

## A new species of *Melo* (Gastropoda: Volutidae) from northwestern Australia

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**Abstract** – A new species of volutid gastropod, *Melo* (*Melocorona*) *ashmorensis*, is described from Ashmore Reef off northern Western Australia. The new species is compared with three known tropical species of *Melo* (*Melocorona*): *M. aethiopica* (Linnaeus, 1758), *M. amphora* (Lightfoot, 1786), and *M. broderipii* (Gray in Griffith and Pidgeon, 1834). Key features of *Melo ashmorensis* are its large size (up to 283 mm long), and the spire is raised above the spines and above the top of the outer lip of shell. There are 13–16 very low, uniform spines per whorl which cease at or near the aperture line before the adult whorl. *Melo amphora* differs in being larger with a depressed spire, with 16–20 straight or curved spines which do not extend to the body whorl, and gradually increase in size, with the final spine often being very long and the highest of all. The protoconch is white in *M. ashmorensis*, compared to yellowish in *M. broderipii*. Spines are more numerous on *M. broderipii* (about 50 per whorl) and reach the end of the whorl on all specimens. The key characteristic of *M. aethiopica* is the very swollen outer lip which is flared in adults. The spire of *M. aethiopica* is depressed, and there are 28–34 spines per whorl.

**Key words:** new species, *Melo*, Volutidae, northwestern Australia, Ashmore Reef, Cartier Island, Hibernia Reef

### INTRODUCTION

The continental shelf off northwestern Australia is one of the widest in the world, with a maximum width of 350 km. The shelf is a continuous structure that extends from North West Cape, Western Australia, across the top of the continent to the tip of Cape York, Queensland. Open ocean atolls are located near the outer edge of the shelf in northwestern Australia. There are no signs of volcanic stacks in the centre, so the reefs are not classic Darwinian atolls. Instead they originated in shallow water and have grown vertically to remain in the shallows as the surrounding area became deeper (Carrigy and Fairbridge 1954). The fauna of these open ocean atolls was almost totally unknown until a series of expeditions was mounted by the Western Australian Museum to Rowley Shoals (1982), Scott and Seringapatam Reefs (1984) and Ashmore Reef and Cartier Island (1986) (Berry 1986; 1993). A few years later, the Northern Territory Museum worked at Ashmore Reef, Hibernia Reef and Cartier Island (Russell and Vail 1988; Russell and Hanley 1993). Results obtained were spectacular, and included the first specimen of the largest species of giant clam, *Tridacna gigas* (Linnaeus, 1758) collected in Western Australia (Wells and Slack-Smith 1986). From the various animal phyla examined about 20–25% of species

recorded were new to Western Australia. In addition there were genera and species which were new to Australia. Many of the new Australian records were species commonly recorded on oceanic atolls throughout the Indo-Pacific, but which had not been recorded on the Australian continental coastline. The fauna was more closely related to that of the Great Barrier Reef in eastern Queensland than it was to the adjacent continental coastline in northwestern Australia (Wells 1986).

Molluscs collected in the surveys were recorded by a series of papers (Wilson 1985; Wells 1986; 1993; Wells and Slack-Smith 1986; Wells and Bryce 2000; Wells and Allen 2005; Willan 2005). Altogether these papers recorded over 900 species of shallow water molluscs from the offshore atolls. Since then there have been several species described from the atolls.

One feature of the molluscs was that there have been very few species of Volutidae collected from the offshore atolls (Wells 1993). Volutes lack a planktonic distributional phase in their life cycle; instead crawling young emerge from benthic egg masses (Wilson 1994). This severely restricts the dispersal capability of volutes and tends to lead to allopatric speciation. It appears that the atolls being located so far offshore presents a considerable barrier to the distribution of volutes. The single

