Re-evaluation of the status of type material for 18th and 19th century species of *Melo* (baler shells) (Mollusca: Gastropoda: Volutidae) and its bearing on current taxonomy in the genus

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ABSTRACT

Melo Broderip, 1826 (Mollusca: Volutidae) (baler shells) is a small but ecologically, economically and culturally important genus of large carnivorous marine gastropods from the Indo-West Pacific. *Melo* has long proved taxonomically challenging primarily due to heavy reliance on highly variable shell features. The status of type material for species described in the 18th and 19th centuries is here re-evaluated, both to promote nomenclatural stability and facilitate future taxonomic and phylogenetic work on the genus. Lectotypes are here designated for *Voluta melo* [Lightfoot], 1786, *Voluta amphora* [Lightfoot], 1786, *Voluta aethiopica* Linnaeus, 1758 and *Voluta broderipii* J.E. Gray in Griffith & Pidgeon, 1833. *Voluta ducalis* Lamarck, 1811 is shown to be an earlier name for the species currently known as *Melo umbilicatus* Broderip in G.B. Sowerby I, 1826 and will have to be formally confirmed a *nomen oblitum* through application to the ICZN Commission (Lamarck's name only partly fails to meet the criteria of ICZN Article 23.9.1 (Reversal of precedence)). Specimens currently accepted as the holotypes of *Melo umbilicatus* Broderip in G.B. Sowerby I, 1826, *Voluta georginae* J.E. Gray in Griffith & Pidgeon, 1833 and *Voluta miltonis* J.E. Gray in Griffith & Pidgeon, 1833, and one of the syntypes of *Voluta tessellata* Lamarck, 1811, are here designated as the relevant lectotypes of those species. The name *Voluta haustrum* [Lightfoot], 1786, presently regarded as a synonym of *Melo amphora* ([Lightfoot], 1786), is shown instead to be an earlier name for *M. tessellatus* (Lamarck, 1811) but is here considered a *nomen oblitum*. The name *Voluta anguria* [Lightfoot, 1786], presently regarded as a synonym of *Melo melo* ([Lightfoot], 1786), is simply another name for *Cymbium pepo* ([Lightfoot], 1786), although preceding *Voluta pepo* [Lightfoot], 1786 in the Portland Catalogue. Apart from wrongful inclusion in the synonymy of *M. melo* by some previous authors, the name *Voluta anguria* appears to have been wholly neglected in later literature and is here regarded as a *nomen oblitum*.

The genus *Melo* Broderip, 1826 (baler shells) is a small but distinctive group of large, carnivorous, mostly shallow-water marine snails of the family Volutidae occurring in the tropical Indo-West Pacific (McMichael 1962, Morton 1986, Darragh & Ponder 1998). At present *Melo* contains 17 nominal species, with 11 recorded from Australian waters (Abbottsmith 1969, Weaver & du Pont 1970, Wilson & Gillett 1971, Bail 1990, Poppe & Goto 1992, Wilson 1994, Dharma 2023, Zheng & Maxwell 2025). Species are of economic and cultural importance (as food, used in art, amulets or of totemic significance — see Akerman 1975, Przywolnik 2003, Roberts 2012, Vitales 2013) in all countries where they occur and the shells are also sought by collectors (Bail 1990). For these reasons *Melo* species have been well represented in scientific and popular literature but, largely due to their variability both in form and colour patterning, problems have arisen regarding the true identity of some taxa, particularly the status of type material underlying the validity of currently accepted names. Four well-known and key species (*M. melo* ([Lightfoot], 1786) (type of the genus *Melo*), *M. amphora* ([Lightfoot], 1786), *M. aethiopicus* (Linnaeus, 1758) and *M. broderipii* (J.E. Gray in Griffith & Pidgeon, 1833)), either never had type specimens originally designated or specimens are presently untraceable, leaving the taxonomic identity of those species to rest on interpretation and so-called 'restriction' of illustrations cited by the original authors (usually from earlier works). Three other species (*Melo umbilicatus* (Broderip in G.B. Sowerby I, 1826), *M. georginae* (J.E. Gray in Griffith & Pidgeon, 1833) and *M. miltonis* (J.E. Gray in Griffith & Pidgeon, 1833)) currently have holotypes but the validity of their designations are suspect when interpreted under the ICZN Code. Additionally, type localities of *Melo* species were sometimes not stated, nebulous or demonstrably wrong and have had to be restricted or corrected by subsequent authors (Weaver & du Pont 1970). In this study we re-evaluate and clarify the type material (surviving specimens and/or cited illustrations of specimens) of *Melo* species, focusing only on 'older' (18th and 19th century) species, which often have longer and complex taxonomic histories. Recently described species are not discussed as there do not appear to be any issues regarding the status of designated type material (for details see Morrison & Wells 2005; Cossignani & Allary 2021; Dharma 2023; Zheng & Maxwell 2025, 2026). However, we note that holotypes (and all paratypes)

for those species described by Cossignani & Allary (2021) and Zheng & Maxwell (2025, 2026) are apparently lodged in private collections, rather than recognised scientific institutions. Further research will be required to determine whether any of the newly described species are synonyms of the species covered herein.

MATERIALS AND METHODS

This re-evaluation is based on surviving specimens, literature (especially figures in illustrated works) and where possible, museum documentation (labels and notes). Type specimens held by the Natural History Museum (London, UK) of three *Melo* species (*Voluta georginae* Gray, 1833, *Voluta miltonis* Gray, 1833 and *Melo umbilicatus* Broderip, 1826), have been examined. Photographs of type material or otherwise historically relevant specimens were provided by the Natural History Museum (London), the Muséum national d'Histoire naturelle (Paris), the Muséum d'Histoire Naturelle (Geneva), the Museo di Storia Naturale, University of Pisa, the Museum of Evolution in Uppsala University, the Linnean Society of London and the Australian Museum (Sydney). Synonyms listed for each species are confirmed by inspecting available type specimens and/or photographs and the original figures given by authors or figures in other works cited by authors in their descriptions. Every effort has been made to establish the existence (or otherwise) of specimens associated with synonyms but in many cases such specimens proved untraceable. Illustrations from historical literature were obtained from scanned volumes in the Biodiversity Heritage Library and, for each author's figures, the relevant BHL link is in the associated reference (item number or link to first page of volume or of paper; in some cases links to text and illustration volumes). To avoid confusion in discussions of species, figure numbers from original source works are indicated as 'fig/figs' and figure numbers from our own plates are indicated as 'Fig/Figs'. For species described by W.J. Broderip (*M. umbilicatus*) and by J.E. Gray (*M. broderipii*, *M. georginae* and *M. miltonis*) we have followed Petit (2009) and Petit & Coan (2008) in using the full author citation ('Broderip in G.B. Sowerby I' and 'J.E. Gray in Griffith & Pidgeon') rather than 'Broderip' or 'J.E. Gray' as currently adopted by WoRMS.

ABBREVIATIONS

Institution collections

AM: Australian Museum (Sydney, Australia), *MHNG*: Muséum d'Histoire Naturelle (Geneva, Switzerland), *MNHN*: Muséum national d'Histoire naturelle (Paris, France), *NHMUK*: Natural History Museum, (London, United Kingdom), *QMMO*: Queensland Museum, Mollusca Collection (Brisbane, Australia), *UPSZTY*: Museum of Evolution, Uppsala University (Uppsala, Sweden)

RESULTS AND DISCUSSION

Genus *Melo* Broderip, 1826

Type species: *Voluta melo* [Lightfoot], 1786 (original name), accepted as *Melo melo* ([Lightfoot], 1786) (type by absolute tautonomy)

The generic name *Melo* was first used in an auction catalogue ('The Museum Calonnianum') published anonymously but now usually credited to the shell dealer George Humphrey (Humphrey, 1797). Since this work has been ruled to be unpublished by the International Commission of Zoological Nomenclature (Opinion 51, 1912: case presented by W.H. Dall) the name is now formally credited to Broderip (1826), who provided a diagnosis and illustrations.

Synonyms: *Melocorona* Pilsbry & Olson, 1954; type species, *Melo broderipii* (J.E. Gray in Griffith & Pidgeon, 1833) by original designation.

***Voluta melo* [Lightfoot], 1786 (= *Melo melo* ([Lightfoot], 1786)**

Type material: According to Weaver & du Pont (1970): 'type figures restricted by Rehder (1967) to Martini, 1777, Conchylien-Cabinet 3, pl. 72, figs 772, 773'. These are the same figures (see Fig. 1A–B herein) originally cited by Lightfoot (1786) who is now accepted as the author of the Portland Catalogue despite it being published anonymously (for a full discussion of the Portland Catalogue's authorship, see Dance 1962 and Kay 1965). Rehder in fact 'restricted' a figure for only a single Lightfoot species from the catalogue (Lot 3802: 'Helix undata' = *Solaropsis undata* ([Lightfoot], 1786) a eupulmonate land snail), specifically stating

that he was doing so (Rehder 1967, p. 29). For all other Lightfoot species in the catalogue recognised as being valid, Rehder simply repeated verbatim Lightfoot's original text and figure references (whether or not one or more figures were involved) but did provide a synonymy for each species and sometimes commentary. Kay (1965) examined the unpublished manuscript volumes of the Portland Collection written by Solander and used by Lightfoot in compiling the Portland Catalogue. She notes that 'while only a single reference is listed for the majority of species in the catalogue, that reference is usually second or third in a list of four or more references in the manuscripts'. This is evidence that Lightfoot had intentionally used reference figures that he believed accurately portrayed the species he was describing. Dall (1908, 1921), Dance (1962), Kay (1965) and Weaver & du Pont (1970) — but curiously not Rehder (1967) — have all drawn attention to the *lapsus* (or perhaps printing error) in the Portland Catalogue indicating 'Martyn' as the source for figures when in fact 'Martini' was usually intended. Lightfoot included both Martyn (1784) and Martini (1777) as two of several references he consulted when compiling the catalogue, and fortunately the figure numbers he quoted for 'Martyn' in connection with *Melo* species only match those of Martini.

As Lightfoot did not state that he was basing his description on a single specimen of *Voluta melo* (i.e. not fulfilling ICZN Article 73.1 relating to holotype designations), the syntype series therefore consists of the specimens illustrated by Martini (1777, figs 772, 773; see Fig. 1A–B herein) in addition to the 14 specimens sold from the Portland Catalogue (from Lots 13, 125, 233 (two specimens), 320, 662 (two specimens), 969, 1176 (two specimens), 1448, 2172, 2523 and 3262). From these 16 syntypes we designate, as per ICZN Articles 74.4 (lectotype designation by means of an illustration or description) and 74.7 (lectotype designations after 1999), the shell depicted by Martini in his figure 772 as the lectotype of *Voluta melo* [Lightfoot], 1786 and note that it is a small juvenile with the protoconch beginning to be encroached upon by the body whorl but not yet enveloped by it (see Fig. 1A herein). According to Martini (1777, p. 53), the specimen he illustrated was from his own collection ('Ex Museo nostro'): it is presently untraceable and probably lost (see Kronenberg & Reise 2023, concerning the fate of the Friedrich Martini (1729–1778) collection). It is worthwhile noting that Linnaeus's annotation of the 12th edition of the *Systema Naturae* (held in the Linnaean Collection of the Linnean Society, London) indicates that he considered *Melo melo* (at that stage unnamed) as a spineless variant of his *Voluta aethiopica* (see discussion for *Melo aethiopicus*).

Type locality: Not originally stated; subsequently restricted by Weaver & du Pont (1970) to 'waters off Singapore' (mistakenly credited by them to Weaver (1964)).

