

Studies on Cardiidae. 3.<sup>1</sup>

The recent species of *Maoricardium* Marwick, 1944 (Mollusca, Bivalvia), with description of a new species

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As part of a revision of the family Cardiidae, a review of the Recent *Maoricardium* is presented. Five species, all of Indo-Pacific origin and one of them not properly described before, are treated and illustrated.

Key words: Bivalvia, Cardiidae, *Maoricardium*, taxonomy, Indo-Pacific.

INTRODUCTION

When Marwick (1944: 263-265) introduced the genus *Maoricardium* for four fossil Cardiidae from New Zealand, he gave the following diagnosis: "Shell very large, umbos strongly prosogyrous, at anterior third or fourth. Lunule with raised margin; escutcheon not defined. Sculpture of numerous strong radials bearing blunt, cup-shaped tubercles, especially anteriorly and ventrally. Hinge long, moderately wide cardinals; left anterior cardinal short conical, left posterior cardinal long, not so high, almost horizontal, close to ligamental nymph; left anterior lateral high and strong, without socket for right anterior; left posterior lateral, weak; right posterior cardinal very large, right anterior also relatively large; laterals strong. Ligamental nymphs long and very high. Genotype: *Cardium spatiosum* Hutton. Pliocene." In their very useful paper on Western Australian Cardiidae, Wilson & Stevenson (1977: 106-110) gave some additional characters and included two Australian species, viz. *Cardium setosum* Redfield, 1848, and *Regozara fraseri* Garrard, 1963, in *Maoricardium* which they considered a subgenus of the extinct Afro-European genus *Plagiocardium* Cossman, 1886. They also mentioned three other taxa, viz. *Cardium pseudolima* Lamarck, 1819, *Cardium latum* Born, 1780, and *Cardium mansitii* Otuka, 1937, as possible species of *Maoricardium*.

In considering *Maoricardium* a subgenus of *Plagiocardium*, Wilson & Stevenson followed Keen (1969: N585), who recognized *Plagiocardium* with three different subgenera: *Plagiocardium* s.s., *Plagiocardium* (*Maoricardium*), and *Plagiocardium* (*Papillicardium* Sacco, 1899). In our paper on European and West African Cardiidae (Voskuil & Onverwagt, 1989: 76) we re-assigned *Papillicardium* as a subgenus to the widely

<sup>1</sup> Studies on Cardiidae. 2. See: Basteria 54: 247-251, 1990.

spread genus *Parvicardium* Monterosato, 1884. We consider the subgeneric relationship between *Plagiocardium* and *Maoricardium* hard to defend, because of their distant distribution ranges (European Eocene versus Indo-Pacific Tertiary to Recent) and shell morphology, and have chosen to treat *Maoricardium* as a full genus. We revise the five extant species, dealing in particular with taxonomical confusion between two of these, viz. *M. setosum* and *M. pseudolatum* n.sp.

The following abbreviations are used: AMS - Australian Museum, Sydney; DAU - Dautzenberg collection, Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels; JD - Colln. J. Drijver, Bennekom; NNM - Nationaal Natuurhistorisch Museum, Leiden (formerly Rijksmuseum van Natuurlijke Historie); RV - Colln. R.P.A. Voskuil, Delft; WO - Colln. W.J.H. Onverwagt, Egmond aan Zee.

## SYSTEMATIC ACCOUNT

### *Maoricardium fraseri* (Garrard, 1963) (fig. 4)

*Regozara fraseri* Garrard, 1963: 42, pl. 7 fig. 1.

*Plagiocardium (Maoricardium) fraseri* [sic!] "Garrard" Wilson & Stevenson, 1977: 109-110, pl. 1 figs. 8-9, text-fig. 21; Lamprell & Whitehead, 1983: 8.

*Vepricardium fraseri* "Garrard" Habe & Kosuge, 1966: 152, pl. 58 fig. 10.

Description. — Shell swollen and rounded, up to about 62 mm long, relatively thin, with 37 to 42 flat, rectangular ribs that are minutely serrated at their margins. Ribs carrying small, blunt papillae, especially on the extreme posterior region and around the lunula. Intercostal spaces narrow, on anterior half of shell with minute transverse scales corresponding with the serrations on the ribs. Ribs clearly visible from inside. Lunula poorly defined, discernible as a small darker area near the umbo. Colour from dirty white to bright orange-brown, with darker concentric rings. Periostracum thin but clearly visible, especially on the posterior slope.