species of *Melo* collected was listed by Wells (1993) and Wilson (1994) as *Melo amphora* (Lightfoot, 1786) and by Willan (1993) as *M. broderipii* (Gray in Griffith and Pidgeon, 1834) and more recently as *M. aethiopica* (Linnaeus, 1758) (Willan 2005). Closer inspection of WAM material has led us to conclude this is in fact a new species, which is described here. Recently four additional volutes have been reported from Ashmore Reef. *Amoria spenceriana* (Gatliff, 1908) was originally described without a type locality, but Ludbrook (1953) subsequently designated Port Denison, north Queensland. *Amoria spenceriana* was considered to be a synonym of *A. maculata* (Swainson, 1822) by Wilson (1994). However, *A. spenceriana* is now regarded as being a valid species which is endemic to Ashmore Reef (Willan 1995; Bail and Poppe 2001). Two additional species of *Amoria* have been recorded by Willan (2005): *A. cf. grayi* (Ludbrook, 1953) and *A. cf. damonii* (Ludbrook, 1953). A new species, *Cymbiola baili* Prati-Muzetti and Raybaudi-Massilia, 1996, has also been described from Ashmore Reef. Thus the three of the five volutes now known from Ashmore Reef have been new taxa. It is likely that further collecting on these atolls will discover more undescribed species of molluscs.

All specimens examined during this study are lodged in the collections of the Western Australian Museum, Perth (WAM), the Hugh Morrison Collection (HMC), and the Merv Cooper Collection (MCC).

## TAXONOMY

Family Volutidae Rafinesque, 1815

Genus *Melo* Broderip in Sowerby, 1826

Subgenus *Melo* (*Melocorona*) Pilsbry and Olsson, 1964

*Melo* (*Melocorona*) *ashmorensis* sp. nov.