Synonyms: *Voluta indica* Gmelin, 1791 ('in mari indico', Indian Ocean), p. 3467, citing Gottwald (1714, fig. 64), Martini (1777, pl. 72, figs 772, 773) and Knorr (1790, pl. 8, fig. 1); *Cymbium maculatum* Röding, 1798 (no locality stated), p. 152, citing Martini (1777, pl. 72, figs 772, 773); *Voluta citrina* Fischer [von Waldheim], 1807 ('les mers des Indes'), p. 167, citing Martini (1777, pl. 72, fig. 772).

Inspection of the cited figures associated with these three names clearly supports all being included in the synonymy of *Melo melo* as per Weaver & du Pont (1970).

As far as we can determine, the name *Voluta anguria* [Lightfoot], 1786 was first listed as a synonym of *Melo melo* by Rehder (1967) and has remained so (Weaver & du Pont 1970; Bail 1990, 2000; Bail & Poppe 2001; Dharma 2023). However, Lightfoot (1786), using a Solander name marked as 'S' in the Portland Catalogue, referred to this species as the 'great brown African Melon' (Lot 1448, p. 64; or 'great brown Melon of Guinea' Lot 2523, p. 115) and cited figure 767 by Martini (1777, pl. 71) as an illustration. Martini's figure 767 (see Fig. 1E herein) is clearly not *M. melo* (despite Rehder's (1967, p. 130) judgement) but instead *Cymbium pepo* ([Lightfoot], 1786), which correlates well with the common names used in the catalogue for this species (an African rather than an Indo-Pacific species).

Although the name *Voluta anguria* [Lightfoot], 1786 (p. 64, Lot 1448) precedes that of *Voluta pepo* [Lightfoot], 1786 (p. 87, Lot 1940) in the Portland Catalogue, it cannot be considered a prior name for *Cymbium pepo* (both of Lightfoot's names being published simultaneously in the same work).

The ICZN Code (Recommendation 69A.10) makes provisions for only one use of 'position precedence' where a type species designation is involved, and clearly this does not apply here. The name *Voluta anguria* [Lightfoot], 1786 appears to have not been used in the literature other than inclusion in the synonymy of other species. Prevailing usage of the name *Cymbium pepo* ([Lightfoot], 1786) is indicated and the name *Voluta anguria* [Lightfoot], 1786 is here regarded as a *nomen oblitum*. It is more difficult to determine how the West African '*Voluta anguria*' came to be accepted for so long as a synonym of the Indo-Pacific *Melo melo*, given that Martini's figure is reasonably accurate (the fine spiral striae on the protoconch here interpreted as artistic license). Gray (1855) included '*Voluta anguria* Solander' as a synonym of '*Yetus neptuni*, Gmelin' (now = *Cymbium pepo* ([Lightfoot], 1786)) so clearly he accepted that the species was from Africa. Weaver & du Pont (1970) not only included *Voluta anguria* in the synonymy of *Melo melo* but concluded that reference to the 'African Melon' was 'in error' (p. 69) and by so doing rejecting (wrongly) Lightfoot's locality information.

Voluta tessellata (Lamarck, 1811) *(= Melo tessellatus* (Lamarck, 1811))

Type material: In support of his original description of *Voluta tessellata* Lamarck (1811), used illustrations in Buonanni (1684, 3: fig. 1, see Fig. 2A herein), Lister (1685, fig. 797, see Fig. 2B herein), Seba (1758, pl. 65 fig. 10, pl. 66 fig. 6, see Fig. 1F–G herein) and Martini (1777, 3: pl. 74, fig. 781, see Fig. 1C herein) as well as a specimen in the Muséum National d'Histoire Naturelle (Lamarck Collection) currently designated as a syntype (MNHN-IM-2000-25406, see Fig. 1D herein, V. Heros pers. comm. to JMH, 3rd March 2024). Weaver & du Pont (1970) listed *Voluta tessellata* Lamarck, 1811 as a synonym of *M. aethiopicus* (Linnaeus, 1758) adding that 'type figure based on Buonanni, 1684, *Recreatio Mentis et Oculi*, fig. 1'. Although we would agree with Weaver & du Pont that the specimen illustrated by Buonanni is indeed *M. aethiopicus* (Linnaeus actually cites Buonanni's figure, among others, in his description of *Voluta aethiopica*), Lamarck's species was clearly based on four sources of illustrations (five illustrations in total) and at least one extant specimen, not just the figure given by Buonanni. Therefore, we would reject any notion that Weaver & du Pont had restricted the 'type figure' to Buonanni's figure (they have not fulfilled ICZN Article 74.1). Given that both Buonanni's and Lister's figures show *M. aethiopicus*, not *M. tessellatus* (though Lister seems to have copied Buonanni, who in turn copied an earlier source), we are left with Seba's and Martini's illustrations (all depicting small *M. tessellatus* juveniles), in addition to the Lamarck Collection specimen (MNHN-IM-2000-25406). Further discussion of the latter is warranted to further clarify its current status. Virginie Heros (MNHN) has provided us with the following reading of the label glued to the specimen (MNHN-IM-2000-25406): 'individu décrit par Lk. dans la coll. L[illegible] Muséum de même que *Voluta nautica* Lk'. Translation: 'specimen described by Lk. in the L[amarck] Muséum collection, the same as the *Voluta nautica* Lk.'). The length of this specimen (88.9 mm V. Heros pers. comm. to JMH, Nov. 2025) is slightly longer than Lamarck's stated dimensions 'longueur, environ huit centimètres' ('length, about eight centimetres'). Salmon (1952) referred to the specimen as 'le type de Lamarck', based on the contents of the label, also indicating that Kiener (1839, pl. 3, fig. 2) had illustrated it (although without any comment from Kiener confirming its type status). However, given that the label glued to the shell is not in Lamarck's hand or currently attributable to any known worker (*fide* V. Heros and P. Bouchet, MNHN, pers. comm. to JMH, Nov. 2025), that Lamarck did not state he was basing his description on a single specimen (not fulfilling ICZN Article 73.1) and that he relied upon other specimens figured in published works (here regarded as syntypes), we would agree with the current given status of specimen MNHN-IM-2000-25406 as a syntype, not a holotype.

In summary, the type series for *Voluta tessellata* consists of the five syntypes depicted in Buonanni's and Lister's illustrations (all showing *M. aethiopicus*) and Seba's and Martini's illustrations, in addition to the extant specimen in the MNHN (MNHN-IM-2000-25406). Although Salmon (1952) appears to be the first author to refer to specimen MNHN-IM-2000-25406 as Lamarck's 'type', since publication of the species name, he cannot be credited with having designated a lectotype either

under ICZN Article 74.5 (Lamarck's name was based on multiple illustrations from other works and at least one specimen; Salmon did not state that he was selecting a specimen from a type series to act as the name-bearing type) or Article 74.6 (Salmon clearly stated and not inferred that specimen MNHN-IM-2000-25406 was Lamarck's 'type'). Therefore we here designate MNHN-IM-2000-25406 (see Fig. 1D herein) as being the lectotype of *Voluta tessellata* (as per ICZN Article 74.7 — Lectotype designations after 1999).

Lamarck's (1811) original spelling '*Voluta tesellata*' was later emended (Lamarck, 1822) to '*Voluta tessellata*' without comment and this change has been adopted by later authors as per ICZN Article 33.3.1 (incorrect subsequent spelling in prevailing usage now deemed the correct original spelling).

Type locality: Not originally stated but here restricted, on the basis of known records, to shallow waters surrounding the islands of southern Indonesia.

Synonyms: *Voluta haustrum* [Lightfoot], 1786, ('China') citing Martini (1777, pl. 74, fig. 781). Status uncertain: *Voluta nautica* Lamarck, 1822 ('l'Océan asiatique'), p. 329, citing Seba, 1758, pl. 64, fig. 2; Martini, 1777, pl. 75, fig. 785 and Lamarck, 1798, pl. 387, fig. 72 and Lamarck personal collection (holotype: MHNG-MOLL-52226).

The earliest name for this species is *Voluta haustrum* [Lightfoot], 1786, which derives from the Portland Catalogue (Lot 3054, p. 137). Lightfoot referred to the species as the 'banded coronated Melon, very rare, from China' and cited as an illustration figure 781 from Martini (1777) (see Fig. 1C herein), the same figure later used by Lamarck (1811) for *Voluta tessellata*. Gray (1855) regarded '*Voluta haustrum*' as an unpublished manuscript name of Solander's ('Soland. MSS', p. 54) and listed it as a synonym of '*Cymbium tessellatum*', but the legitimacy of the Portland Catalogue as a published work and Lightfoot's authorship (both contested by Clench 1964) are now firmly established (Dance 1962, Kay 1965). Rehder (1967), Weaver & du Pont (1970) and some later authors (Bail & Poppe 2001, Dharma 2023) have all included the name *Voluta haustrum* in the synonymy of *Melo amphora* ([Lightfoot], 1786). However, Martini's figure 781 bears little resemblance to that species; therefore the name *Voluta haustrum* should be excluded from its synonymy. Concerning the status and usage of the name *Voluta haustrum* [Lightfoot], 1786, we note that it does not fulfill either requirement of ICZN Article 23.9.1 (reversal of precedence), the name not having been used as valid since 1899 (23.9.1.1), and the junior synonym (*Voluta tessellata*, as *Melo tessellatus*) being used instead (23.9.1.2, see discussion for *Melo melo*). This being so, the prevailing usage of *Melo tessellatus* should continue and the name *Voluta haustrum* is here regarded as a n*omen oblitum*.

The status of Lamarck's *Voluta nautica* as a valid species has long been debated. Kiener (1839), apparently unaware of the publication precedence rule, listed *Voluta tessellata* Lamarck, 1811 as a variety of *Voluta nautica* Lamarck, 1822 and also illustrated a specimen from the Lamarck collection (MHNG) presently considered the holotype of *Voluta nautica* (with distinctive orange and white patterning, see Fig. 3A–C herein). Both Gray (1855) and Reeve (1861) regarded *Voluta nautica* as a synonym of '*Cymbium aethiopicum*' (= *Melo aethiopicus*), and Broderip (1847) had previously canvassed that idea, although still treating the species as valid. Weaver & du Pont (1970) included the names *Voluta tessellata* (as '*Voluta tesselata*') and *V. nautica* in the synonymy of *M. aethiopicus*, evidently following Tryon (1882) and Smith (1942). In recent years, the name *Melo nautica* (Lamarck, 1822) has been applied to certain cream-coloured Philippine shells that resemble *M. tessellatus* in form (globose shell with strongly recumbent spines), but like *M. broderipii* have a brown protoconch (Poppe & Goto 1992, Poppe 2008). It seems highly unlikely that *M. nautica* is a synonym of *M. aethiopicus* (on the basis of conchological differences) and although current opinion (Dharma 2023) might favour its inclusion in the synonymy of *M. tessellatus*, further work (particularly DNA) is needed to explore other possibilities, such as species, subspecies or hybrid.

Voluta amphora [Lightfoot], 1786 (= *Melo amphora* ([Lightfoot], 1786)

Type material: According to Weaver & du Pont (1970): 'type figure limited by Rehder (1967) to Martini, 1777, Conchylien-Cabinet, 3, pl. 74, fig. 780'.

As explained previously (see discussion for *Melo melo*), Rehder restricted figure references in only one instance (a land snail), preferring to repeat verbatim Lightfoot's (1786) Portland Catalogue entries (including figure sources and figure numbers) for all other species including *Voluta amphora*.

