

A Review of the *Relegamoria molleri* Species Complex (Gastropoda: Volutoidae: Volutidae) from Eastern Australia

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ABSTRACT A review of the *Relegamoria molleri* (Iredale, 1936) complex was undertaken using newly sourced material from a number of private research collections and Atlas of Living Australia (“ALA”) database, which contains the Australian and Queensland Museums holdings and records. After a detailed review of several hundred specimens including morphological and distributional characters, *Relegamoria* Iredale, 1936 is reinstated at the generic level and the two previously recognised subspecies *R. molleri isabelae* Bail, Limpus & Poppe, 2001 and *R. molleri vandenbergae* Bail, Limpus & Poppe, 2001 are raised to full species and a further nine new species are recognised: *Relegamoria aliuamolleri* new species, *Relegamoria archaeomolleri* new species, *Relegamoria ariae* new species, *Relegamoria elsieae* new species, *Relegamoria charlyi* new species, *Relegamoria barbaracollinsae* new species, *Relegamoria annetteae* new species, *Relegamoria youngorum* new species and *Relegamoria ashleyfieldi* new species. This revision highlights the need for a broader review into the deep-water fauna of Queensland and New South Wales, particularly as more private collections are made available for scientific study.

KEYWORDS Volutidae, *Relegamoria*, *R. molleri*, *R. isabelae*, *R. vandenbergae*, *R. aliuamolleri*, *R. archaeomolleri*, *R. ariae*, *R. elsieae*, *R. charlyi*, *R. barbaracollinsae*, *R. annetteae*, *R. youngorum*, *R. ashleyfieldi*, Australia, Citizen Science, Trawler, Collections

INTRODUCTION

There have been several recent papers on Australian Volutidae, particularly from Queensland, South Australia and Western Australia that have demonstrated that many unnamed species remain hidden especially in private collections (Bail, Limpus & Poppe 2001, Bail and Limpus 2003, 2008, 2009, 2011, 2013, 2014, 2015, 2016; van Pel & Moolenbeek 2010; Morrison 2012, 2018, 2023; Cossignani & Allary 2019; Healy 2019; Poppe & Tagaro 2020; Morrison & Schneider 2021; Hallan 2023; Pozzi 2023). Furthermore, historical works often noted novel regional populations without

taxonomically recognising them, as often the material at hand was considered inadequate in the authors’ eyes to be recognised at the species or subspecies level (Bail, Limpus & Poppe 2001).

Biogeography is an important but often overlooked multidisciplinary field, which is extremely important to understanding the distribution of marine mollusks. Biogeography plays an important role in understanding the *Relegamoria molleri* (Iredale, 1936) complex (previously known as *Amoria molleri* before this paper). The Solanderian Molluscan Province, covers most of the coast of

Queensland from the Torres Straits in the north to approximately Tweeds Heads just into northern New South Wales and is ecologically dominated by the Great Barrier Reef and its associated island groups, including myriad isolated coral reefs in the western Coral Sea (Petuch & Berschauer 2020). The Solanderian Molluscan Province can be further divided into three distinct subprovinces, the Moretonian Subprovince, the Cairnsian Subprovince, and the Coralian Subprovince, each with its own distinct fauna of endemic molluscan species (Petuch & Berschauer 2020). One of the most characteristic endemic volutid species radiations is known from the Cairnsian Subprovince and includes 12 species and subspecies in the genus *Cymbiola*, which occur along with a large number of other endemic volutid taxa including *Volutoconus multiformis*, *Nannamoria inflata* and *N. gotoi* (Bail, Limpus & Poppe 2001; Petuch & Berschauer 2020). As a result of the Volutidae being characterized by larvae with direct development (without any lecithotropic stage), populations of organisms tend to become separated into isolated genetic pools, which over time lead to speciation (Bail, Limpus & Poppe 2001). The focus of this study, the *Relegamoria molleri* complex, is the result of such a species radiation in this rich and diverse tropical environment.

In this paper, we elevate two subspecies to the rank of species, and describe three new species previously treated as forms, as well as presenting an additional six new species. This paper follows Maxwell *et al.* (2021) in which the rank species is used for morphologically dissimilar organisms and where the subspecific rank is reserved for those organisms that can only be differentiated with the use of genetics. This rejects the historical concept propositioned by Mayr (1982), and replaces that concept with a belief that the practical rationale for erecting species is to generate points of references upon

which a clear explanation of the natural world can be grounded (Maxwell *et al.* 2021).

