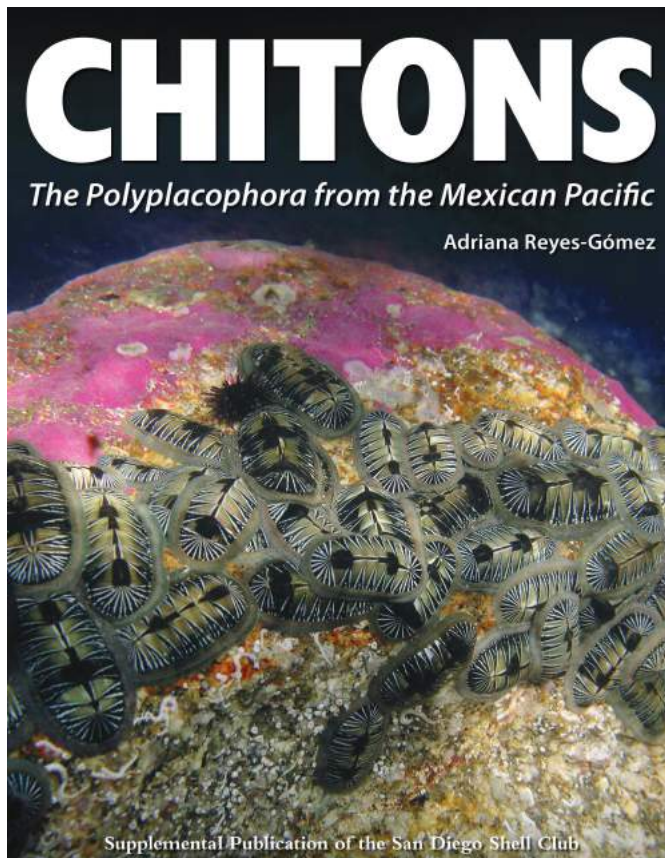
Lamprell, K. & Whitehead, T. 1992. Bivalves Australia: Volume 1. Crawford House Press, Bathurst. 182 pp.

Schneider, J.A., 1992. Preliminary cladistics analysis of the bivalve family Cardiidae. *American Malacological Bulletin* 9:145-155.

Schneider, J.A. 1995. Phylogeny of the Cardiidae (Mollusca, Bivalvia): Protocardiinae, Laevicardiinae, Lahullinae, Turlonogocardiinae subfam. n. and Pleuriocardiinae subfam. n.. *Zoologica Scripta* 24: 321-346.

Vidal, J. 1999. Taxonomic review of the elongated cockles: genera *Trachycardium*, *Vasticardium* and *Acrosterigma* (Mollusca, Cardiidae). *Zoosystema* 21: 259-335.

Wilson, B.R. & S. Stevenson. 1977. Cardiidae (Mollusca, Bivalvia) of Western Australia. *Western Australian Museum Special Publication no. 9.* 114 pp.