Material. — AUSTRALIA, Queensland: Keppel Bay, 1980 (JD/3; WO/4; RV/2).

Type. — Holotype: trawled in 35 fathoms, E. of Tin Can Bay, SE. of Fraser Island, Queensland, Australia (AMS C.64068).

Distribution. — The species seems to be confined to Australian waters. It is known from Queensland, where it is dredged together with *M. setosum* in Keppel Bay and Western Australia (Wilson & Stevenson 1977: 109-110).

Discussion. — This species was called *P.(M.) fraseri* by Wilson & Stevenson, a misspelling of the specific epithet. It is poorly known and quite uncommon. *M. fraseri* is neither a deep-water form of *M. setosum* nor a junior synonym of *M. mansitii* as suggested by Wilson & Stevenson, but a distinct and easily recognizable species.

### *Maoricardium mansitii* (Otuka, 1937) (fig. 7)

*Cardium (Ringicardium?) mansitii* Otuka, 1937: 137-138, fig. 53a-b.

*Maoricardium mansitii* "Otuka" Habe & Kosuge, 1966: 152, pl. 58 fig. 6.

Description. — Shell relatively thin, more swollen than in *M. setosum*. Umbones prominent, up to about 67 mm long, with 40 to 45 ribs that are low and rectangular and covered with rows of small papillae, most densely placed anteriorly. Lunula

poorly defined. A large impressed field anterior to the umbones is present, resulting in a conspicuously outline. Intercostal spaces with minute transverse scales. Ribs visible from inside. Colour dirty white with faint traces of brown. Periostracum thin and irregular, giving the shells a somewhat dirty appearance.

Material. — TAIWAN: Taiwan Channel (JD/2)

Type. — Not located. Type locality: Hôkôto, Taiwan.

Distribution. — *Maoricardium mansitii* is known from Taiwan only, where it is occasionally trawled by fishermen.

Discussion. — This species seems to be uncommon in collections, possibly due to its restricted geographical range. We were not able to find other specimens than the two from Taiwan Channel, Taiwan in the J. Drijver collection. *Maoricardium mansitii* is not conspecific with *M. fraseri* as suggested by Wilson & Stevenson (1977: 110).

*Maoricardium pseudolima* (Lamarck, 1819) (figs. 8-11)

*Cardium pseudolima* Lamarck, 1819: 7.

*Cardium pseudolima* "Lamarck" Stry, 1964: 29, pl. 2 fig. 128; Bosch & Bosch, 1982: 171.

Description. — Shell heavy and stout, up to 150 mm long, with 35 to 42 flat ribs, covered with rows of papillae, connected on the anterior ribs, larger and stubbier on the posterior slope. Lunula poorly defined. A relatively flat area is present anterior to the umbones. Intercostal spaces relatively wide. Ribs poorly visible from inside. Two colour forms occur: the typical bright pink to reddish orange form with many irregular concentric rings, and the less common pure white form. Periostracum prominent in fresh specimens; most specimens in collections have been cleaned, leaving small traces of periostracum only.

Material. — ADEN: Dredged in harbour, at 28 feet depth, October 6, 1938 (NNM/1). KENYA: Mombasa (RV/5; WO/7); Mombasa, by diver, at 10-20 m depth, leg. K. van Duin (WO/1). OMAN: Masirah Island, leg. D. Bosch. (RV/2; WO/4). TANZANIA: (RV/1; WO/2). ZANZIBAR: (RV/2; NNM/4).

Type. — According to Lamy (1941: 562), the type is in the Dufresne collection. It is not known where the Dufresne collection is now. Type locality: Not given.

Distribution. — This species is confined to the Western Indian Ocean, from Tanzania and Zanzibar to the Gulf of Aden and Oman. Reliable records from localities in the Central Indo-Pacific are not known to us.