ABBREVIATIONS

AWC	Annette Whitney Collection, Sarina, Qld.
BCC	Barbara Collins Collection, Machans Beach, Qld.
BSRF	BlueSky Research Foundation Collection, Yorkeys Knob, Qld.
ARFC	Ashley R. Field Collection, Smithfield, Qld.
CTC	Charly Taylor Collection, Julatten, Qld.
VCC	Valda Cantamessa Collection, Qld.
IIC	Invertebrate Identification Reference Collection, Faulconbridge, NSW.
AMS	Australian Museum, Sydney, NSW.
SH	shell height
SW	shell width

METHODS

Shell specimens from private collections were sought and examined for the purposes of undertaking a review of the *Relegamoria molleri* complex and the identification of potential new species. This material was compared to illustrations of existing type material, and after consideration of the morphological variation, which was contextualised with intraspecific variability and distribution patterns, new taxa were identified and described.

In the determination of distributions of species, consideration was given to the existing literature, although this data was very limited (Bail, Limpus & Poppe 2001), and to the locality data provided with the material under examination.

Additionally, significant consideration was placed on the nature of the sourcing of the material. In this case, the material was primarily derived from commercial trawling activities. Given the vicissitudes of locational accuracy that inevitably come with extended trawling ventures that often cover a wide area on each trip, the data that is presented with a specimen, may not be location specific but rather regional in nature or represent the home port from which the trawlers operated (Figure 13). Furthermore, the trawl times and topography of the benthos are generally unknown and this can lead to variability in data labels for many specimens.

SYSTEMATICS

Class	Gastropoda Rafinesque, 1815
Infraorder	Neogastropoda Wenz, 1938
Superfamily	Volutoidea Rafinesque, 1815
Family	Volutidae Rafinesque, 1815
Tribe	<i>Amoriini</i> Gray, 1857
Genus	<i>Relegamoria</i> Iredale, 1936

Relegamoria Iredale, 1936

Redescription. Shells small to large size (SH 40-120 mm) and cylindrical in form. The outer lip is moderately reflected, and there is a flattened edge on the outer lip. Below the edge of the outer lip there is a long axially raised callous. The columella has distinctive irregularly sized plaits (5-7). Protoconch variable, multiwhorled (4+ whorls), straight sided and conical with pointed apex, coloured tan to dark brown and smooth or pale brown with a white suture and with fine spiral striae (7-8 per whorl) and very fine radial striae to small pointed apex, broad, stepped convex whorls, obvious spiral striae and pale white to cream. Body whorl smooth or with very fine radial striae, typically uniform in colour, and or with two rows of short radial stripes of brown.

Synonymy.

Relegamoria Iredale, 1936, p. 314 (Monotypic).

Amoria (*Relegamoria*) Weaver & du Pont, 1970, p. 163.

Amoria Darragh, 1988, p. 224.

Amoria (*Amoria*) Poppe & Goto, 1992, p. 191. Bail, Limpus & Poppe, 2001, p. 30.

Type Species: *Relegamoria molleri* Iredale, 1936 by original designation.

Remarks. This genus differs from other members of *Amoria* Gray, 1855 in having the raised callous centrally inside the aperture and irregular columellar plaits. The protoconch structure differs from the type species of *Amoria*, *A. turneri* (Gray in Griffith and Pidgeon, 1834) which is broad, stepped, multiwhorled (3+), pale cream to white with a smooth white suture. Examination of the protoconch characters of the type species of *A. (Amorena)* Iredale, 1929, *A. (Zebramoria)* Iredale, 1929 and *A. (Cymbiolista)* Iredale, 1929 confirms there are consistent differences which previous authors such as McMichael (1960), Macpherson and Gabriel (1962), Weaver and du Pont (1970), Darragh (1988), and Bail, Limpus & Poppe (2001) have variously treated *Amoria* as a single genus, a genus with one to four subgenera or as full genera. Volutes have separate sexes, and therefore, there is a reasonable probability of sexual dimorphism with the females being larger and possibly broader than the males.

Relegamoria molleri Iredale, 1936
(Figure 1, Plates 1 and 3)

Description. Shell solid, up to 110 mm in length and ovately fusiform. The spire is smooth and brown in colour. Spire whorls are smooth, slightly convex and with distinct sutures. There is often a pale band just below the suture. The body whorl is smooth. The outer lip is centrally

straightened moderately angled at the anterior, well rounded, and somewhat extended posteriorly. The outer lip joins at the shoulder of the body whorl, and the anterior sinus is shallow. There is a strong callous centrally just below the inner edge. The columellar plaits are typically 4 in number but may vary in size and form. Colour variable from brown through to peach and off white, but uniformly plain, rarely with rows on axial dashes.