Figures 1–4

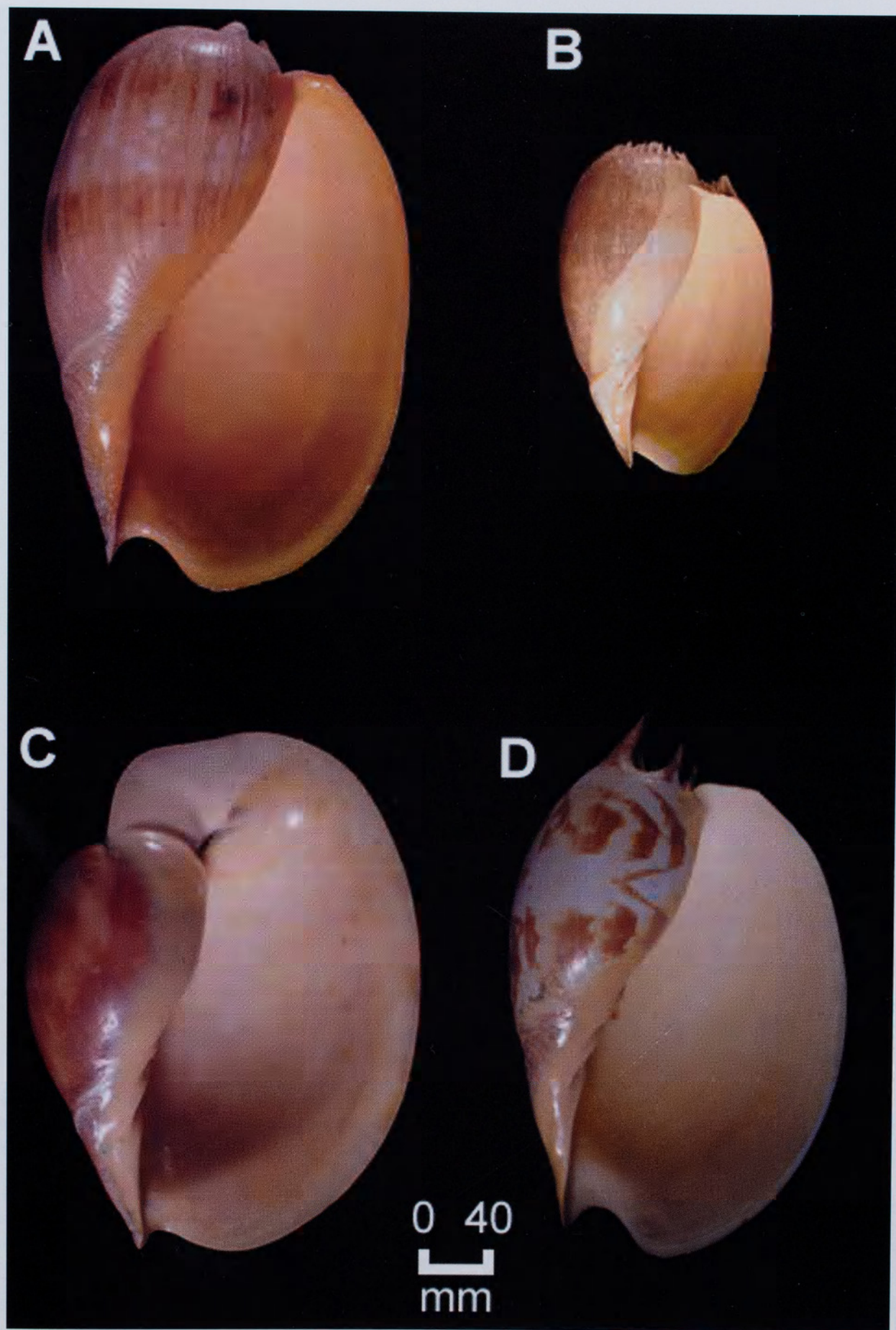
### Material Examined

Holotype, Ashmore Reef (12°10'S, 122°58'E), collected in sand at 3 m depth, 1984, H. Morrison (WAM S.14955).

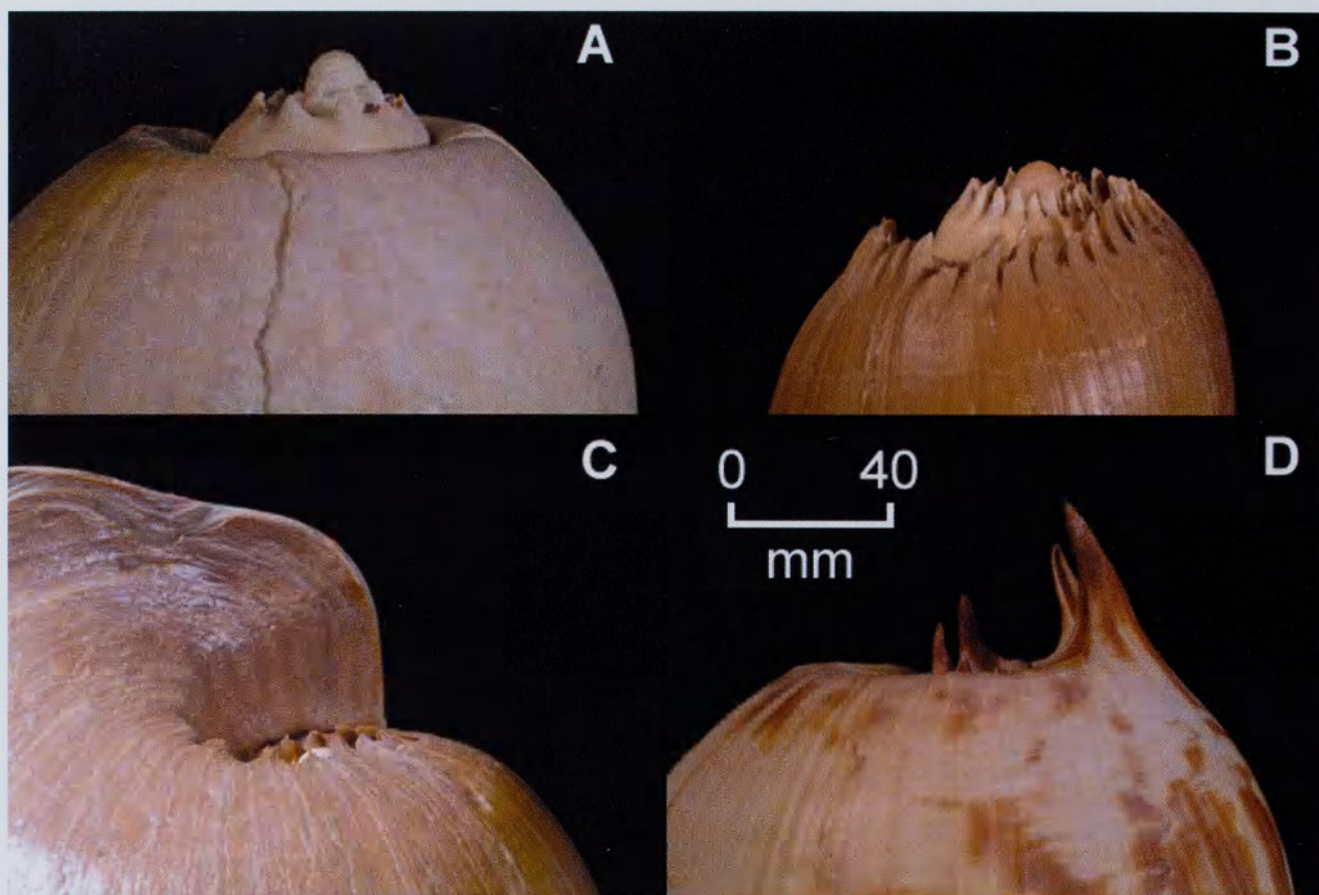
Paratypes: 1 specimen, Hibernia Reef (11°55'S, 123°28'E), collected in sand on coral, 2 m depth, 19 September 1994, H. Morrison (WAM S.14956); 1