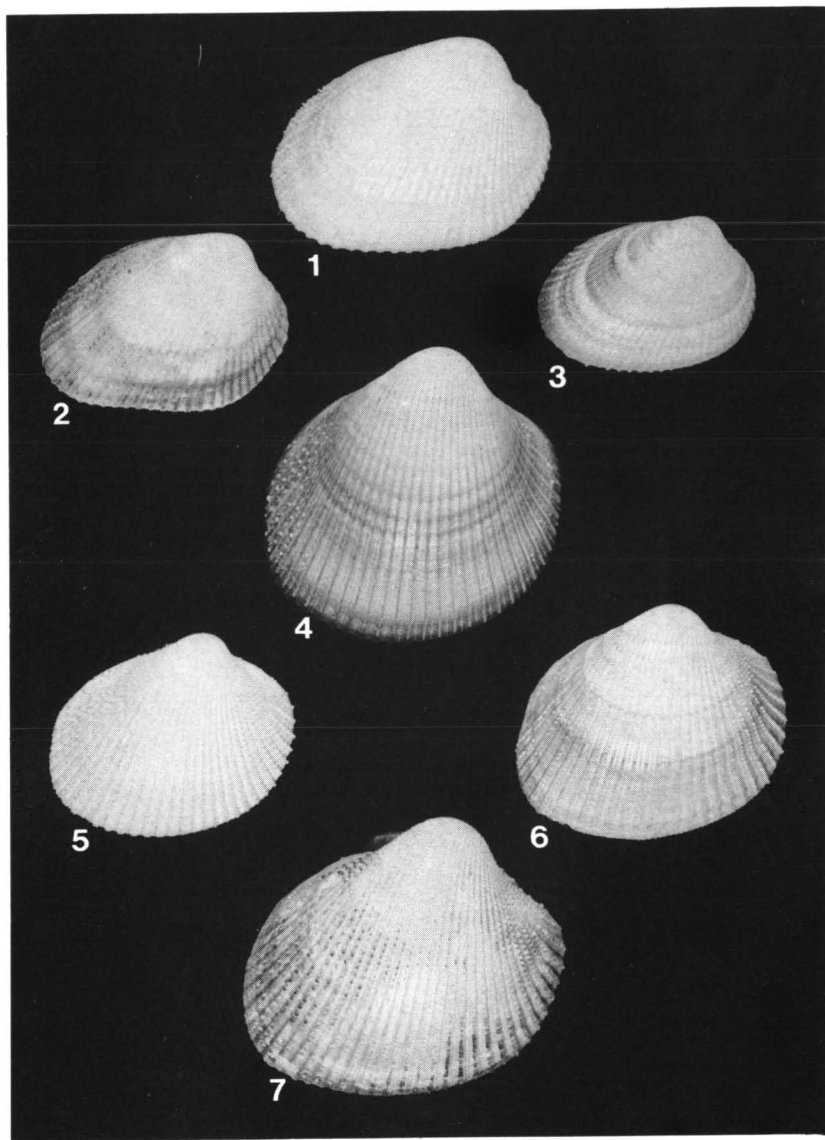
Discussion. — *Maoricardium pseudolima* is a very common and well known species, present in large quantities in most collections because it is commercially fished by East African fishermen for the tourist industry. It lives on intertidal sandflats near Dar es Salaam, Tanzania, according to Widmer (1981: 138).

*Maoricardium setosum* (Redfield, 1846) (figs. 5-6)