Type Material. *Holotype* – AMS C.60699 (SH 76 mm, width 33 mm).

Type Locality. Off Manly, New South Wales, 85 fathoms (Iredale 1936, p. 314)

Synonymy.

Relegamoria molleri Iredale, 1936, p. 314, pl. 23, fig. 10.

Amoria (Amoria) molleri molleri Bail, Limpus & Poppe, 2001, p. 30, pl. 50.

Distribution. Cape Moreton, Queensland south to Sydney, New South Wales at depths between 145 - 180 meters state range based on the material we have examined and on ALA.

Material Examined. Cape Moreton (6 x VCC; 5 x JRC); Of Mooloolaba (3 x VCC; 11 x AWC); Northern New South Wales (1 x VCC); Moreton Bay (3 x VCC), S. of Double Island Point, S. of K'gari Island (1 x IIC S.4176).

Remarks. *Relegamoria molleri* can be differentiated by its straight outer lip and a strong, elongated and narrow callous on the inner aperture when compared to *R. ariae*, which has a rounded and less calloused inner lip. The posterior outer lip of *R. molleri* is more quadrate than *R. isabelae*, which is more elongated. The sharp spire of *R. molleri* differs from the bulbiform and entirely calloused spire that is typical with adult *R. annetteae*. The left ventral side of *R. molleri* is rounded and lacks the concave anterior third found in *R. vandenbergi* and *R. aliuamolleri*. The higher spire and more fusiform shell of *R. molleri* distinguishes this species from the quadrate shell and blunt spire of *R. elsieae*.



Figure 1. The holotype of *Relegamoria molleri* Iredale, 1936 (SH 76 mm, SW 33 mm) (AMS C.60699).

Relegamoria isabelae (Bail, Limpus & Poppe, 2001)
(Figure 2, Plates 1 and 4)

Description. Shell elongated, narrow almost cylindrical, reaching up to 120 mm in length. The spire is acute, high and smooth. The upper outer lip is strongly quadrate anteriorly, and moderately extended and well-rounded posteriorly. The central outerlip is straight and the central callous is short but well-defined just below the inner edge. The anterior sinus is moderately shallow with the side formed by the outerlip tending to be acute. The columellar plaits are variable in number and strength of form, The colour is typically light peach, but maybe white and yellow, with two rows of distinct axial dashes on the body whorl and some small lines below the sutures.

Type Material. *Holotype* – AMS, C.204771 (SH 112.5 mm).

Type Locality. Trawled between 210 - 220 meters off Hixson Cay (Bail, Limpus & Poppe 2001, p. 32).

Synonymy.

2001 *Amoria (Amoria) molleri isabelae*
Bail, Limpus & Poppe, p. 32, fig. 8, pl. 54.

Distribution. Off Southern Swain Reefs between 200- 250 meters on gray muddy sand (Bail, Limpus & Poppe 2001, p. 32).

Material Examined. Off Swain Reefs (2 x VCC); Hixson Cay (1 x VCC; 3 x AWC, 1 x S.4163 IIC).



Figure 2. The holotype of *Relegamoria isabelae* (Bail, Limpus & Poppe, 2001) (SH 112.5 mm) (AMS, C.204771).

Remarks. The shell of *R. isabelae* can be differentiated from *R. youngorum* by the elongated and high spire of the shell. The aperture of *R. isabelae* is narrower than its sister taxa *R. elsieae* and *R. ariae*. The shell of *R. isabelae* is also much larger than *R. aliuamolleri* and the much rarer *R. charlyi*.

Note on the original holotype labels of this species and the following one, the authorship is

given as Bail, Limpus & Poppe. On the second page of their publication, the original German library registration, the authorship of the paper is given as Bail, Limpus & Poppe. The authors indicate that the text is written by Bail & Limpus and the illustrations *etc.* are by Poppe. However, where the new subspecies and form names are introduced the authors do not state that the authorship is Bail & Limpus as such: they just simply put either n. forma or n. ssp, and therefore, the authorship should be Bail, Limpus & Poppe.