As Lightfoot did not base his description of *Voluta amphora* on a single specimen ('the type', not fulfilling ICZN Article 73.1), the type series (syntypes) consists of the specimen illustrated by Martini (fig. 780) associated with Portland Catalogue Lot 708 (see Fig. 1H herein) together with the five other specimens sold from the catalogue (from Lots 708, 2172, 2214 (two specimens) and 3874). From these six syntypes we designate, in accordance with ICZN Articles 74.4 and 74.7, the specimen (a juvenile) depicted by Martini (fig. 780) as the lectotype of *Voluta amphora* (see Fig. 1H herein). According to Martini (1777, p. 59) the specimen was from the 'Mus. Bolteniano' (= Bolten collection; Joachim Friedrich Bolten, 1718–1796) but we have been unable to trace its whereabouts (for historical background on the fate of the Bolten collection, see Kronenberg & Wieneke 2020). The colour pattern shown in Martini's figure 780 (dark chocolate patches and large white triangles) is frequently observed in shells from northern Western Australia, the Northern Territory and certain areas of tropical Queensland (Wilson & Gillett 1971).

Type locality: Originally stated by Lightfoot (1786) as 'China', later corrected and restricted by Weaver & du Pont (1970) to 'Shark Bay, central Western Australia'. Given the strong possibility that *M. amphora* hybridises with *M. miltonis* in the Shark Bay area (Abbottsmith 1969, Wilson & Gillett 1971, Wilson 1994), this revised type locality choice would not seem ideal.

Synonyms: *Voluta cithara* [Lightfoot], 1786 ('Japan'), p. 96, citing Seba (1758, pl. 65, figs 1–2); *Cymbium flammeum* Röding, 1798 (no locality stated), p. 151 citing Martini (1777, pl. 74, fig. 780); *Voluta diadema* Lamarck, 1811 ('l'Océan asiatique'), p. 57, citing Gualtieri (1742, pl. 29, fig. H), Seba (1758, pl. 65, fig. 12, pl. 66, figs 1–3, 7–8, 10, 15), Martini (1777, pl. 74, fig. 780), and Lamarck (1798, pl. 388, fig. 2 = a redrawing of Martini, pl. 74, fig. 780) plus three syntypes (MNHN-IM-2000-29221; MHNG-MOLL-52227, 52229 — see Fig. 3D–G herein); *Voluta armata* Lamarck, 1811 ('les mers du Cap de Bonne-Esperance'), p. 57, citing Seba (1758, pl. 65, figs 1–2), Martini (1777, pl. 76, figs 787, 788) and Lamarck (1798, pl. 388, fig. 1 = a redrawing of Martini, pl. 76, fig. 787); *Voluta regia* Schubert & Wagner, 1829 (no locality stated), pp 13–14, figs 3038–3039); *Melo amphora knighti* N. Jackson, 1954 (fig. 1) ('Gloucester Passage, on the eastern side of Cape Gloucester', p. 35, two syntypes AM C. 103338).

Inspection of cited figures and in some cases surviving syntypes (via photographs and label data courtesy of Virginie Heros (MNHN) and Emmanuel Tardy (MHNG)) associated with names *Voluta cithara*, *Cymbium flammeum*, *Voluta diadema*, *Voluta armata* and *Voluta regia* clearly supports continued inclusion of all five in the synonymy of *Melo amphora* as per most recent authors. However, we note that figure 7 of Seba (1758) appears to be *M. aethiopicus* and his figure 2 could be either *M. amphora* or *M. umbilicatus*. The same ambiguity surrounds Martini's figures 787 and 788 (in relation to *Voluta armata*), which are either badly rendered or depict an aberrant specimen with an exceptionally high spire. A syntype of *Voluta diadema* — a somewhat faded buff- and white-coloured juvenile — exists in the MNHN collection (see Fig. 3D–E herein) and can be identified with certainty as *M. amphora*. The accompanying (old) label, not in Lamarck's hand, states 'type Lamarck' but for the present we prefer to regard it as a syntype (as MNHN does). Two other Lamarck syntypes of *Voluta diadema* are in the collection of the MHNG (see Fig. 3F–G herein), as is a shell of uncertain provenance illustrated by Kiener (1839) and identified by him as '*Voluta armata* Lam.' All three of these MHNG specimens are here confirmed as being *M. amphora*. The reasons for rejecting the name *Voluta haustrum* [Lightfoot], 1786 as a synonym of *Melo amphora* ([Lightfoot], 1786) were given earlier (see discussion for *Melo tessellatus*). Our inspection of images of the two syntypes of *Melo amphora knighti* Jackson, 1954 (AM C 103338, courtesy of Alison Miller, Australian Museum) indicates that it is simply a colour form of *M. amphora* exhibiting a white aperture and, externally, white background colour from the Gloucester Passage area on the Great Barrier Reef, Queensland, Australia. The specimen illustrated by

Jackson is a juvenile (125 mm length) and the other is a very large (495 mm length, gerontic) specimen. The animal of *M. amphora knighti* does not differ from typical *M. amphora* (see Jackson 1954).

Voluta aethiopica Linnaeus, 1758 (= *Melo aethiopicus* (Linnaeus, 1758)

Type material: According to Weaver & du Pont (1970) 'type figure limited by Hanley (1855) to Gualtieri, 1742, Index Testarum Conchyliorum, pl.29, fig. I'. Unfortunately, this is not the case. In his original description of *Voluta aethiopica*, Linnaeus (1758) cited figures in Buonanni (1684: pl. 3, fig. 1, see Fig. 2A herein), Rumphius (1705, pl. 31, figs A–B, see Fig. 2E herein), Gualtieri (1742: pl. 29, figs H–I, see Fig. 2D herein) and d'Argenville (1742: pl. 20, fig. F, see Fig. 2F herein). Hanley (1855) discussed these figures, noting that most of them did appear to represent the 'intended typical form' of *Voluta aethiopica* (Rumphius, fig. A, Gualtieri, fig. I, d'Argenville, fig. F; see Fig. 2D–F herein), although some figures were of other species, notably *Melo amphora* (referred to by Hanley as *Melo diadema* and *Melo armatus*). We can confirm Hanley's assessment and add that the figure by Buonanni is a distorted image of a small juvenile *M. aethiopicus* (see discussion regarding *Melo tessellatus*). To better appreciate the difficulties in interpreting Linnaeus's species, it is worth quoting verbatim the original 1758 Latin description 'aethiopica. 373. V. testa ventricosa, spira coronata spinis fornicatis, apice papillari, columella quadri-plicata' (p. 733) (our translation/interpretation: 'aethiopica. 373. V[oluta] shell inflated, spire coronated, spines prostrate, apex [i.e. protoconch] papillate, columella four-folded'). Importantly, shell colour and pattern are not mentioned and, as Hanley emphasised, the number of columellar plaits is given as four. Four columellar plaits sometimes occur in *Melo aethiopicus* (more commonly with three plaits) but are usually seen in *M. tessellatus* and *M. broderipii* — the latter species in fact sometimes misidentified as *M. aethiopicus*. This does raise doubt about the true identity of the shell (or shells) examined by Linnaeus (assuming he may have had, or at least seen, specimens when preparing his description), a problem frequently encountered when dealing with Linnaean species (Dodge 1959, Dance 1967, Wallin 2001, Way 2007).

Dodge (1955) discussed the difficulties inherent in Linnaeus's description of *Voluta aethiopica*, including Hanley's evaluation of 'the composite nature of the synonymy' and the poor or ambiguous nature of some of the figures cited by Linnaeus. He concluded that there remained 'considerable doubt on the identification' and that Linnaeus's 'conception of the species was faulty' but also added that 'it is also probably true that Linnaeus intended to describe aethiopica rather than any of the other figured shells'. Dodge stated that no specimen identifiable as *Voluta aethiopica* could be found in the Linnaean Collection of the Linnean Society of London but that a specimen marked as such and evidently matching 'typical aethiopica' was present in the Queen's Collection in the Linnaean Collection of the Zoological Museum of Uppsala University (the collection of Louisa Ulrika, Queen Consort of King Adolphus Frederik) although Dodge could not determine its status, type or otherwise. It should however be noted that Dodge did not personally examine either the London or Uppsala collections and was obviously acting on advice received from collection staff. Wallin (2001) lists three shells in the Uppsala collection, which we have been able to examine as photographs courtesy of Paco Cardenas (Head, Linnaean Collection, University of Uppsala). All are juveniles, two what would be currently accepted as *M. aethiopica* (see Fig. 4B–C herein) and the other as *M. tessellatus* (see Fig. 4D herein). According to Wallin, all zoological specimens in the Uppsala collection, with a single exception (one lot of insects), lack labels in Linnaeus's hand.

Regarding the three '*Voluta aethiopica*' shells, the two *M. aethiopica* (Univ Uppsala Collection numbers UPSZTY 636, UPSZTY 1490) each have a handwritten ink label by Carl Thunberg (a student of Linnaeus) and all three specimens have mechanically-printed labels of Olof Swartz (a student of Linnaeus the younger) (see Fig. 4B–F herein). Curiously, Wallin does not mention the Thunberg label associated with specimen UPSZTY 636 and specifically claims that such a label is absent from specimen UPSZTY 1490. It is impossible to determine with absolute certainty whether or not Linnaeus examined any of these three shells when preparing his original description of *Voluta aethiopica* (in the 10th edition of the *Systema Naturae*, species '373'), which only made

reference to illustrations in other works (Buonanni, Rumphius, Gualtieri and d'Argenville). However, the fact that he did not cite his (then) unpublished catalogue of the Queen Louisa Ulrika Collection (a collection he examined and documented) in the original description of the species strongly suggests that either the three Uppsala shells had yet to be acquired by the Queen or at least were not observed by Linnaeus. Significantly, Linnaeus (1758) does cite this unpublished catalogue (as 'M.L.U.' = Museum Ludovicae Ulricae) for several mollusc species described in the 10th edition of the *Systema Naturae*. *Voluta aethiopica* is however included in the published version of this catalogue (Linnaeus 1764, as species '241') and in the 12th edition of the *Systema Naturae* (Linnaeus 1767, as species '435'), in the latter case with specific mention of its inclusion in the 1764 work. Unfortunately, none of the three shells in Uppsala bear an ink number or are accompanied by a Linnaeus-penned label and therefore we cannot give them syntype status (nor does the Uppsala University Linnaean Collection).

The Linnean Society of London collection possesses a small juvenile of *Melo melo* marked in ink inside the aperture with the number '435', possibly by Linnaeus himself (*fide* Isabelle Charmantier, Linnean Society, pers. comm. to JMH 2024), which matches Linnaeus's species number for *Voluta aethiopica* in the 12th edition of *Systema Naturae* (1767) (see Fig. 4G–J herein). S.P. Dance (unpublished note from the society's Linnaean Collection archive), who catalogued the molluscs of the London collection in 1963, has drawn attention to this discrepancy in identification and concluded that this shell should not be used as the lectotype of *Voluta aethiopica* but that the specimen depicted by d'Argenville (see Fig. 2F herein) should be chosen as 'obviously Linnaeus got the name *aethiopicus* from the earlier literature, whose figure F on pl. 20 he cites, among others'. Interestingly, d'Argenville (1742) states that the shell he had illustrated was 'dite la Couronne d'Ethiopie' ('known as the Ethiopian Crown') indicating that the epithet 'aethiopica' was already in use for this species before the appearance of his volume. The Linnean Society of London's specimen ('435') correlates with Hanley's (1855) sighting of Linnaeus's ink amendment (on a copy of the 12th edition of the *Systema Naturae*) 'Variat absque corona' ('it varies without the crown' [of spines]) in relation to *Voluta aethiopica* indicating that Linnaeus later came to regard *Melo melo* as merely a form of his species that lacked spire spines (the '435' number written on the shell was intentionally meant to identify it as *Voluta aethiopica*). The same Linnaean amendment (see Fig. 5D herein) appears on certain other copies of the *Systema Naturae* 12th edition also held by the Linnean Society (*fide* Isabelle Charmantier and Andrea Deneau, Linnean Collection). While this specimen of *Melo melo* was almost certainly used by Linnaeus in preparing his modified (1767) 12th edition description of *Voluta aethiopica*, it does not qualify as a syntype. S.P. Dance, on the Linnean Society Collection label for this species (see Fig. 4J herein), further notes that aside from the '435' specimen, Hanley had isolated two other '*Melo indicus*' (= *M. melo*) shells: a smaller one (possibly marked as '451', '437' or '435') and a shell described by Hanley as 'a gigantic marked specimen', the latter apparently missing from the Linnean Collection (*fide* Dance). As with specimen '435', neither of these two additional specimens qualify as syntypes of *Voluta aethiopica*.