Figure 1 Apertural and dorsal views of holotype of *Melo ashmorensis* (WAM S. 14955).



**Figure 2** Comparison of apertural views of: A. Holotype of *Melo ashmorensis* (WAM S. 14955); B. *M. broderipii* (WAM S. 14959) (Balabac Island, Palawan, Philippines; 7°59'N, 117°06'E); C. *M. aethiopica* (MCC; locality unknown); D. *M. amphora* (WAM S. 14960) (Broome, Western Australia; 17°58'S, 122°14'E).



**Figure 3** Comparison of apertural view of spines of: A. Holotype of *Melo ashmorensis* (WAM S. 14955); B. *M. broderipii* (WAM S. 14959); C. *M. aethiopica* (MCC); D. *M. amphora* (WAM S. 14960).

specimen, Hibernia Reef (11°55'S, 123°28'E), collected in sand on coral, 2 m depth, 19 September 1994, H. Morrison (WAM S.14957); 1 specimen, Hibernia Reef (11°55'S, 123°28'E), collected in sand on coral, 2 m depth, 19 September 1994, H. Morrison (HMC); 1 specimen, Ashmore Reef (12°10'S, 122°58'E), Station 16, transect from west of north lagoon to reef front, 17 September 1984, F.E. Wells and C.W. Bryce (WAM S.14958).

#### Type locality

Ashmore Reef (12°17'S, 123°02'E) off northern Western Australia (Figure 5).

#### Etymology

Named after Ashmore Reef, northwestern Australia, where the species was first found.

#### Diagnosis

Large *Melo*, up to 283 mm long. Ovate, outer lip not extended dorsally. Protoconch white, 3 whorls. Teleoconch whorls with 13-16 low spines, 4-8 mm high, widely spaced, terminate at or near aperture line. Spire extends above spines on body whorl and above top of outer lip of shell. 3 columellar plaits. Body whorl background colour mottled beige to brown. Two wide distinct dark brown bands divide shell into three roughly equal sections. Aperture bright orange.

#### Description

##### Shell

Typical *Melo* shape, large, ovate, outer lip not extended dorsally. Up to 283 mm long and 179 mm wide (Table 1). Protoconch white, of three whorls, 7

**Table 1** Details of the type material of *Melo ashmorensis*.

Specimen	Repository	Locality	Length (mm)	Width (mm)	Length/Width	Shoulder spines
Holotype	WAM S.14955	Ashmore Reef	276	174	1.59	16
Paratype	WAM S.14956	Hibernia Reef	283	179	1.58	13
Paratype	WAM S.14957	Hibernia Reef	223	132	1.69	16
Paratype	HMC	Hibernia Reef	184	112	1.64	14
Paratype	WAM S 14958	Ashmore Reef	98	56	1.75	16



**Figure 4** Comparison of growth series of *Melo ashmorensis* and *M. amphora*: A–D, *M. ashmorensis*: A. Holotype, WAM S. 14955. B. Paratype WAM S.14957. C. Paratype, HMC. D. Paratype WAM S. 14958. E–H. *M. amphora*. E. WAM S. 14960. F. WAM S. 14961. G. WAM S. 14961. H. WAM S. 14963.