Relegamoria vandenbergae (Bail, Limpus
& Poppe, 2001)

(Figure 3, and Plates 2 and 5)

Description. Shell solid, heavy, up to 70mm in length and somewhat falcate in form. The protoconch is pointed sitting atop the spire. The spire is short, somewhat triangular, with a convex side. The body whorl is rounded. The outerlip is rounded and there is a weak callosity centrally just below the inner edge. The columellar plaits are irregular in number and form. Varying in colour from peach to off-white.

Type Material. *Holotype* – AMS, C.204770 (SH 71.3 mm).

Type Locality. Off Pith Reef at a depth of 300 meters (Bail, Limpus & Poppe, 2001, p. 33).

Synonymy.

2001 *Amoria (Amoria) molleri vandenbergae* Bail, Limpus & Poppe, 2001, p. 33, fig. 9, pl. 55.



Figure 3. The holotype of *Relegamoria vandenbergae* (Bail, Limpus & Poppe, 2001) (SH 71.3 mm) (AMS C.204770).

Distribution. Off Pith Reef Between 300-320 meters (Bail, Limpus & Poppe, 2001, p. 33).

Material Examined. Off Pith Reef (VCC; 1 x AWC); off Mackay (1 x AWC).

Remarks. One of two species found in far North Queensland, *R. vandenbergae* is more ovate and with a less developed callous and lacks the flaring outer lip of the sister taxa, *R. ashleyfieldi*, the outer lip of which is flaring. Furthermore, *R. vandenbergae* is smaller than *R. ashleyfieldi* which also has a strong raised ridge prior to the formation of the outer lip that is less developed to obsolete in *R. vandenbergae*.

Relegamoria aliutamolleri Maxwell & Berschauer, new species
(Figure 4, Plates 1 and 8)

Description. The light weight shell is somewhat falcate in form, up to 60 mm in length. The protoconch is slightly raised and the apex is rounded. The spire is smooth and is variable in height ranging from short to moderately elongated. The body whorl is smooth without

ornamentation. The outer lip is rounded and joins at the shoulder where it is angular and does not extend past the sinus. The posterior sinus is moderately deep. There is a moderate narrow callosity that is just below the outer lip. The columellar plaits vary from four to five, with the central plaits being the largest. The shell is coral peach to peachy orange and has three rows of axial lines: the first just below the sutures; the second at the shoulder; and the third on the lower half of the shell.



Figure 4. *Relegamoria aliutamolleri* n. sp. Holotype – Trawled off North Reef, BSRF TC018 (SH 53 mm, SW 21 mm) [ex CTC].

Type Material. *Holotype* – Trawled 145 meters off North Reef, deposited in the BlueSky Research Foundation Collection, no. TC018 (SH 53 mm, width 21 mm). *Paratype 1* – trawled off North Reef, CTC (50 mm). *Paratype 2* – trawled off North Reef, CTC (SH 52 mm). *Paratype 3* – trawled off North Reef, CTC (SH 50 mm). *Paratype 4* – trawled Swain Reefs, CTC (54.5 mm). *Paratype 5* – trawled Swain Reefs, 200 meters, VCC (SH 45.7 mm).

Paratype 6 – trawled east of Bundaberg, VCC (56.4 mm). *Paratype 7* – trawled off Capricorn Group, ARFC no. 1624 (SH 45.8 mm). *Paratype 8* – trawled off Lady Elliot Island, ARFC no. 1623 (SH 50 mm). *Paratype 9* – trawled off North Reef, S.35627 IIC (SH 45.8 mm). *Paratype 10* – S.35582, off Swain Reefs IIC (SH 49.4 mm).

Type Locality. Trawled 145 meters off North Reef, Queensland.

Synonymy.

2001 *Amoria (Amoria) molleri molleri*
forma *reducta* Bail, Limpus &
Poppe, 2001, p. 31, pl. 52.

Distribution. The northern Capricorn Group to the southeast of the Swain Reefs at a depth around 140-160 meters (Bail, Limpus & Poppe 2001).

Etymology. A compound from the Latin *aliua* (= another) and “molleri” and named to reflect its historical taxonomic association with *R. molleri*.

Remarks. Bail, Limpus & Poppe (2001) first identified *R. aliua molleri* as a dwarf form of *R. molleri*. This species is much smaller than the other members of the complex, except *R. charlyi*, but differs from that species in having a more acute posterior aperture and not as well developed columellar plaits. However, notwithstanding size differences, the *R. aliua molleri* differs from *R. molleri* in the more fusiform shape, lacks the strong central callosity that is so distinctive in that species.