Courtesy of Antonio Callea and Marco Dellacasa (University of Pisa, Italy), we have been able to determine that Gualtieri's (1742) figure H is clearly identifiable as *Melo amphora* (specimen still in the Gualtieri Collection, University of Pisa). The original figure H proved to be two views of the same shell (see Figs 2D, 5A–C herein). This shell nevertheless remains a syntype of *Voluta aethiopica*. Gualtieri's figure I (depicting a small juvenile *Melo aethiopicus*) certainly does not match an existing specimen in the collection (a broader, apparently larger juvenile, see Fig. 4A herein). The specimens represented by Gualtieri's figures (H (shell extant) and I (shell not extant)) both qualify as syntypes of *Voluta aethiopica*, but the *M. aethiopicus* shell in the collection does not.

In summary, given that Linnaeus did not base his description of *Voluta aethiopica* on a single specimen ('the type', not fulfilling ICZN Article 73.1) but instead on multiple specimens illustrated in other works and possibly specimens he handled, the known type series consists of six syntypes represented by the figures he cited. Of these, the

specimens illustrated by d'Argenville (pl. 20, fig. F, see Fig. 2F herein), Gualtieri (pl. 29, fig. I, see Fig. 2D herein) and Buonanni (pl. 3, fig. 1, see Fig. 2A herein), most closely match the current concept of *Melo aethiopicus*, and, in accordance with Dance's suggestion (in an unpublished note) and ICZN Articles 74.4 and 74.7, we here designate the specimen illustrated by d'Argenville (Fig. 2F) as the lectotype of *Voluta aethiopica* (narrow shell, numerous short and equal spines, shell pattern of two broad bands of colour, Fig. 6 I–J show a comparably-sized juvenile specimen). We note that Montfort (1810) cited '*Cymbium aethiopicum*' (= *Melo aethiopicus*) as the type species of *Cymbium*, a genus now (fortunately) attributed to Röding (1798) and used for a group of Atlantic, mostly West African, volutes.

Lastly, in connection with the illustration by Buonanni (1684, pl. 3, fig. 1), it is apparent that he had copied an earlier (c. 1646) more accurate and unpublished etching of the same shell by Wenceslau Hollar (1607–1677) (compare Fig. 2C to 2A). This further supports the view that Buonanni was intending to illustrate *Melo aethiopicus* as concluded by Hanley (1855) and not *M. tessellatus* as has been suggested by some authors (Weaver & du Pont 1970).

Type locality: 'M. Persia, & Key Asiae' (Linnaeus, 1758, p. 733); = ? Persian Sea & Asian Islands ('M' being an abbreviation of the Latin 'mare' (sea) and 'Persia' likely referring to the western Indian Ocean area). 'Key Asiae' was apparently a faux-Latin Linnaeus locality for which we here offer an interpretation. 'Asia' from the Latin 'Asia' originally referred to Asia Minor (and is itself derived from earlier Greek) but in Linnaeus's day, indicated the continent of Asia. 'Key' was most likely deriving from the Spanish 'cayo' for island, therefore 'Key Asiae' is interpreted as 'Asian Islands'. Type locality restricted by Weaver & du Pont (1970) to 'Indonesia'.

Synonyms: *Cymbium aethiopicum* var. *aurantium* S.G. Finch, 1930 (locality stated as '?') (holotype NHMUK 20210057), Cuming Collection (p. 55, citing Reeve (1860, pl. 2, figs 1b–c) and Broderip (as 'Sowerby', 1847, pl. 82, fig. 13). Examination of the holotype of *Cymbium aethiopicum* var. *aurantium* and Reeve's figures (which exactly match the holotype) support the current status of Finch's name as being a junior synonym of *Melo aethiopicus*.

Voluta broderipii J.E. Gray in Griffith & Pidgeon, 1833 (= *Melo broderipii* (J.E. Gray in Griffith & Pidgeon, 1833))

Type material: Although Gray presented a very good illustration of his new species (J.E. Gray in Griffith & Pidgeon, 1833, pl. 26, an apertural view, see Fig 6A herein), no matching specimen was apparently ever registered by the NHMUK nor can one be located in the collection (pers. obvs. A. Salvador 2025): it may have been lost. Weaver & du Pont (1970), presumably aware of the specimen's absence, cited Gray's illustration as the 'Type Figure'. As Gray did not state or otherwise indicate that this species was based on a single specimen (not fulfilling ICZN Article 73.1), it must be assumed that more than one specimen was used (syntypes) in his description. Weaver & du Pont's (1970) citation of Gray's figure cannot be accepted as a valid lectotype designation either under ICZN Article 74.5 (Weaver & du Pont did not explicitly indicate that they were selecting the illustration in Gray to serve as the name-bearing type) or under Article 74.6 (Weaver & du Pont clearly accepted Gray's illustration as the 'type figure' for the species, not inferred it). It should also be noted that Weaver & du Pont (1970) were familiar with the term 'lectotype', used it occasionally in their book and actually defined it in their glossary. Therefore, we here designate the specimen depicted in Gray's illustration (see Fig. 6A herein) as the lectotype of *Voluta broderipii* Gray in Griffith & Pidgeon, 1833 as per ICZN Articles 74.4 and 74.7.

A specimen registered as NHMUK 1837.12.1.259 (Locality: —?. W.J. Broderip collection) formerly housed in the type collection, is not the shell figured by Gray (pl. 26, see Fig. 6A herein) but instead that figured by Hanley (1858, *Conch. Misc.* pl. 12, fig. 32, see Fig. 6B–D herein; see Petit & Coan 2008). This Hanley specimen is a juvenile, unlike the original figured specimen that appears to be larger and possibly mature judging from the illustration (Fig. 6A). Petit & Coan (2008) have clarified the alteration of the original spelling of the species name from '*Voluta broderippii*' (given on J.E. Gray's plate, issued 1833) to '*Voluta broderipii*' (in text, issued 1834) indicating acceptance of the latter through ICZN Article 33.3.1 (incorrect subsequent spelling in prevailing usage now deemed the correct original spelling).

Type locality: Originally not stated. According to Weaver & du Pont (1970) this was subsequently restricted by M. Smith (1942) to 'Manila Bay, Philippines'. Broderip (1847) had already provided a locality ('Manilla' [sic]) and therefore should be credited for restricting the type locality. It should also be noted that Smith's use of 'Hab.' (presumably an abbreviated form of 'habitat' or the French 'habite') was loose — sometimes used to repeat locality data given in an original description (a type locality, as used by many early authors of molluscs), in a list of various localities including an original stated one, and in a locality specifically identified by him as the 'type locality'.

Synonyms: *Voluta lamarckii* Kiener, 1839 ('les mers de l'Inde') (p. 5, pl. 4, fig. 76); '*M. regius*, Brod.' (Broderip, 1847, p. 415).

Kiener's description and colour plate (showing what appear to be two views of the same mature shell) support the current status of *Voluta lamarckii* as a synonym of *Melo broderipii* (see Weaver & du Pont 1970). Broderip (1847) cited the name '*M. regius*, Brod' as a synonym of *Melo broderipii* but without further details, and Gray (1855) added '1855' to the reference but did not provide any publication information, strongly suggesting use of a manuscript name (see discussion for *Melo miltonis*). Broderip's name should not be confused with *Voluta regia* Schubert & Wagner, 1829, a synonym of *Melo amphora* ([Lightfoot], 1786).

***Melo umbilicatus* Broderip in G.B. Sowerby I, 1826**

Type material: NHMUK 1837.12.1.34 (Broderip in G.B. Sowerby I, 1826, fig. 3, see Figs 7A–C, 8A–C herein), current given status: holotype.

Broderip's original description of *Melo umbilicatus* consists of an illustration of NHMUK 1837.12.1.34 (Broderip, 1826, fig. 3) and a brief figure caption. Although the first sentence of the caption '*Melo umbilicatus*, (Broderip) N.S. [= new species] in an intermediate stage of growth' appears to apply to the illustrated specimen (NHMUK 1837.12.1.34, see Figs 7A–C, 8A–C herein), the second sentence demonstrates that Broderip actually used multiple specimens (syntypes) to formulate his description ('In the full grown shell the whorls of the spire and body whorl project so much beyond the apex, that the latter is seen as it were at the bottom of an excavation'). As Broderip did not fulfil the requirements of ICZN Article 73.1 (a single specimen used in a description), specimen NHMUK 1837.12.1.34 can no longer be accepted as the holotype of *Melo umbilicatus*. Reeve (1860, plates 9 and 10 and associated text) refers to a specimen (here confirmed held by the NHMUK) as 'the original type of Mr. Broderip'. Unfortunately, this specimen (see Fig. 7E–F herein) cannot be confirmed as being from Broderip's collection because it lacks an inscribed 'B' (Broderip Collection) number. An associated label claiming this specimen to be number 343 in the Broderip Collection may belong to another shell in the collection (pers. obvs. A. Salvador 2026). In contrast, NHMUK 1837.12.1.34 (Broderip's illustrated specimen) does exhibit an inscribed B. number (B.34) (see Fig 7C herein). Wilkins (1953) first drew attention to Reeve's assertion of having illustrated Broderip's 'type' and concluded it was an error, based on the fact that Broderip's illustrated specimen (from the 1826 description, NHMUK 1837.12.1.34) did not correlate with what Reeve illustrated. Although Wilkins (1953) was the first author since publication of the species name to refer to the 'holotype' of *Melo umbilicatus* Broderip in G.B. Sowerby I, 1826, he cannot be credited with having designated a lectotype either under ICZN Article 74.5 (despite the original Broderip description confirming the species name was based on more than one specimen, Wilkins' subsequent use of the term 'holotype' shows that he was not selecting a specimen from a type series to serve as the name-bearing type) or under Article 74.6 (Wilkins referred to (and accepted) the 'holotype', and did not 'infer' it). It should also be added that Wilkins (1953) was clearly aware of the concept of lectotype and used it in his paper (for certain strombid and vermetid species). Therefore, we here designate specimen NHMUK 1837.12.1.34 (see Fig. 8A–C herein) as the lectotype of *Melo umbilicatus* Broderip in G.B. Sowerby I, 1826 as per ICZN Article 74.7.

Hanley (1858, pl. 8. fig 23, see Fig 7D herein) provided colour illustrations of the lectotype from apertural and dorsal aspects but made no reference to its status (or the status of the three other specimens he illustrated — for further background to Hanley's illustrations see discussion for *M. miltonis*).

In contrast, Broderip (1847, pl., 83, fig 29) rather poorly illustrated the specimen claimed by Reeve (1860) to be Broderip's 'type' but surprisingly not the specimen in the original 1826 description (NHMUK 1837.12.1.34).

Type locality: Not originally stated. According to Weaver & du Pont (1970), Gray (1855) restricted the type locality to 'Moreton Bay, south Queensland, Australia' (Gray only cited 'Moreton Bay' since the state of Queensland was not separated from New South Wales until 1859), but Broderip (1847) had earlier provided this locality ('Moreton Bay, New Holland') and should be credited accordingly. Wilkins (1953) was incorrect in stating that Broderip (1826) had given 'Moreton Bay' as the locality: Broderip (1826) does not mention a locality either in his text or on the plate of his new species.