mm high, 12 mm across. Three juvenile and adult whorls expand rapidly. Spire raised above spines on shoulder of upper whorls, and above top of outer lip of shell, 13–16 very low spines per whorl, widely spaced, of relatively uniform size (about 4–8 mm), do not reach outer edge of whorl, instead cease at or near aperture line before adult whorl. Body whorl mottled beige to brown background with two wide distinct bands, which divide shell into three roughly equal sections. Bands on ventral surface are blocks of dark brown, become complete on body whorl. Aperture bright orange.

#### Animal

Not known.

#### Distribution

Known only from Ashmore Reef and Hibernia

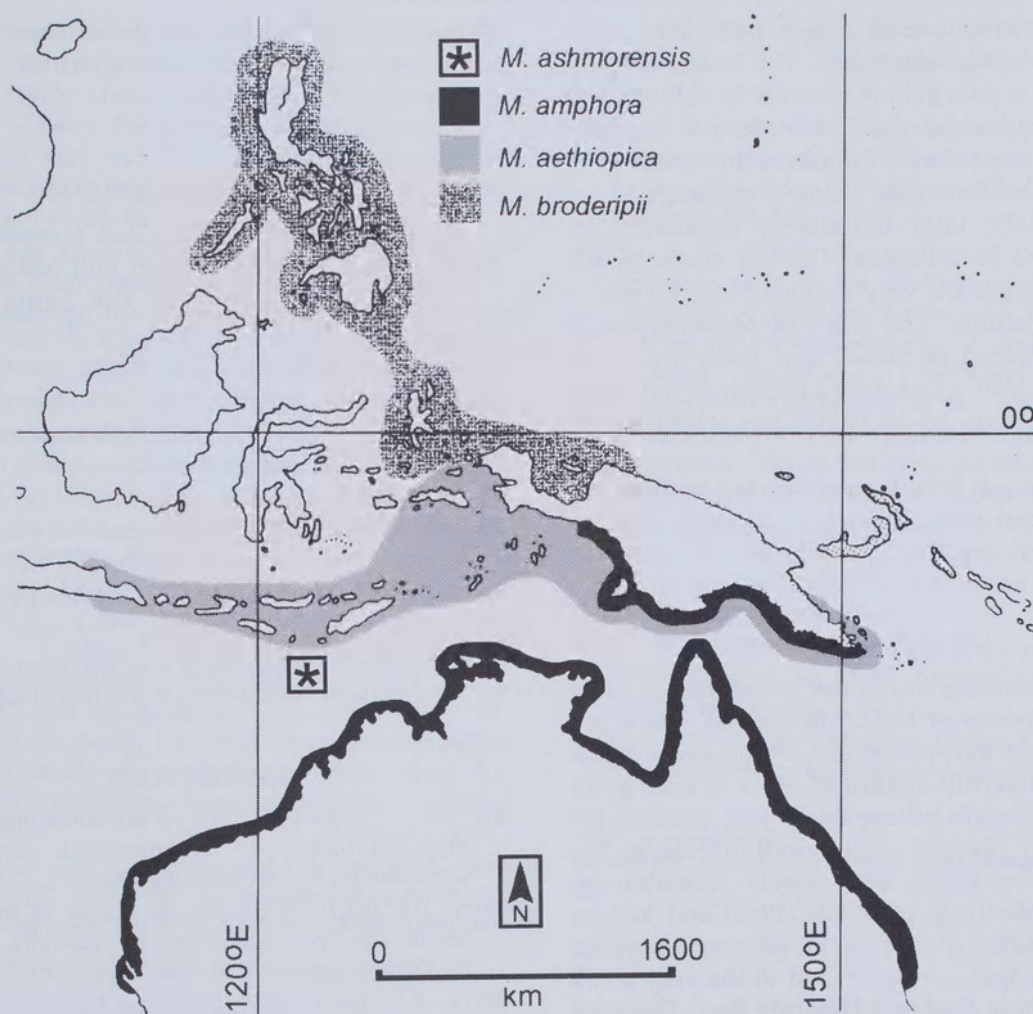
Reef (11°27'S, 123°30'E). Not known from nearby Cartier Island (12°32'S, 123°33'E).