Relegamoria annetteae Maxwell &
Berschauer, new species
(Figure 5, Plates 1 and 8)

Description. The shell is solid, moderately large and fusiform in shape, up to 100 mm in length. The spire is moderately tall, and the apex is acute with a blunted protoconch. The spire whorls are moderately convex with indistinct sutures, smooth and with a glossy

polished appearance. The body whorl is anteriorly inflated with a well-defined shoulder, and when viewed ventrally is triangulate with straight sides. The outerlip is centrally straight with a prominent callous. The posterior sinus is shallow and the outerlip joins where the sinus terminates. There are three or four columella plaits that are not strongly developed. The shell is peachy with a glossy appearance and three rows of numerous even axial lines that may have a smudged appearance.

Type Material. *Holotype* – Deposited in the BlueSky Research Foundation Collection, no. TC019 (SH 89 mm, width 37 mm). *Paratype 1* – trawled off K’gari, BCC (SH 97.5 mm). *Paratype 2* – trawled off K’gari, BCC (SH 105 mm). *Paratype 3* – trawled off K’gari, BCC (SH 82 mm). *Paratype 4* – off Mooloolabah, CTC (82.5 mm slightly juvenile). *Paratype 5* – off Bundaberg S.35581 IIC (juvenile SH 79.1 mm). *Paratype 6* – off K’gari, VCC (93.1 mm).



Figure 5. *Relegamoria annetteae* n. sp. *Holotype* – trawled off K’gari, BSRF TC019 (SH 89 mm, SW 37 mm) [Ex CTC].

Type Locality. Trawled east of K’gari 140-160 meters.

Synonymy.

2001 *Amoria (Amoria) molleri molleri*
forma *capricornica* Bail, Limpus &
Poppe, p. 31, pl. 51, fig. 1.

Distribution. Ranges from south of Lady Musgrave Island to the southern areas of K’gari.

Etymology. Named in honour of Annette Whitney for her contribution to the Whitsunday, Townsville and Proserpine Shell Clubs and her encouragement of young shell collectors.

Material Examined. Off K’gari (2 x AWC).

Remarks. A beautiful, large and well calloused member of the *Relegamoria*, *R. annetteae* differs from *R. molleri*, *R. elsieae* and *R. ariae* in having a triangulate spire that is often bulbous, entirely calloused. Furthermore, *R. annetteae* is much narrower anteriorly than other members of the *Relegamoria* such as *R. molleri* and *R. elsieae*. The shell of *R. annetteae* lacks the concave left dorsal side that is typical with *R. aliuamolleri*. The form of the outer lip of *R. annetteae* is straight rather than being recurved as in *R. ariae*.

Relegamoria archaeomolleri Maxwell &
Berschauer, new species
(Figure 6, and Plate 1)

Description. The smooth shell is fusiform, solid and moderately large, up to 80 mm in length, with a high spire. The protoconch is slightly raised and the apex of the shell is rounded. Spire whorls becoming more convex with growth forming a distinctive shoulder on the body whorl. There is a raised axial nodule on the shoulder just before the commencement of the outer lip. The outer lip is somewhat reflected and there is a strong axial callous just below the edge. The outer lip is rounded and rises to meet the shoulder where it forms the border of the sinus, but does not extend past it. The

columellar plaits are irregular and few in number.

Type Material. *Holotype* –Deposited in the BlueSky Research Foundation Collection, no. TC021 (SH 78 mm, width 36 mm).

Type Locality. The Bunker Islands, 205-215 meters.

Distribution. Known only from a subfossil taken from the trawling grounds off the Bunker Islands.

Etymology. The name is derived from the Latinised form of the Greek ἀρχή (beginning) and “molleri” denoting it as one of the progenitors of *R. molleri*.

Remarks. Known from a subfossil, *R. archaeomolleri* differs from others in the complex in having a high spire and raised lump on the shoulder before the outer lip. The posterior of the outer lip is not quadrate or acute as found in *R. molleri*, *R. ariae*, *R. elsieae* or *R. annetteae*, being angled anteriorly and not forming the distinctive raised border at the posterior sinus as in other members of the complex.



Figure 6. *Relegamoria archeomolleri* n. sp. Holotype – Trawled Bunker Group, 205-215 meters, BSRF TC021 (SH 78 mm, SW 36 mm) [ex CTC].