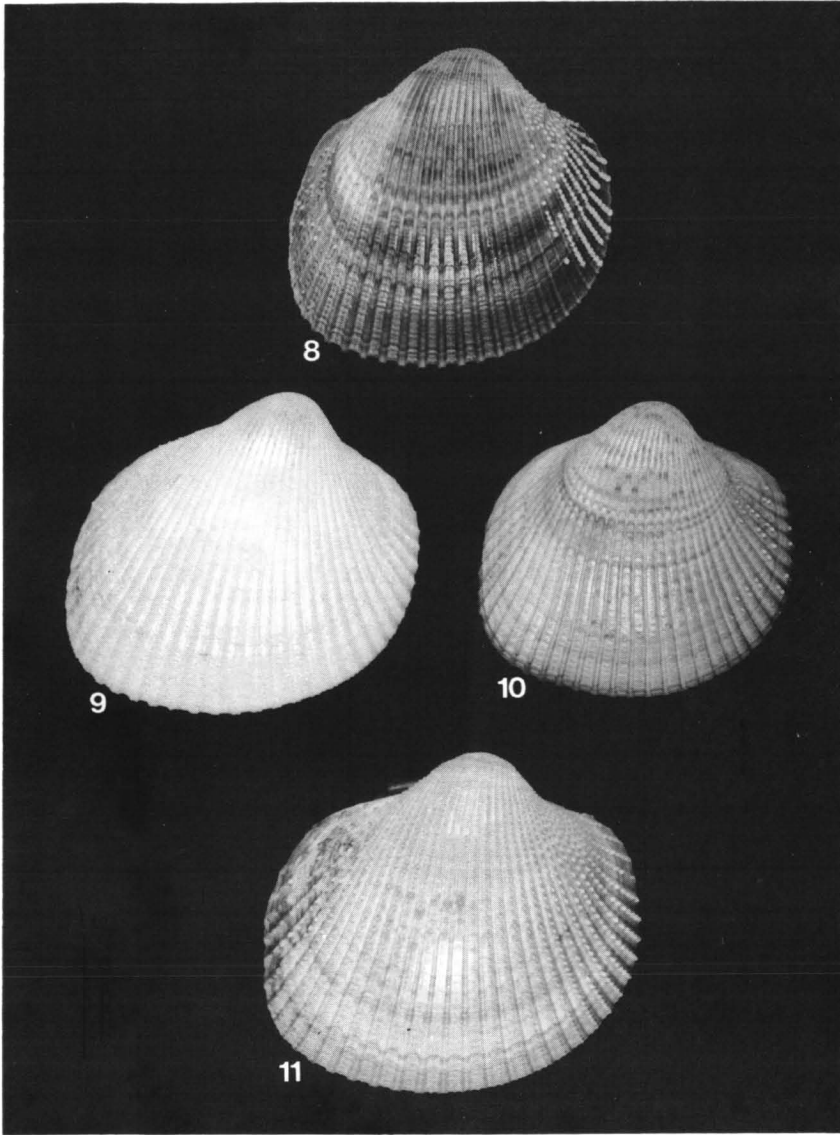
*Cardium setosum* Redfield, 1846: 6, pl. 6 fig. 1a-c.

*Plagiocardium (Maoricardium) setosum* "Redfield" Wilson & Stevenson, 1977: 108-109, pl. 1 figs. 10-14, text-fig. 20; Lamprell & Whitehead, 1983: 8.

Description. — Shell relatively solid and elongated, up to 75 mm long, with 33 to 38 flat ribs that are covered with rows of small papillae, which are most closely set on anterior slope. Ventral margin regularly curved, never straight or oblique. Lunula



Figs. 1-7. *Maoricardium* species. 1, *M. pseudolatum* n.sp., paratype, Australia, Queensland, N. of Townsville, dredged, 30 feet deep, 1989 (RV), length 56 mm; 2, *M. pseudolatum* n.sp., paratype, Indonesia, Bali, Sanur Beach, during low tide in sand, leg. K. van Duin, January 1980 (WO); 3, *M. pseudolatum* n.sp., paratype, Solomon Islands, Guadalcanal, Marau Sound, Honiara, dredged in 10-12 m, leg. J. Kengalu, 1979 (WO); 4, *M. fraseri* (Garrard, 1963), Australia, Queensland, Keppel Bay, 1980 (WO); 5, *M. setosum* (Redfield, 1846), Australia, Western Australia, Broome, 15 m deep, sand and grit bottom, October 1989 (RV); 6, *M. setosum* (Redfield, 1846), Australia, Queensland, Keppel Bay, leg. K. Lamprell (RV); 7, *M. mansitii* (Otuka, 1937), Taiwan, Taiwan Channel (JD). All shells about 2/3 natural size.



Figs. 8-11. *Maoricardium pseudolima* (Lamarck, 1819). 8, Oman, Masirah Island, leg. D. Bosch (WO), length 91 mm; 9-11, Kenya, Mombasa (WO). Slightly less than half natural size.