#### Remarks

The genus *Melo* has two subgenera: the monospecific *Melo*, with *M. melo* (Lightfoot, 1786) and *Melocorona* with all the remaining species, including *M. ashmorensis*. Poppe and Goto (1992) and Bail and Poppe (2001) recognise the following species in the subgenus: *M. miltonis* (Gray in Griffith and Pidgeon, 1834), *M. amphora* (Lightfoot, 1786), *M. georgiana* (Gray in Griffith and Pidgeon, 1834), *M. umbilicatus* (Broderip in Sowerby, 1826), *M. aethiopica* (Linnaeus, 1758) and *M. broderipii* (Gray in Griffith and Pidgeon, 1834). *Melo miltonis* is a southern Australian species which is very similar to the tropical Australian species *Melo amphora* (Lightfoot, 1786).

**Table 2** Comparison of relevant species in the volute subgenus *Melborona*. Shell lengths after Poppe and Goto (1992).

Species	Range (after Poppe and Goto, 1992)	Shell length (mm)	Columellar plaits	Spire	Outer aperture	Shoulder spines	Colour
<i>M. ashmorensis</i>	Ashmore Reef and Hibernia Reef, northwestern Australia	270	3	Spire raised above spines and above top of outer lip of shell. Protoconch largely eroded, white, 3 whorls	Ovate, outer lip not swollen.	13–16 very low spines, widely spaced, uniform size; do not reach outer edge of whorl, cease at or near aperture line before adult whorl	Juvenile and adult shell expands rapidly, 3 whorls. Body whorl mottled beige to brown background with 2 wide distinct bands, which divide shell into three roughly equal sections. Bands on ventral surface are locks of dark brown, become complete on body whorl. Aperture bright orange
<i>M. aethiopica</i>	Java, Indonesia to Papua New Guinea	200–250 maximum 348	3–4	Spire very depressed. Large white protoconch white, 3 1/2 whorls	Ovate, very swollen outer lip, flared in adults	Up to 28–34 spines per whorl. Very low, equal height, generally face in towards spire	Juvenile and adult shell expands rapidly, 3 whorls. Dull dark brown on body whorl, little or no banding. Aperture pale cream to orange
<i>M. amphora</i>	Shark Bay, Western Australia to Moreton Bay, Queensland. Also southern Papua New Guinea	300–468 maximum 524	3	Spire depressed, surrounded by coronet of spines higher than spire. Large protoconch white, 3 whorls	Ovate, outer lip of mature specimens usually higher than spire	Straight or curved, usually erect 16–20 per whorl, do not extend to body whorl, gradually increase in size, final spine often the highest, very long	Juvenile and adult shell expands rapidly swollen, 3 whorls. Colour colour and pattern on body whorl variable, juveniles often with wavy, zigzag, banding but body whorl of mature shells generally uniform pale cream to brown, aperture uniformly pale yellow to straw colour
<i>M. broderipii</i>	Primarily Philippines, also Papua New Guinea	250–350 maximum 371	4	Low but raised. Large yellow protoconch, 4 whorls	Ovate spines numerous, low	About 50 spines per whorl, equidistant, low equal height, erect, reach end of whorl on all specimens examined	Juvenile and adult shell expands rapidly, 3 whorls. Body whorl pale yellow to straw colour, 2 indistinct bands, generally central to body whorl. Aperture uniform pale yellow



**Figure 5** Map of northern Australia and the western Pacific Ocean showing the distribution of species of *Melo* (*Melocorona*) discussed in the text.

Apparent hybrids between the two species occur in the Shark Bay region of Western Australia (Wilson 1994). Similarly, Wilson (1994) considers *M. georgiana* to be a synonym of *M. amphora*. Weaver and duPont (1970) and Wilson (1994) regard the Queensland species *M. umbilicatus* as closest to *M. aethiopica*. None of these species (*M. miltonis*, *M. georgiana* or *M. umbilicatus*) are discussed further.

As indicated on Table 2, *M. ashmorensis* is restricted to Ashmore Reef and Hibernia Reef, where no other species of *Melo* are known to occur.