Relegamoria ariae Maxwell & Berschauer,
new species
(Figure 7, Plates 1, and 6)

Description. The large sized heavy shell, up to 100 mm in length, is cylindrical and fusiform, with a rounded aperture lip and short but conical spire. The protoconch is slightly raised and the distinct sutures are moderately incised. The spire whorls are smooth. The body whorl is bulbus without a distinctive axial ridge before the formation of the outer lip. The outer lip is rounded. Columellar plaits variable in form but typically are four, but may be diminished to absent. The posterior sinus is well developed and the outer lip forms border that extends past the sinus where it is acute, sharp and parallel to the spire. Colour is uniformly coral to light tan/cream with three rows of axially thin irregular brown lines: the first running out from just below the suture, the second on the shoulder of the body whorl and the third row on the lower third of the shell.

Type Material. *Holotype* – Deposited in the BlueSky Research Foundation Collection, no. TC014 off Lady Elliot Island, CTC (SH 68 mm). *Paratype 1* – off northern K’gari (locality uncertain), BCC (SH 102 mm). *Paratype 2* – off northern K’gari (locality uncertain), BCC (SH 71 mm). *Paratype 3* – Lady Musgrave Island ARFC no. 4886 (SH 99.1 mm).

Type Locality. Off Lady Elliot Island, at 180 meters.

Synonymy.

2001 *Amoria* (*Amoria*) *molleri molleri*
forma *capricornica* Bail, Limpus &
Poppe, p. 31, pl. 51, figs. 3, 4, 6 & 7.

Distribution. Off Lady Musgrave and the Bunker Group in 180-250 meters of water (Bail, Limpus & Poppe 2001, p. 31).

Etymology. Named after Aria Taylor, the granddaughter of Charly Taylor who provided the type material for this study.

Remarks. *R. ariae* can be differentiated from the similarly coloured and patterned *R. elsieae*, which is larger and of quadrate shape. *R. isabelae* is smaller and less elongated and has a finer inner callous. *R. annetteae* differs in being darker and more calloused and heavier, and from other *Relegamoria*, being much more rotund, which is contrasted with the similarly coloured and patterned *R. elsieae*, the shell of which has straight sides, or *R. annetteae*, which is biconic in structure. The smaller *R. aliuamolleri* is much more fusiform than the new species.



Figure 7. *Relegamoria ariae* n. sp. Holotype – Lady Elliot Island BSRF TC014 (SH 68 mm, SW 29 mm) [ex CTC].

Relegamoria ashleyfieldi Maxwell &
Berschauer, new species
(Figure 8, Plates 2 and 7)

Description. The shell is heavy, up to 100 mm in length, wide and ovate. The protoconch is slightly elevated. The spire varies in height, but typically is moderately high, and somewhat acute. The spire whorls are slightly convex and there is a slight concave ramp leading to the

shoulder. The sutures are defined and there is no sculpture on the whorls. The body whorl is inflated at the shoulder. The outer lip is reflected and broadly flared, with a well-defined axial callous before the commencement of the flaring lip. The columellar has typically seven irregular plaits the central being the largest. The colour is peach with two rows of faint axial lines and a third row of irregular lines below the suture.

Type Material. *Holotype* – Deposited in the BlueSky Research Foundation Collection, no. TC022 (SH 78 mm, width 36 mm). *Paratype 1* - North of Pith Reef, 280-300 meters, ARFC no. 5022 (SH 93.6 mm). *Paratype 2* - North of Pith Reef, 280-300 meters, BCC (SH 71 mm); *Paratype 3* - North of Pith Reef, 280-300 meters, BCC (SH 86 mm).



Figure 8. *Relegamoria ashleyfieldi* n. sp. *Holotype* – North of Pith Reef 280-300 meters, BSRF TC022 (SH 78 mm, SW 36 mm) [ex CTC]

Type Locality. 50 km North of Pith Reef, Queensland.

Distribution. Found between 280-300 meters in the Pith Reef area.

Etymology. Named in honour of Dr. Ashley Field for bringing this new species to the authors' attention.

Remarks. *R. ashleyfieldi* is a large species and along with the similarly coloured but smaller species *R. vandenbergae* are the only currently recognised members of the genus found in far north Queensland. In addition, it differs from the other species recognised here by its large size, shape and broadly reflected outer lip. The rounded, but angulate, shoulder of *R. ashleyfieldi* as well as the reflected and broadly flared outer lip of that species differentiates it from *R. vandenbergae*.