Synonyms: *Voluta ducalis* Lamarck, 1811: type locality: 'l'Océan indien' (provisional *nomen oblitum*).

Lamarck (1811)'s description of *Voluta ducalis* refers to a specimen in his own collection ('mon cabinet') and with some doubt ('le meme ?') specimens illustrated by Chemnitz (1788, Vol. 10, plate 148, figs 1385–1388) — the latter in fact good colour representations of *Cymbiola cymbiola* (Gmelin, 1791) (see Fig. 5E herein) as previously pointed out by Weaver & du Pont (1970). Therefore it is completely understandable that later authors (Gray 1855, Reeve 1860, Ponton 1868) either interpreted the Lamarck species as a form of another (which Lamarck himself was very uncertain of), or like Broderip (1847) ignored it. Fortunately, Lamarck's shell survives (MHNG-MOLL-52230, present given status: holotype, length 70 mm, see Fig. 6E–G herein) and is extremely similar to small juveniles of *Melo umbilicatus* from northern Queensland and the Northern Territory (Fig. 6H). Therefore Weaver & du Pont's (1970) conclusion that Lamarck's holotype was 'too juvenile for positive identification [*species dubia*]' (p. 75) cannot be supported. Despite Lamarck's puzzling (and unfortunate) reference to Chemnitz's illustrations (clearly depicting *Cymbiola cymbiola*), *Voluta ducalis* Lamarck 1811 is the earliest name for the species and not yet a synonym of *Melo umbilicatus* as is widely (and currently) believed (Weaver & du Pont 1970, Bail 1990, Poppe & Goto 1992, Wilson 1994, Dharma 2023). Article 23.9.1 (reversal of precedence of the ICZN Code) requires that in order to use a junior synonym or homonym in preference to a demonstrated senior synonym or homonym the latter must not have: (a) been used as a valid name since 1899 and (b) the junior synonym or homonym has been used as the presumed valid name for a taxon 'in at least 25 works published by at least 10 authors in the immediately preceding 50 years and encompassing a span of not less than 10 years'. We can find three post-1899 citations of Lamarck's name as valid: Wilkins, 1953 (as *Cymbium ducale*); Tokioka, 1962 (as *Melo ducale* based on a likely misidentification of *M. amphora* egg case juveniles) and Weaver, 1962 (as *Melo ducalis*), but do note that all publications in the last 50 years (1974 to 2026) appear to have used Broderip's name exclusively. In this instance the code recommends (ICZN Article 23.9.3) that the junior name (*Melo umbilicatus*) be used until a formal request is made to the Commission for the senior name to be suppressed (rendering Lamarck's name a provisional *nomen oblitum*).

Voluta georginae J.E. Gray in Griffith & Pidgeon, 1833 (= *Melo georginae* (J.E. Gray in Griffith & Pidgeon, 1833))

Type material: NHMUK 1952.8.1.1. (figured by Gray, 1833, pl. 34, see Fig. 8D–F herein), current given status: holotype.

As Gray did not state or otherwise indicate that his description of *Voluta georginae* was based on a single specimen (not fulfilling Article 73.1), it must be assumed that more than one specimen was used (syntypes). G.L. Wilkins registered Gray's illustrated specimen as the 'holotype' of *Voluta georginae* in 1952 indicating that it, and the 'holotype' of *Voluta miltonis* had not previously been extracted from the general collection and moved to the type collection. Although Weaver & du Pont (1970) appear to have been the first authors to refer to specimen NHMUK 1952.8.1.1 as the 'holotype' of *Voluta georginae* since publication of the species name, they cannot be credited with having designated a lectotype either under ICZN Article 74.5 (Weaver & du Pont did not explicitly indicate that they were selecting a specimen from a type series to serve as the name-bearing type) or under Article 74.6 (Weaver & du Pont clearly stated, not

inferred, that specimen NHMUK 1952.8.1.1 was the holotype). As noted previously, Weaver & du Pont (1970) were acquainted with the term 'lectotype' and even included it in their glossary. Therefore, we here designate specimen NHMUK 1952.8.1.1 (see Fig 8D–F herein) as the lectotype of *Voluta georginae* J.E. Gray in Griffith & Pidgeon, 1833 as per ICZN Article 74.7.

Type locality: 'From Swan River' (Western Australia) (Gray, 1833) corrected to 'Moreton Bay; Blackwood Bay; Port Essington' (Gray, 1855) here restricted to Moreton Bay (southern Queensland, Australia).

Synonyms: *Melo mucronatus* Broderip, 1847 (pl. 73, figs 23 and 28); no known type material presently traceable in NHMUK.

Unfortunately, no specimens matching Broderip's two illustrations of *Melo mucronatus* could be found either in the type collection or general collection of the NHMUK (pers. obvs. A. Salvador 2024, 2025) suggesting they may be lost. However, the illustrations (of two small juveniles) leave no doubt that *M. mucronatus* is a synonym of *M. georginae*, as indicated by Gray (1855), Hanley (1858), Reeve (1860) and later authors (Weaver & du Pont 1970, Bail 1990). The type locality of *Melo mucronatus*, 'Moreton Bay, in New Holland' (Broderip, 1847, p. 416) is also consistent with this synonymy, given that *M. georginae* is the only species of *Melo* definitely found within Moreton Bay.

Voluta miltonis J.E. Gray in Griffith & Pidgeon, 1833 (= *Melo miltonis* (J.E. Gray in Griffith & Pidgeon, 1833))

Type material: NHMUK 1952.5.13.2. (figured by Gray, 1833, pl. 29, see Fig. 8G–I herein), current given status: holotype.

As Gray did not state or otherwise indicate that his description of *Voluta miltonis* was based on a single specimen ('the type') (not fulfilling Article 73.1) it must be assumed that more than one specimen was used (syntypes). Wilkins (1953) provided some provenance details of the nine '*Cymbium miltonis*' held in the NHMUK collection at that time, including Gray's illustrated shell (NHMUK 1952.5.13.2), one from the Sowerby Collection (from 1832 and likely seen by Gray) and others dating from 1838–1840 (not available to Gray in 1833). He noted that Gray's illustrated specimen had no locality data but that the other material mostly came from Swan River or Sharks Bay in 'New Holland' (localities in present day Western Australia). Although Wilkins (1953) was the first author to refer to specimen NHMUK 1952.5.13.2 as the 'holotype' since the publication of the species name, he cannot be credited with having designated a lectotype either under ICZN Article 74.5 (Wilkins did not explicitly indicate that he was selecting the specimen from a type series to serve as the name-bearing type) or under Article 74.6 (Wilkins clearly stated, not inferred, that specimen NHMUK 1952.13.2 was the holotype). As indicated previously, Wilkins (1953) understood the term 'lectotype' and used it in relation to certain other taxa. Therefore, we here designate specimen NHMUK 1952.5.13.2 (see Fig. 8G–I herein) as the lectotype of *Voluta miltonis* Gray in Griffith & Pidgeon, 1833 as per ICZN Article 74.7.

Type locality: 'New Holland'; Weaver & du Pont (1970) have credited Gray (1855, p. 55) with restricting the type locality to 'Australia; Swan River' when in fact Broderip (1847, p. 415) had already done so ('Swan River, New Holland') and should therefore be credited.

Synonyms: *Melo cylindratus* Broderip in G.B. Sowerby I, 1847 (name introduced by Broderip as a synonym of *M. miltonis*) NHMUK 1837.12.1.255; originally registered as '*Melo cylindricus (miltonis)*, 'Swan River, New Holland', W.J. Broderip collection.

Melo miltonis has been figured in numerous works (both historic and recent) and even in its juvenile state has almost never generated any taxonomic confusion. However, in 1837 two specimens were registered in the NHMUK collection as '*Melo cylindricus (miltonis)*' (sic) presumably from a label or unpublished manuscript (NHMUK 1837.12.1.254-255). One of these specimens (NHMUK 1837.12.1.255, now labelled as a syntype of '*Melo cylindratus* Broderip in Sowerby I, 1847') has an associated note stating 'Sow. [illegible] f.40,41' which appears to refer to figures 40 and 41 of Hanley (1858, these figures labelled by him as '*M. miltonis*'). Broderip (1847) mentioned '*Melo cylindratus*, Brod.' (sic) as a synonym of *M. miltonis* without any further comment, publication year or literature reference

but it is not certain if either of his figures 24 and 25 are of NHMUK 1837.12.1.254 or 255. Gray (1855) also regarded this name as a synonym of *Cymbium miltonis* and added the year '1855' ('*Melo cylindratus*, Brod. 1855'). Unfortunately we can find no publication of Broderip's dating from 1855 (or any other year) describing '*Melo cylindratus*'. The name may have been included in Broderip's intended contribution on *Melo* to G.B. Sowerby I's *Species Conchyliorum* series, which was discontinued after Sowerby's death in 1854 (Petit 2009). According to Gray (1855, p. 53), this series was apparently published by a bookseller ('Mr Lumley') on 1st of March 1855 (indeed, Petit 2009 notes that no copies of that work have ever been found). Certainly Hanley (1854–1858) published plates of several genera including *Melo* (in 1858) which 'were originally intended to appear in the 'Species Conchyliorum' of the late G.B. Sowerby' (Hanley, 1858) but the name '*Melo cylindratus*' does not appear, Hanley using the name *Melo miltonis*. Like Broderip and Gray, Reeve (1861) and Smith (1942) also include the name '*Melo cylindratus* Broderip' in the synonymy of *M. miltonis* and we would concur with this action.

SUMMARY

The present study has sought to clarify the status of existing type material (surviving specimens and specimens as depicted in illustrated works cited by authors) for species of the genus *Melo* described in the 18th and 19th centuries. For all eight species it has been deemed necessary, after due consideration of all previously published work, to designate lectotypes both to maintain stability of nomenclature for these well-known taxa and for the benefit of future taxonomic study of *Melo*. Table 1 summarises the primary synonyms of the species here treated and Table 2 summarises the revised status of the type material pertinent to these species. The current holotypes of *Voluta georginae* J.E. Gray in Griffith & Pidgeon, 1833, *Voluta miltonis* J.E. Gray in Griffith & Pidgeon, 1833 and *Melo umbilicatus* Broderip in G.B. Sowerby I, 1826 are each here designated, as lectotypes (see Table 2). The names *Voluta ducalis* Lamarck, 1811, *Voluta haustrum* [Lightfoot, 1786] and *Voluta anguria* [Lightfoot, 1786] are here regarded as *nomina oblita* (*Voluta ducalis*, provisionally). The status of Lamarck's *Voluta nautica* remains unresolved and we suggest excluding that name from the synonymy of other species until further research sheds more light on the issue.

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and Marco Dellacasa), syntypes of *Melo amphora knighti* (Alison Miller, Malacology Department, Australian Museum, Sydney). We would like to give special thanks to Richard Willan and the two reviewers for their careful reading of the manuscript and valuable suggestions for improvements.