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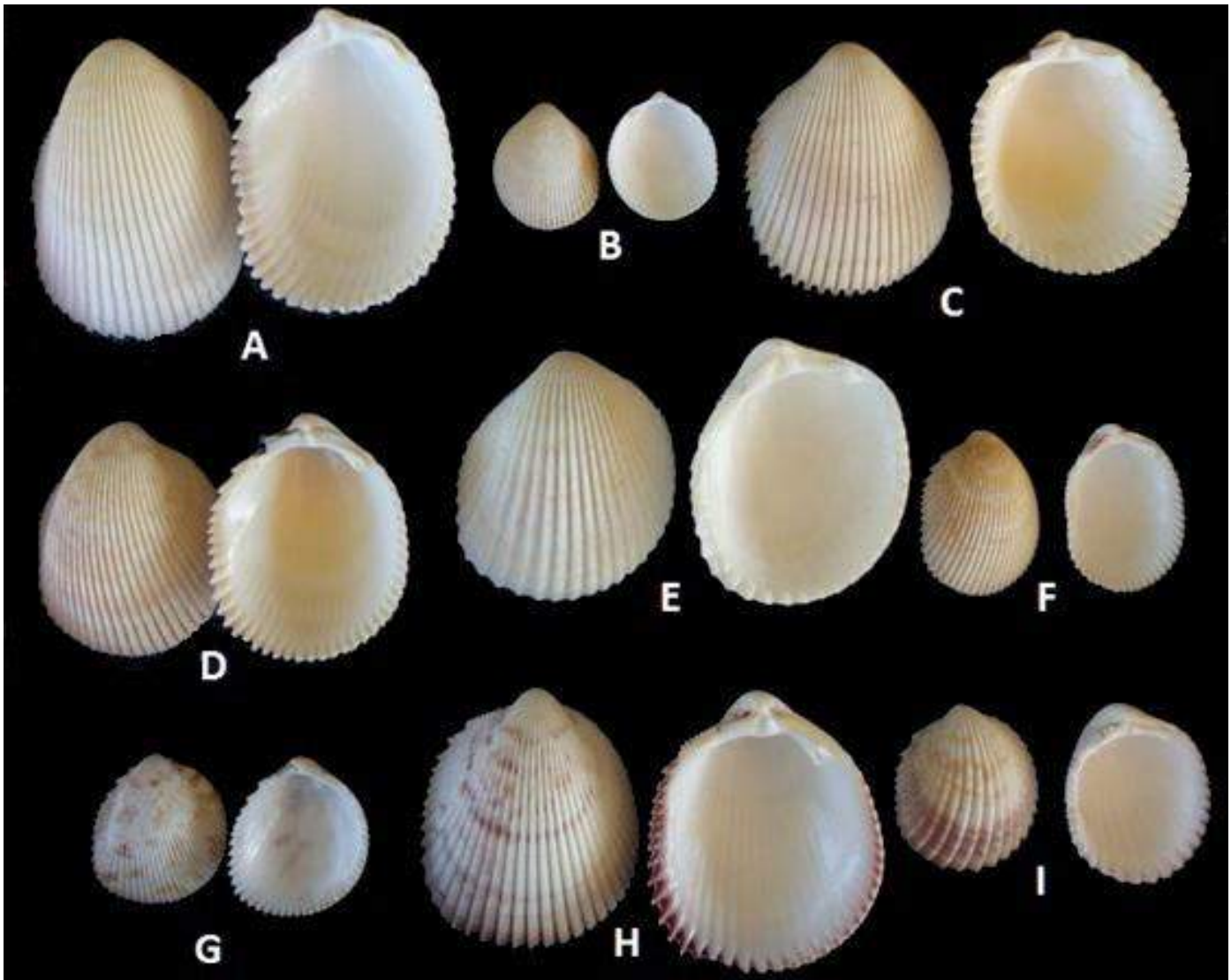


Figure 2. The new species with comparatives showing size and morphology: **A** = *Vasticardium wilsoni* Voskuil & Onverwagt, 1991: Broome 89.7 mm Cantamessa collection; **B** = *Acrosterigma impolita* Sowerby 1833: Queens Beach, Bowen 38.8 mm Cantamessa Collection note the lack of posterior and anterior shell distinctiveness from the dorsum that is atypical in the sister *Vasticardium*; **C** = *V. luteomarginata* Voskuil & Onverwagt, 1991: Solomon Islands 75.9 mm Cantamessa Collection; **D** = *V. elongata* Brugière, 1789: Bramble Reef 71.4 mm Cantamessa Collection; **E** = *V. angulata* Lamarck 1819: Swains Reefs 75.6 mm Cantamessa Collection; **F** = *V. coralense* Vidal 1993: Swains Reefs 51.3 mm Cantamessa Collection; **G** = *V. swanae* new species: Bramble Reef 45.8 mm, Holotype: Queensland Museum Type No. MO85748.; **H** = *V. mendanaense* Sowerby, 1896: Swains Reefs 80.1 mm Cantamessa Collection; **I** = *V. vertebrata* Jonas, 1844: Myora Beach 51.6 mm Cantamessa Collection.