Relegamoria barbaracollinsae Maxwell & Berschauer, new species
(Figure 9, and Plate 2)

Description. The shell is medium sized, up to 85 mm in length, heavy, solid and ovate with a flared outer lip. The protoconch is blunt and the top of the shell is rounded. The sutures of the spire are well defined and there are fine axial subsutural incised growth lines, which do not extend to the shoulder of the shell. The outer lip is thickened and flattened at the edge with a strong axial callosity centrally. The posterior sinus is moderately deep, and the outer lip is rounded and thickened. There are six well defined and somewhat uniform columellar plaits. The shoulder is well defined. Shell colouration is uniformly peachy with very indistinct axial lines in three rows, the first below the suture, the second below the shoulder and the third on the lower third of the shell.

Type Material. *Holotype* – Deposited in the BlueSky Research Foundation Collection, no. TC017 (SH 81.5 mm, SW 45 mm).

Type Locality. Outside Barrier Reef, off Mackay, 200 meters.

Distribution. This species is from the northern end of the Swain Reefs and has been taken by trawlers operating in that region whose data is often vague.

Etymology. Named in honour of Barbara Collins for her work in supporting research and up and coming collectors globally.



Figure 9. *Relegamoria barbaracollinsae* n. sp. Holotype – Trawled outer reef off Mackay, 200 meters, BSRF TC017 (SH 81.5 mm, SW 45 mm) [ex CTC].

Remarks. *R. barbaracollinsae*, is currently only known from the holotype and is most similar to *R. ashleyfieldi*, which is larger and to *R. vandenbergae*, which is smaller but differs from other *Relegamoria* in being quadrate, with a wide flaring reflected outer lip. The flaring outer lip is much straighter than that of *R. vandenbergae*, and the acuteness of the posterior outer lip of *R. ariae* and *R. youngorum* differentiates those species from *R. barbaracollinsae*.

Relegamoria charlyi Maxwell & Berschauer,
new species
(Figure 10, and Plate 2)

Description. The small shell, up to 50 mm in length, is fusiform and elongated with a high protoconch. The outer lip is posteriorly straight becoming curved anteriorly. The spire and body whorls are smooth, giving the shell a reflective white polished look. The sutures are indistinct and shallow. The posterior of the outer lip is rounded and blunt ending at the shallow sinus. The edge of the outer lip is somewhat reflected forming a narrow labial fattened area that phases anteriorly. There is a slight axial callosity midway along the length just inside the aperture. The columellar plaits are variable in size and number six on the holotype, the central plaits being distinctly larger than the others. The colour is off white without pattern.



Figure 10. *Relegamoria charlyi* n. sp. Holotype – East of Swain Reefs, BSRF TC016 (SH 50 mm, SW 21 mm) [ex CTC].

Type Material. *Holotype* – Deposited in the BlueSky Research Foundation Collection, BSRF TC016 (SH 50 mm, SW 21 mm) [ex CTC].

Type Locality. Deep water, below 240 meters, between the Swain Reefs and South West Cay systems.

Distribution. This species is restricted to the deep waters to the east of the Swain Reefs near the South West Cay system and was collected by a deep water research vessel.

Etymology. Named for Charly Taylor who provided the type material for this study.

Remarks. *R. charlyi* is currently only known from the holotype but is most similar in size to *R. aliuamolleri*, which has a more rounded posterior outer lip and different colouration from that species. While similar in colour, being white, the outer lip and heavier shell of *R. youngorum* enables these two species to be differentiated.

Relegamoria elsieae Maxwell & Berschauer,
new species
(Figure 11, Plates 1 and 6)

Description. The overall shape of this medium sized, up to 100 mm in length, heavy shell is cylindrical and mucronate. The aperture lip is distinctively straight. The protoconch is short and raised. The spire whorls are not ornamented, and the sutures are distinct. The body whorl is smooth, with a distinctive axial ridge prior to the formation of the outer lip. The inside edge of the outer lip has a callosity that forms a ridge that is centrally developed and somewhat pinched axially. Columellar plaits are typically five in number, with the first two smaller than the others. The posterior sinus is moderately wide with the upper outer lip forming a sharp rounded border that is reflected. Colour is uniformly coral peach with three rows of axially thin irregular brown lines: the first just below the suture, the second on the shoulder of the

body whorl and the third on the lower third of the shell.