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FIGURES

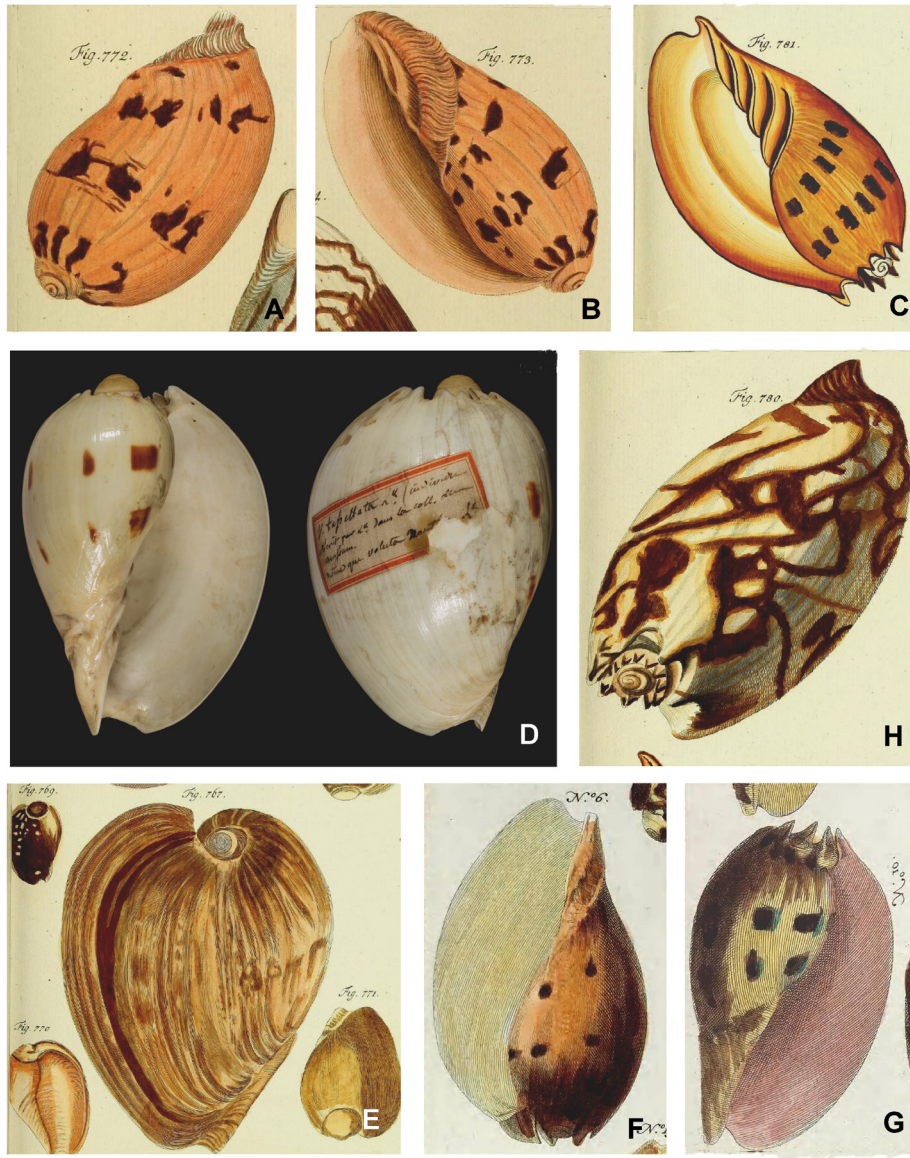

Figure 1. A–B. Figures 772, 773 (pl. 72) from Martini (1777), representing syntypes of *Voluta melo* [Lightfoot], 1786 (Fig. 772 representing the lectotype here designated). **C.** Figure 781 (pl. 74) from Martini (1777) representing a syntype of *Voluta haustrum* [Lightfoot], 1786 and a syntype of *Voluta tessellata* Lamarck, 1811. **D.** Dorsal and apertural views of syntype of *Voluta tessellata* Lamarck, 1811, from the Lamarck Collection, MNHN-IM-2000-25406 (herein designated as the lectotype). **E.** *Voluta anguria* [Lightfoot], 1786: figure 767 (pl. 71) from Martini (1777) representing a syntype of *Voluta anguria*. **F–G.** From Seba (1758) representing syntypes of *Voluta tessellata* Lamarck, 1811. **F.** Figure 6, pl. 66; **G.** Figure 10, pl. 65 (the latter shown reversed from original for comparison). **H.** Figure 780 (pl. 74) from Martini (1777) representing a syntype of *Voluta amphora* [Lightfoot], 1786 (representing the lectotype here designated). **A–C**, **E–H** images accessed through Biodiversity Heritage Library scanned volumes. **D** courtesy of MNHN, Paris (photograph: M. Caballer (Project RECOLNAT CANR-11-1NBS-004)).

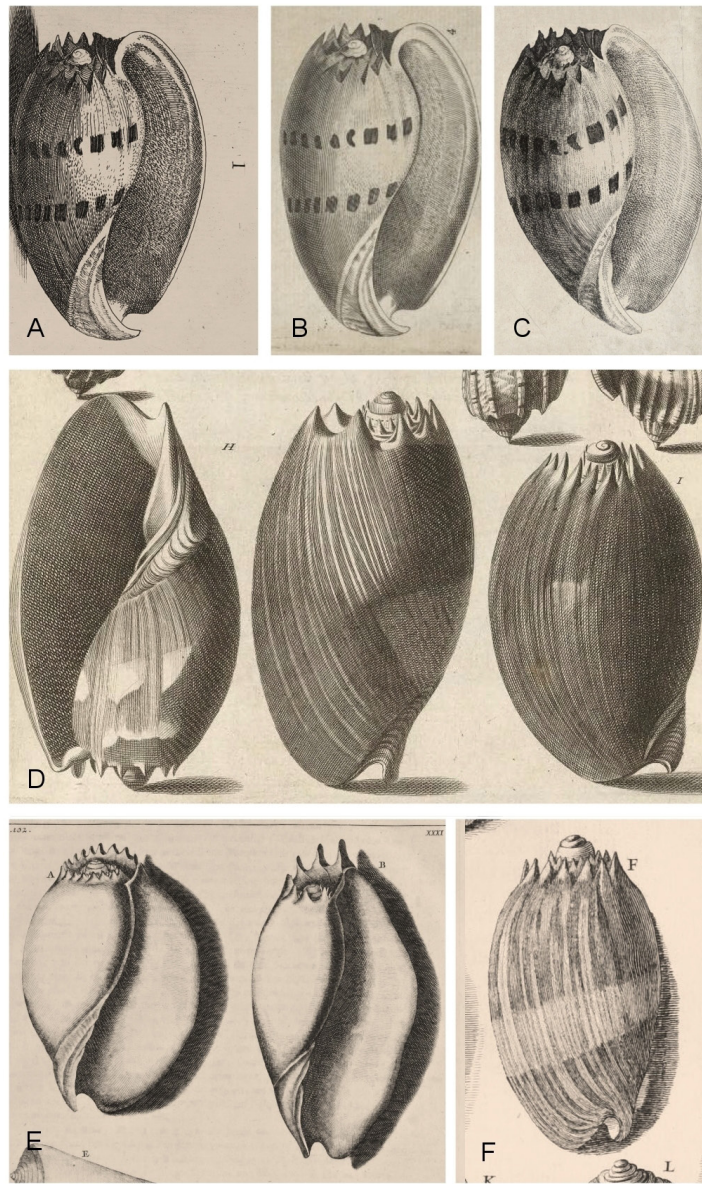

Figure 2. A. Figure 1, Buonanni (1684) representing a syntype of *Voluta aethiopica* Linnaeus, 1758 and a syntype of *Voluta tessellata* Lamarck, 1811 (reorientated for ease of comparison). **B.** Figure 797 from Lister (1685) representing a syntype of *Voluta tessellata* Lamarck, 1811 (reorientated for ease of comparison). **C.** Unpublished print by Wenceslau Hollar (c. 1646) (reversed for comparison with **A–B**). **D.** Plate 29, figs. H (centre and at left) and I (at right) from Gualtieri (1742) representing syntypes of *Voluta aethiopica* Linnaeus, 1758. **E.** Plate 31, figures A (left), B (right) from Rumphius (1705) representing syntypes of *Voluta aethiopica* Linnaeus, 1758. **F.** Plate 20, figure F from d'Argenville (1742) representing a syntype of *Voluta aethiopica* Linnaeus, 1758 (representing the lectotype here designated). **A–B**, **D–F** images accessed through Biodiversity Heritage Library scanned volumes; **C** University of Toronto (Wikicommons).

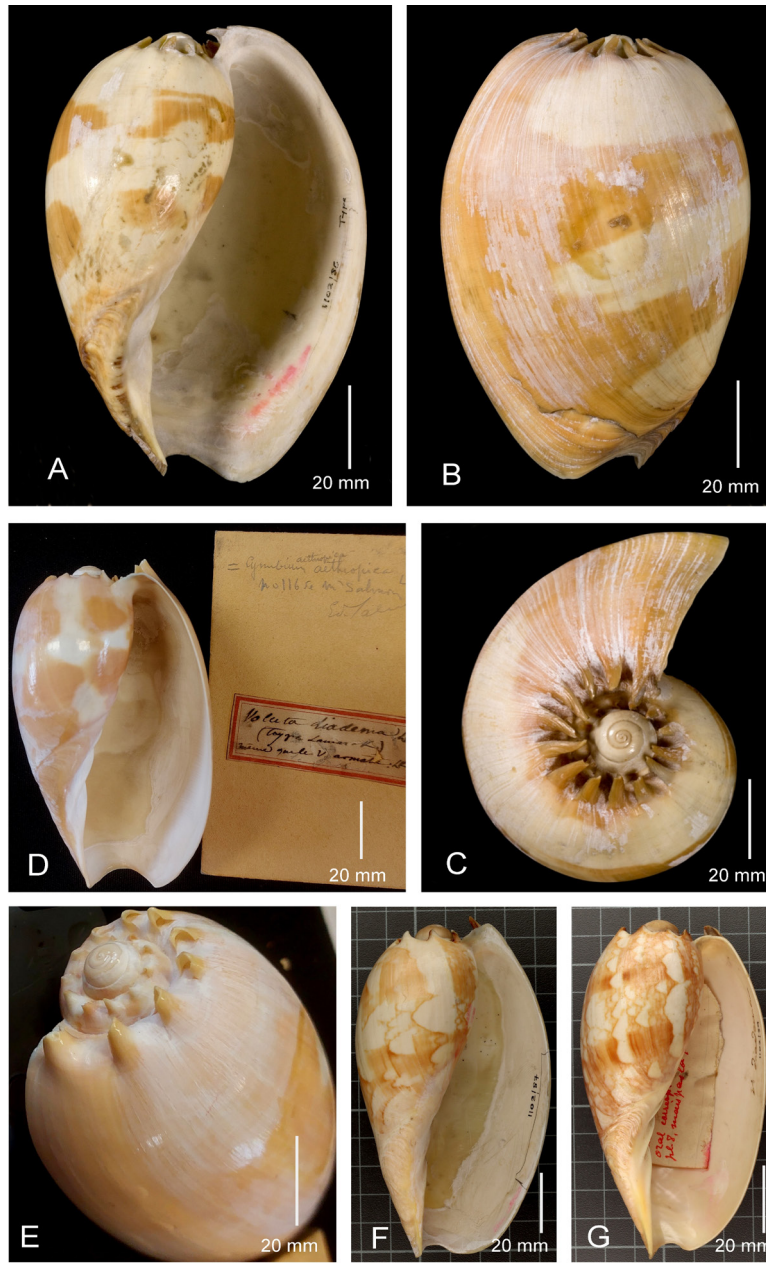

Figure 3. A–C. Holotype of *Voluta nautica* Lamarck, 1822 (MHNG-MOLL-52226, length 123 mm) shown from apertural, dorsal and spire aspects. **D–E.** Syntype of *Voluta diadema* Lamarck, 1822 MNHN-IM-2000-29221, length 110.2 mm) — the associated label (in an unknown hand) stating 'type Lamarck', **E.** showing spire of same shell. **F.** Syntype of *Voluta diadema* Lamarck, 1822 (MHNG-MOLL-52227, length 111 mm) **G.** Syntype of *Voluta diadema* Lamarck, 1822 (MHNG-MOLL-52229, length 109 mm), illustrated by Kiener, 1839, pl. 8 as '*Voluta armata var.*' **A–C**, **F–G** courtesy of MHNG (photographs: E. Tardy); **D–E** courtesy of MNHN (photographs: V. Heros).