*Melo ashmorensis* is closest to *M. amphora*, and both Wells (1986) and Wilson (1994) considered it to be *M. amphora*. While juveniles are in fact very close in appearance (Plate 4; Table 2), *M. amphora* grows twice as large as *M. ashmorensis*. Key differences are that the spire is raised above the shoulder spines in *M. ashmorensis* while it is depressed in *M. amphora*, and is well below the spines. There are 13–16, very low, widely spaced shoulder spines of uniform size which do not reach the outer edge of the body whorl in *M. ashmorensis*. In fact, the spines cease at, or near, the aperture line before the adult whorl. In

contrast, the spines of *M. amphora* are straight or curved, usually erect, 16–20 per whorl, do not extend to the body whorl, and gradually increase in size, with the final spine often being very long and the highest of all. The colour of *M. ashmorensis* is relatively uniform. The body whorl background colour is mottled beige to brown, with two, wide, distinct bands which divide shell into three roughly equal sections. On the ventral surface the bands start as blocks of dark brown and become continuous on the body whorl. The aperture is bright orange. In contrast, the basal colour and pattern on the body whorl are variable in *M. amphora*. Juveniles often have wavy or zigzag banding. The body whorl of mature shells is generally uniform pale cream to brown. The aperture is uniformly pale yellow to straw colour.

Willan (1993) originally identified Ashmore specimens as *M. broderipii*. The protoconch is white in *M. ashmorensis*, compared to yellowish in *M. broderipii*. Shoulder spines are much more numerous on *M. broderipii* (about 50 per whorl compared to 13–16) and reach the end of the whorl

on all specimens, instead of not occurring on the body whorl in *M. ashmorensis*. The body whorl of *M. broderipii* is pale yellow to straw in colour, with two indistinct bands, which are central to the body whorl and do not divide the whorl into thirds. The aperture is a uniform pale yellow, not orange.

Willan (2005) later tentatively identified *M. ashmorensis* as *M. aethiopica*. The key characteristic of *M. aethiopica* is the very swollen outer lip which is flared in adults. The spire of *M. aethiopica* is depressed instead of raised, and there are 28–34 spines per whorl which face in towards the spire, compared to only 13–16 spines per whorl on *M. ashmorensis*.

The shell is a dull dark brown on the body whorl of *M. aethiopica* with little or no banding and the aperture is pale cream to orange.

### DISCUSSION

*Melo ashmorensis* is clearly not one of the presently recognised species of *Melo* (*Melocorona*). There is a possibility that the species has been given a name which is currently regarded as a synonym of another species. We believe this is very unlikely for a number of reasons. Many individuals in the population are small, and closely resemble *M. amphora*. Publications by Wells (1993) and Wilson (1994) incorrectly identified *M. ashmorensis* as *M. amphora*. The species is restricted to the very small area of Ashmore Reef and Hibernia Reef. The reefs were discovered in 1811, and were under British jurisdiction. They were not visited by the very early expeditions to Australia which resulted in nonexistent or vague type localities such as "New Holland". The most likely location for a *Melo* type from Ashmore is the Natural History Museum, London. The type of *A. spenceriana* is in the Museum Victoria. During the nineteenth century the Australian Museum, Sydney had the largest mollusc collection in Australia; there are no *Melo* types from Ashmore or Hibernia Reefs in the three museums. Nor are there types in the present collections which have extensive Sahul Shelf material, the Western Australian Museum and the Northern Territory Museum.

Willan (1993) originally identified Ashmore specimens as *M. broderipii*. He later (Willan, 2005) has independently examined the taxonomic status of *Melo* from Ashmore and Hibernia Reefs, and tentatively identified the material as *M. aethiopica*. He concluded that "either these populations represent a new species ... or the separation between *M. aethiopica* and *M. broderipii* is artificial and the two are conspecific. I do not have enough material of *Melo* specimens from Asia to decide between these two alternatives, and so for the time being I have used the name *M. cf. aethiopica*." Examination of Figures 2 and 3 and Table 2 demon-

strate that *M. aethiopica* and *M. broderipii* are in fact separate species and are distinct from *M. ashmorensis*.

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