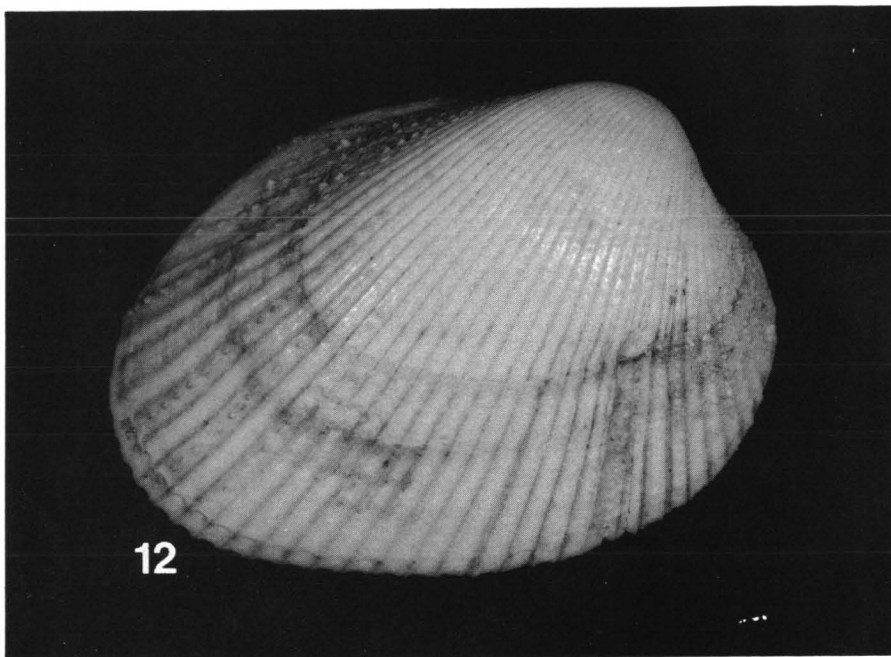


Fig. 12. *Maoricardium pseudolatatum* n.sp., right valve of holotype, Indonesia, W. Sumatra, Padang, leg., E. Jacobson, February 5, 1914 (NNM 56439); enlarged, actual size 41 × 39.5 mm.

poorly defined, only a small area anterior to the umbones is slightly raised. Intercostal spaces narrow, carrying minute transverse scales which correspond with the small scales present on the rib margins. Ribs clearly visible from inside. Colour cream to rusty brown with many irregular darker concentric rings. Periostracum prominent with long, spine-like hairs, which are only present in live-collected specimens, however.

Material — AUSTRALIA: Queensland (WO/1); Queensland, Redcliffe, leg. O.H. Ripplingale (WO/1); Queensland, Keppel Bay, leg. K. Lamprell (RV/1); Queensland, Gladstone harbour, mud-sand, 1985 (RV/3; WO/1); Queensland, St. Helens Beach, on beach after cyclone "Aivu", April 8, 1989 (RV/2); Western Australia, Port Hedland, during low tide in muddy sand, 1980 (WO/2); Western Australia, Broome, 15 m deep, sand and grit bottom, October 1989 (WO/5; RV/2). INDONESIA: Java, Japara (NNM/3 valves); Borneo, Takisoeang near Bandjermasin, leg. J. Westerman, October 6, 1938 (NNM/1 valve).

Type. — Not located. Type locality: "Seas of China"

Distribution. — *Maoricardium setosum* seems to be confined to the Central Indo-Pacific. Literature records of localities in the Indian Ocean concern, in our opinion, *M. pseudolatatum*.

Discussion. — This species is not conspecific with *M. pseudolatatum* as suggested in many publications.

***Maoricardium pseudolatum* n.sp.** (figs. 1-3, 12)

*Afrocardium latum* "Born" Kirtisinghe, 1978: 28, pl. 11 fig. 12 (non Born, 1780).

*Plagiocardium (Maoricardium) latum* "Born" Lamprell & Whitehead, 1983: 8 (non Born, 1780).

*Maoricardium setosum* "Redfield" Habe & Kosuge, 1966: pl. 58 fig. 7 (non Redfield, 1846).

*Plagiocardium setosum* "Redfield" Drivas & Jay, 1988a: 17, No. 11; 1988b: 140-141, No. 3 (non Redfield, 1846).

Description. — Shell solid and elongated, up to about 77 mm long, with 39 to 42 flat ribs that are covered with many minute papillae which are most closely set on the anterior slope and larger and more distant on the posterior slope. Ribs quite widely spaced near the extreme postero-dorsal area. Ventral margin much less rounded than in *M. setosum*, usually straight or clearly oblique. Most specimens possess a flat area near the ventral margin. Lunula poorly defined, only a small slightly raised area visible near the umbones. Intercostal spaces narrow and smooth or with irregularly placed transverse scales. Ribs not well visible from inside. Colour dirty white, posterior slope, ventral margin and extreme anterior part more brightly coloured with pink or orange. Periostracum heavy in fresh specimens, especially near ventral margin.