Figure 4. A. *Melo aethiopicus* from Gualtieri Collection (length 160 mm), University of Pisa compared with Plate 29, figure I from Gualtieri (1742) showing differences. **B.** *Voluta aethiopica* (*Melo aethiopicus*) UPSZTY 1490 (length 80.2 mm) from Uppsala University Zoological Museum Linnaean Collection (with handwritten Carl Thunberg label). **C.** *Voluta aethiopica* (*Melo aethiopicus*) UPSZTY 636 (length 80 mm) (with Thunberg label, and, glued to shell, printed Olof Swartz label). **D.** *Voluta aethiopica* (this specimen = *Melo tessellatus*) UPSZTY 1491 (length 60.5 mm) (lacking Thunberg label but with Swartz label). **E–F.** Thunberg label (**E**) and Swartz label (**F**) from UPSZTY 1490. **G–H.** *Voluta aethiopica* (this specimen = *Melo melo*) (length 93 mm) from Linnaean Collection, Linnean Society of London, numbered inside aperture '435'. **I.** Written number '435' (arrow). **J.** Dance's 1963 Linnean Society Collection label for specimen '435'. **A.** courtesy of University of Pisa (Gualtieri Collection) (photograph: A. Callea); **B–F.** courtesy of Linnaean Collection, Uppsala University (photographs: P. Cardenas); **G–I** courtesy of Linnean Society of London (photographs: I. Charmantier).

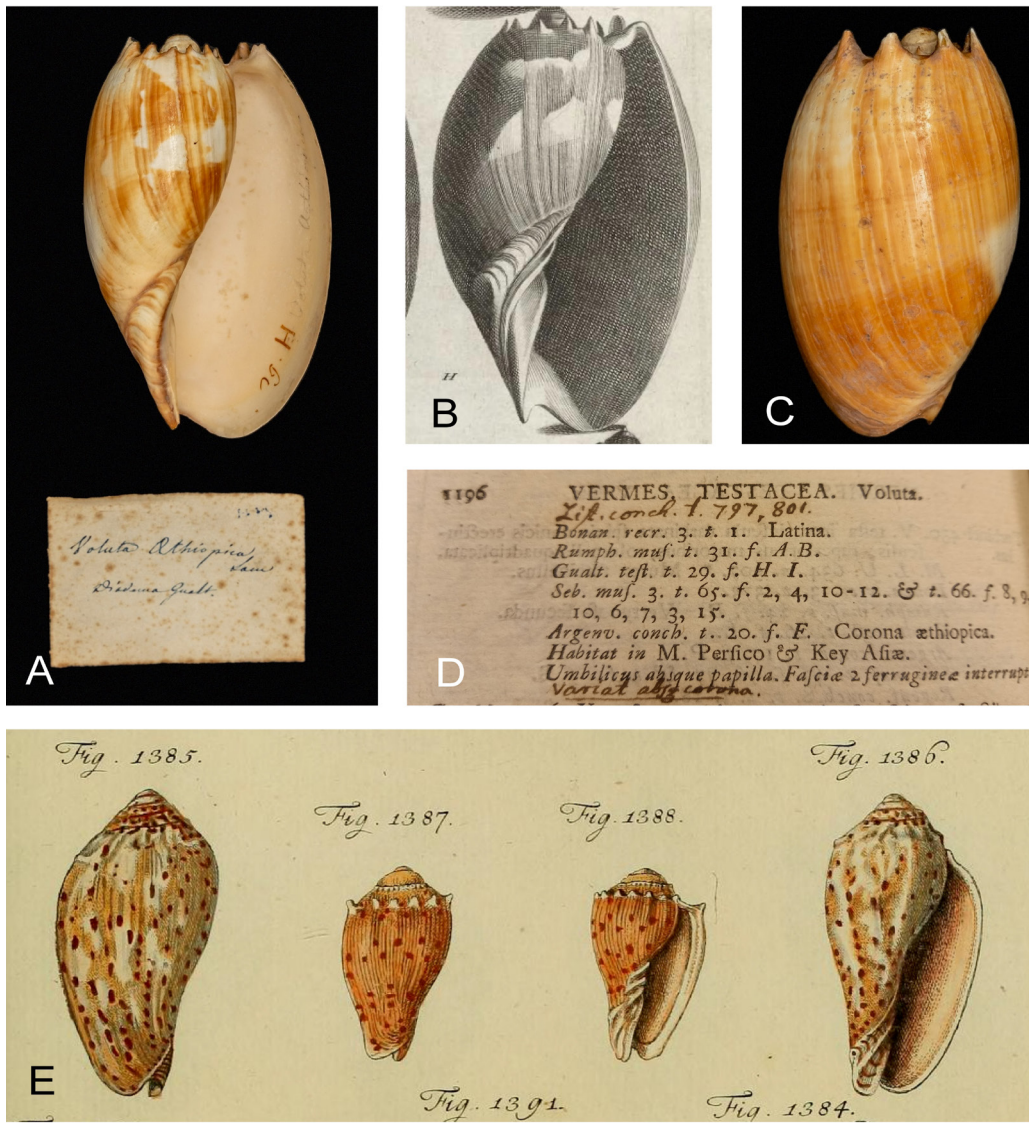

Figure 5. A–C. Apertural and dorsal views of shell illustrated (**B**) by Gualtieri (1742, pl. 29, figure H — see Fig. 2D herein) — although this specimen is in fact *Melo amphora* ([Lightfoot, 1786]) it is a syntype of *Voluta aethiopica*. **C.** Left hand figure (fig. H, Gualtieri 1742, pl. 29) shown for comparison with **A** indicating close agreement between illustration and shell. **D.** Linnaeus handwritten amendments to printed text dealing with *Voluta aethiopica* in the 12th edition of *Systema Naturae* (his intended amendments for a 13th edition). **E.** Figures 1385–1388 from Chemnitz (1788) (= *Cymbiola cymbiola* (Gmelin, 1791)). **A, C** courtesy of University of Pisa (Gualtieri Collection) (photographs: A. Callea); **B, E** images accessed through Biodiversity Heritage Library scanned volumes; **D** courtesy of Linnean Society of London (photograph: A. Deneau).

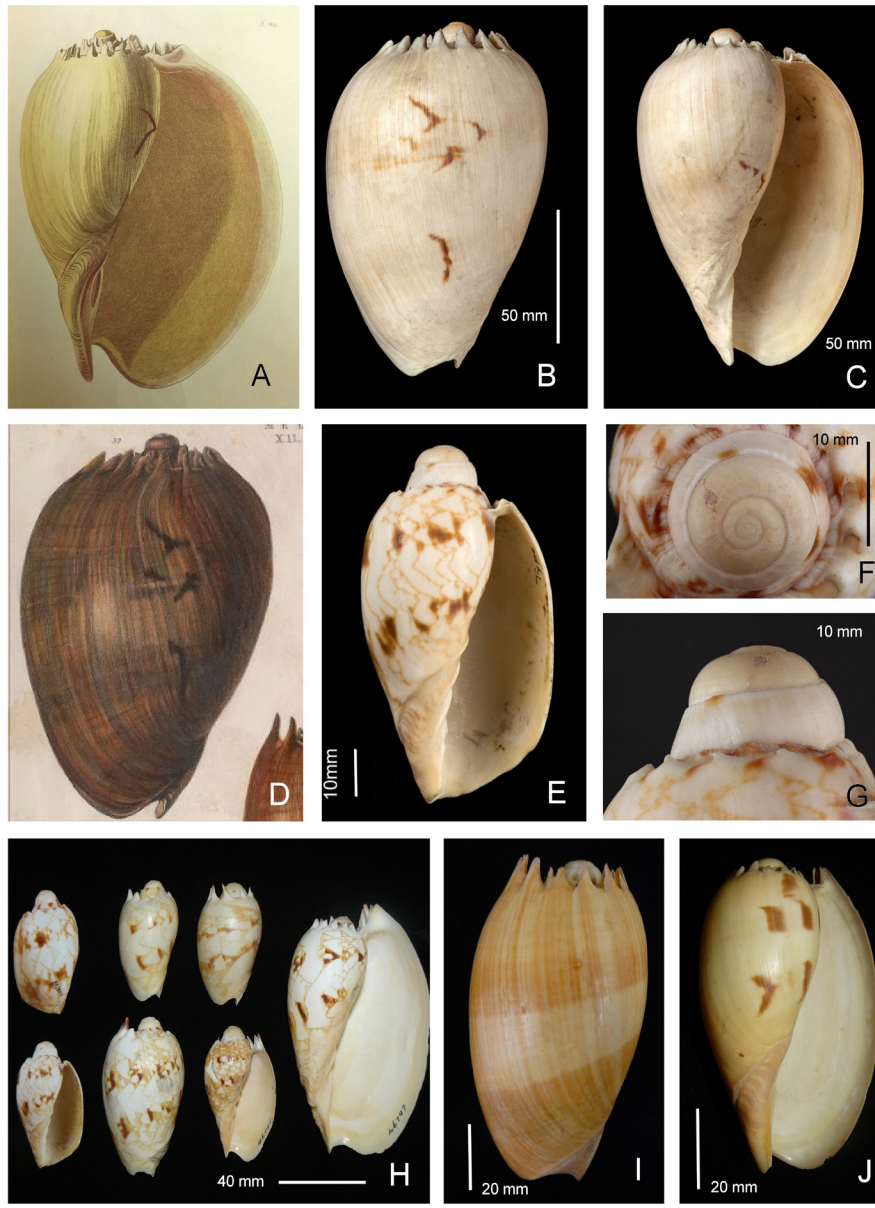

Figure 6. A. Plate 26 from Gray in Griffith & Pidgeon (1833) depicting lectotype (here designated) of *Voluta broderipii* J.E. Gray in Griffith & Pidgeon, 1833 (specimen now presumed lost). **B–C.** Dorsal and apertural views of specimen NHMUK 1837.12.1.259 (Broderip Collection, NHMUK). **D.** Plate 12, figure 32 from Hanley (1858) showing dorsal view of NHMUK 1837.12.1.259. **E–G.** Holotype of *Voluta ducalis* Lamarck, 1811 (MHNG-MOLL-52230) showing whole shell and protoconch views. **H.** Comparison of holotype of *Voluta ducalis* (far left: as cut-out images) with juveniles of *Melo umbilicatus* Broderip in G.B. Sowerby I, 1826 (QMMO 46797, Tree Point, Shoal Bay, Northern Territory). **I–J.** Small juvenile (length 102 mm) of *M. aethiopicus* (Queensland Museum, QMMO 86382 Samarai, PNG). **A, D** images accessed through Biodiversity Heritage Library; **B–C** photographs courtesy of NHMUK. **E–G, H** (extreme left) courtesy of MHNG (photographs: E. Tardy). **H** (centre and right), **I–J** photographs: JMH (QM).

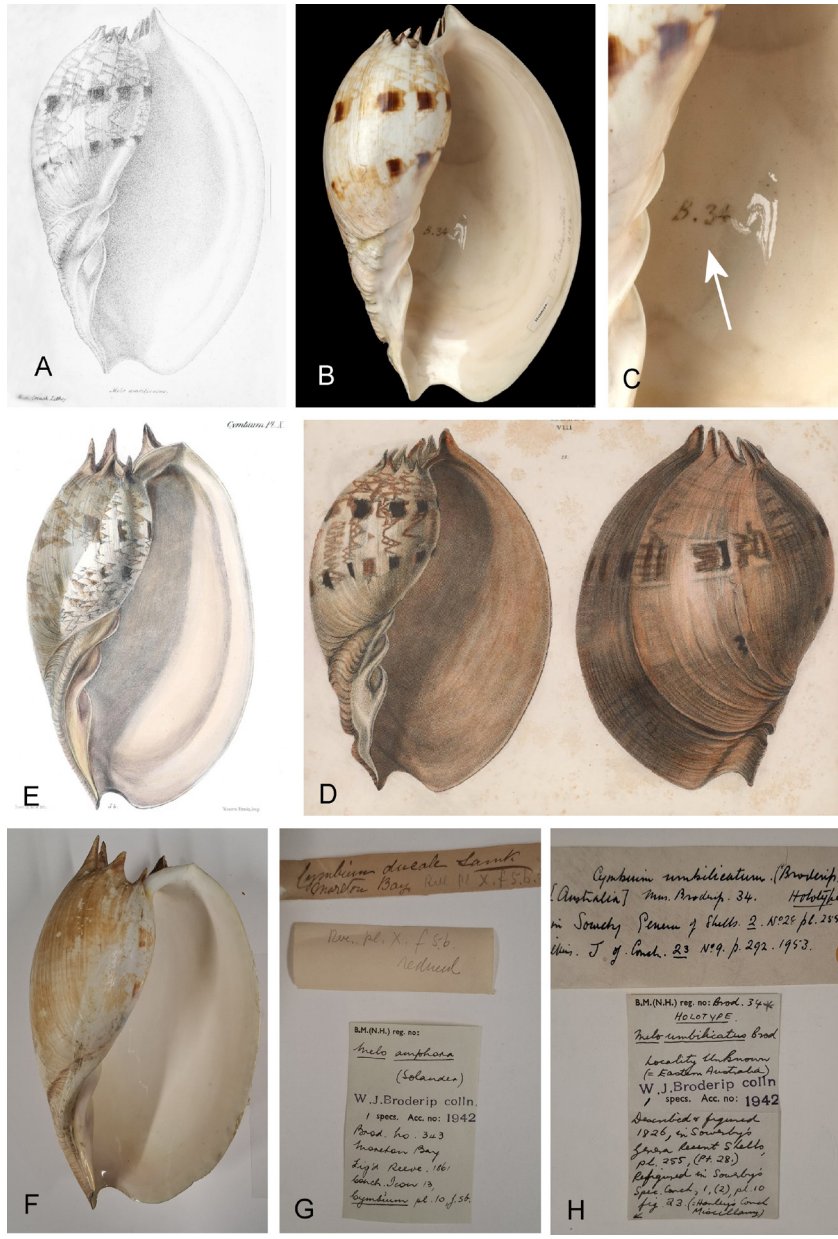

Figure 7. A. Illustration from Broderip (1826, fig. 3) showing *Melo umbilicatus* Broderip in G.B. Sowerby I, 1826 (NHMUK 1837.12.1.34). **B.** *Melo umbilicatus* (NHMUK 1837.12.1.34) (specimen formerly registered as holotype, here designated as lectotype). **C.** Broderip Collection number (B. 34; white arrow) inscribed inside aperture of NHMUK 1837.12.1.34. **D.** Plate 8, fig. 23 from Hanley (1858) showing two views of NHMUK 1837.12.1.34. **E.** Plate 10 from Reeve (1860) supposedly showing 'the original type of Mr. Broderip's *Melo umbilicatus*'. **F.** Actual specimen illustrated by Reeve (from NHMUK Collection), lacking a Broderip Collection number. **G.** Labels associated with the Reeve specimen of *Melo umbilicatus* (in NHMUK). **H.** Labels associated with *Melo umbilicatus* (NHMUK 1837.12.1.34). **A, D–E** images accessed through Biodiversity Heritage Library; **B–C** courtesy of NHMUK, **F–H** photographs: A. Salvador (NHMUK).

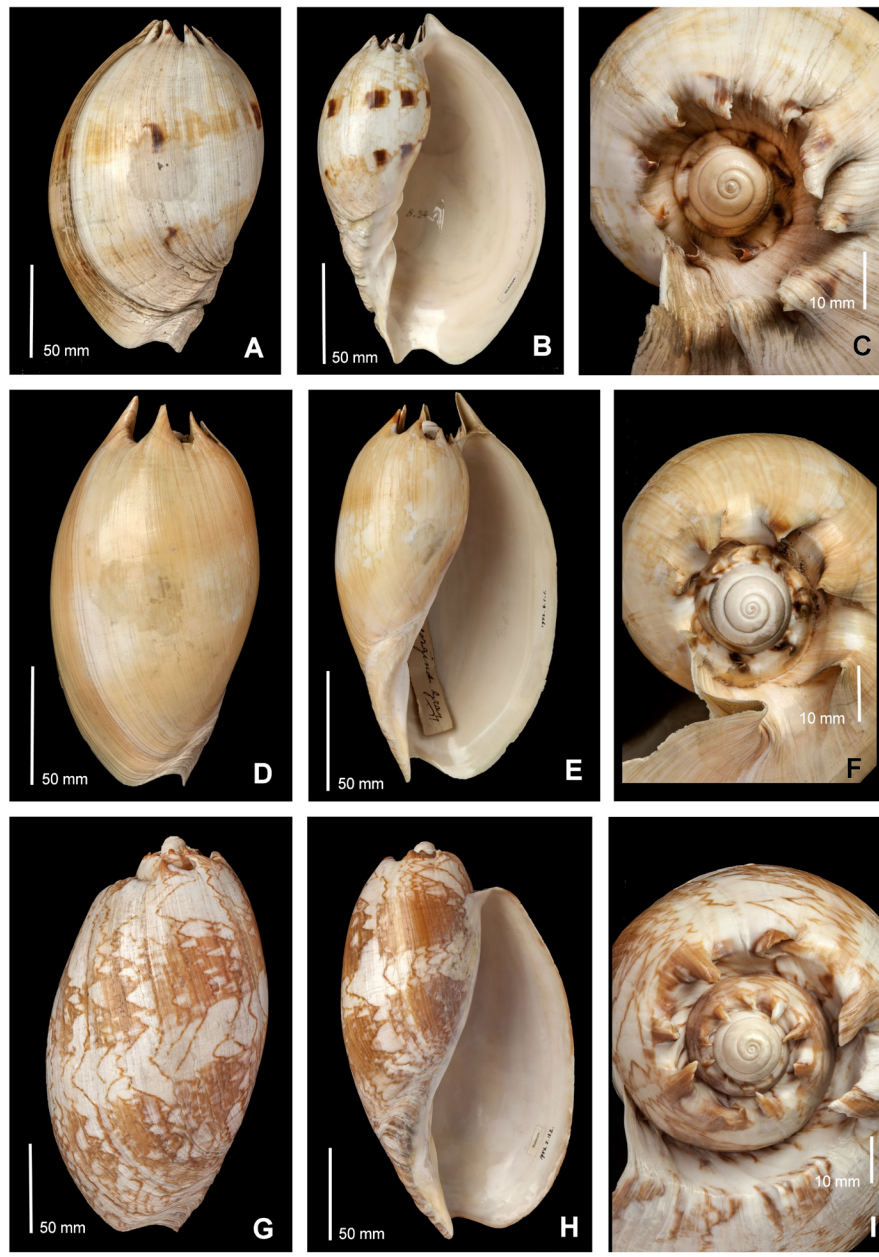

Figure 8. A–C. *Melo umbilicatus* Broderip in G.B. Sowerby I, 1826. Formerly registered as holotype, now lectotype (here designated) NHMUK 1837.12.1.34, total length 175 mm (dorsal, apertural and protoconch/spire views). **D–F.** *Voluta georginae* J.E. Gray in Griffith & Pidgeon, 1833. Formerly registered as holotype and now lectotype (here designated) NHMUK 1952.8.1.1, total length 160 mm (dorsal, apertural and protoconch/spire views). **G–I.** *Voluta miltonis* J.E. Gray in Griffith & Pidgeon, 1833. Formerly registered as holotype and now lectotype (here designated) NHMUK 1952.5.13.2, total length 245 mm (dorsal, apertural and protoconch/spire views). All photographs courtesy of NHMUK.

TABLES

Species	Synonyms
Melo melo ([Lightfoot], 1786)	*Voluta indica* Gmelin, 1791; *Cymbium maculatum* Röding, 1798; *Voluta citrina* Fischer [von Waldheim], 1807
Melo tessellatus (Lamarck, 1811)	*Voluta haustrum* [Lightfoot], 1786 (*nomen oblitum*)
Melo amphora ([Lightfoot], 1786)	*Voluta cithara* [Lightfoot], 1786; *Cymbium flammeum* Röding, 1798; *Voluta diadema* Lamarck, 1811; *Voluta armata* Lamarck, 1811; *Voluta regia* Schubert & Wagner, 1829; *Melo amphora knighti* N. Jackson, 1954
Melo aethiopicus (Linnaeus, 1758)	*Cymbium aethiopicum* var. *aurantium* S.G. Finch, 1930
Melo broderipii (J.E. Gray in Griffith & Pidgeon, 1833)	*Voluta lamarckii* Kiener, 1839; *Melo regius* Broderip, 1847
Melo umbilicatus Broderip in G.B. Sowerby I, 1826	*Voluta ducalis* Lamarck, 1811 (provisional *nomen oblitum*)
Melo georginae (J.E. Gray in Griffith & Pidgeon, 1833)	*Melo mucronatus* Broderip, 1847
Melo miltonis (J.E. Gray in Griffith & Pidgeon, 1833)	*Melo cylindratus* Broderip, 1847

Table 1. Primary synonyms of *Melo* species examined

Species	Type material
Voluta melo [Lightfoot], 1786 (= *Melo melo* ([Lightfoot], 1786))	Lectotype (designated herein), specimen illustrated by Martini (1777, Fig. 772) as per ICZN Articles 74.4 and 74.7
Voluta tessellata Lamarck, 1811 (= *Melo tessellatus* (Lamarck, 1811))	Lectotype (designated herein), MNHN-IM-2000-25406 as per ICZN Article 74.7
Voluta amphora [Lightfoot], 1786 (= *Melo amphora* ([Lightfoot], 1786))	Lectotype (designated herein), specimen illustrated by Martini (1777, Fig. 780) as per ICZN Articles 74.4 and 74.7
Voluta aethiopica Linnaeus, 1758 (= *Melo aethiopicus* (Linnaeus, 1758))	Lectotype (designated herein), specimen illustrated by d'Argenville (1742, Pl. 20, fig. F) as per ICZN Articles 74.4 and 74.7
Voluta broderipii J.E. Gray in Griffith & Pidgeon, 1833 (= *Melo broderipii* (J.E. Gray in Griffith & Pidgeon, 1833))	Lectotype (designated herein), specimen illustrated by J.E. Gray in Griffith & Pidgeon, 1833 (Pl. 26) as per ICZN Articles 74.4 and 74.7
Melo umbilicatus Broderip in G.B. Sowerby I, 1826	Lectotype (designated herein) NHMUK 1837.12.1.34 (formerly 'holotype') as per ICZN Article 74.7
Voluta georginae J.E. Gray in Griffith & Pidgeon, 1833 (= *Melo georginae* (J.E. Gray in Griffith & Pidgeon, 1833))	Lectotype (designated herein) NHMUK 1952.8.1.1 (formerly 'holotype') as per ICZN Article 74.7
Voluta miltonis J.E. Gray in Griffith & Pidgeon, 1833 (= *Melo miltonis* (J.E. Gray in Griffith & Pidgeon, 1833))	Lectotype (designated herein), NHMUK 1952.5.13.2 (formerly 'holotype') as per ICZN Article 74.7

Table 2. Summary of type material and lectotype designations for *Melo* species examined

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