Material. — Holotype: INDONESIA, West Sumatra, Padang, leg. E. Jacobson, February 5, 1914; length 41 mm, height 39.5 mm, width 24 mm, 41 ribs (NNM 56439). Paratypes: AUSTRALIA: (DAU/1); Queensland, N. of Townsville, Palm Island, dredged, 30 feet, leg. K. Lamprell, 1989 (RV/1); Queensland, Townsville, Shelley Beach, after storm, leg. K. Lamprell, December 1988 (RV/1). INDIA: Madras, near aquarium, leg. J. Knock, January 19, 1939 (NNM 56453/1 valve); Madras, Adyar River (NNM 56499/1 valve). INDONESIA: Bali, Sanur Beach, during low tide in sand, dead, leg. K. van Duin, January 1980 (WO/1); Java, Wijnkoopsbaai (NNM 56500/2 valves); Java, Tjilaoet Eureum, leg. L. de Priester, 1931 (NNM 56501/3 valves; DAU, 14 valves); Java, Soekaboemi, leg. E.F. Joachim, 1914 (NNM 56502/4 valves); Sumatra, Padang, February 5, 1914 (NNM 56503/1); Celebes, Badjo (NNM 56504/3 valves); Halmahera Island (NNM 56505/1 valve); Moluccas (NNM 56507/2); West Irian, Misool (NNM 56508/2); Riouw (NNM 56509/1 valve). IRAN: beach near Chambahar, leg. F.C. d'Audretsch, February 4, 1957 (NNM 56510/1 valve). PAKISTAN: near Karachi, leg. Sohail Barkati (NNM 56511/3 valves). SOLOMON ISLANDS: Guadalcanal, Marau Sound, Honiara, dredged in 10-12 m, leg. J. Kengalu, 1979 (WO/1). SRI LANKA: (DAU/1); Colombo, leg. H. Boschma, 1920 (NNM 56512/2 valves); Colombo, Mt. Lavinia Beach, leg. R. IJzerman, January 1932 (NNM 56513/9 valves); Colombo, Goille Tau, leg. J. Knock, January 22, 1939 (NNM 56514/1 valve).

Derivatio nominis. — The name was chosen to indicate that this species has been mistakenly named *latum* by many authors: *pseudolatum* = false *latum*.

Distribution. — This species is widely distributed throughout the Indian Ocean, Solomon Islands, Australia, and Indonesia, to India and Sri Lanka; also Réunion and Mauritius (Drivas & Jay, 1988a & 1988b) and the Arabian Gulf.

Discussion. — This species is quite well known as *Cardium latum* Born, 1780. The two syntypes of *Cardium latum* Born, 1780, in the Vienna Museum belong to a species in the genus *Papyridea* Swainson, 1840. This species is currently known as *Papyridea soleniformis* (Bruguière, 1789), as already pointed out by E.A. Smith (1885: 161), and is distributed in the Caribbean and along the West-African coast. As the name *Cardium latum* Born, 1780, has priority over *Cardium soleniforme* Bruguière, 1789, the latter is

doomed to be synonymized unless it is preserved by an act of the I.C.Z.N. *Maoricardium pseudolatatum* is not recognized by most modern authors as a valid species. It is usually synonymized with *M. setosum*, but it is distinct, easily recognizable and always separated from *M. setosum* by its oblique ventral margin and more elongated shape. Juvenile specimens of *M. pseudolatatum* are misidentified in many collections, carrying names of small Indian Ocean *Afrocardium* species such as *A. carditaeforme* (Reeve, 1845).

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#### SAMENVATTING

In dit artikel behandelen wij de recent voorkomende soorten van het Indo-Pacifische geslacht *Maoricardium* en beschrijven één nieuwe soort: *Maoricardium pseudolatum* n.sp. Nog niet eerder werden de verschillende soorten met elkaar vergeleken. Ook wordt kort ingegaan op de systematische plaatsing van *Maoricardium* en de relatie van dit geslacht met *Plagiocardium* en *Papillicardium*.