Type Material. *Holotype* – Deposited in the BlueSky Research Foundation Collection, no. TC015 (SH 77 mm, SW 32 mm). *Paratype 1* – Trawled off Lady Elliot Island, BCC (SH 84 mm). *Paratype 2* – Trawled off Lady Elliot Island, BCC (SH 95 mm). *Paratype 3* – Lady Elliot Island, BCC (SH 81.0 mm). *Paratype 4* – Lady Musgrave Island ARFC no. 4886 (SH 90.8 mm).



Figure 11. *Relegamoria elsieae* n. sp. *Holotype* – Trawled off Lady Elliot Island, BSRF TC015 (SH 77 mm, SW 32 mm) [ex CTC].

Type Locality. Off Lady Elliot Island and the area of north K'gari, at 180 meters.

Synonymy.

2001 *Amoria (Amoria) molleri molleri* forma *capricornica* Bail, Limpus & Poppe, p. 31, pl. 51, figs. 2 and 5.

Distribution. Northern Capricorn Channel at depths between 180-250 meters (Bail, Limpus & Poppe 2001, p. 31)

Etymology. Named after Elsie Taylor, the granddaughter of Charly Taylor who provided the type material for this study.

Remarks. Differentiated from others in the *Relegamoria* complex, *R. elsieae* has a short spire and much straighter sides of the body and outer lip than *R. ariae* or *R. annetteae*. The shell of *R. elsieae* lacks the gloss of *R. annetteae* or *R. charlyi*. *Relegamoria eliseae* does not have the broad flaring lip that is found in *R. archeomolleri*, *R. barbaracollinsae* or *R. ashleyfieldi*.

Relegamoria youngorum Maxwell &
Berschauer, new species
(Figure 12, and Plate 2)

Description. The ovate shell is glossy and moderately large, up to 70 mm in length. The protoconch is moderately raised, and the apex is blunted. Early whorls of the spire are convex becoming less so as they develop. The shoulder of the body whorl is rounded. There is no sculpture on the spire or body whorl. The outerlip is rounded and there is a moderate callosity centrally just below the edge. The irregular columellar plaits vary in number ranging up to eight. The posterior sinus is shallow and moderately wide with the outerlip extending past an angular and somewhat thin lip. The colour is uniform and peachy to off white.

Type Material. *Holotype* – Deposited in the BlueSky Research Foundation Collection, no. TC020 (SH 68 mm, SW 31 mm).

Type Locality. Trawled east of the Swain Reefs.
Synonymy.

2001 *Amoria (Amoria) molleri molleri*
forma *succincta* Bail, Limpus &
Poppe, p. 32, pl. 53.

Distribution. Found between 140-180 meters along the eastern Swain Reefs (Bail, Limpus & Poppe 2001).

Etymology. Named in honour of Trevor and Marguerite Young for their support and

commitment to the fostering of young malacologists and service to the Townsville Shell Club.



Figure 12. *Relegamoria youngorum* n. sp. Holotype – Off Swain Reefs 120 meters, BSRF TC020 (SH 68 mm, SW 31 mm) [ex CTC]

Remarks. The sharp top of the posterior outer lip shell of *R. youngorum* differs from other *Relegamoria* such as *R. charlyi* and *R. ashleyfieldi*, which are rounded. The shell of *R. youngorum* has a short spire and is ovate, which differentiates it from the neighbouring sister taxa *R. isabelae*, which is more elongated and with a higher spire.

DISCUSSION

As more private collections are made accessible for scientific study, new material becomes available that illuminates the true variability and regionality of what was once considered to be a single species and later proves to be a species complex. This work highlights the benefits of citizen scientist collectors in providing these

insights, and generously making material available for study to the professional taxonomic community with the opportunity to bring new species to the attention of other researchers and the wider collecting community.

In addition, we want to highlight the importance of accurate locality information and where possible preservation of the animal as it is clear that many of the taxa currently recognised in this study are closely related. However, there is quite a bit of variation in the protoconch amongst the above species and it will require additional material and access to the animals to determine if the observed differences require additional generic or subgeneric recognition and how they relate to the *Amoria* as a whole.

We also think that the following Western Australian species *A. rinkensi* Poppe, 1986 and *A. diamantina* Wilson, 1972 might also belong in *Relegamoria*, and work on this is continuing. Furthermore, there are fine microsculpture differences in the protoconch between members of the *Relegamoria*, which alludes to the need for a greater revision of the *Amoria* complex.

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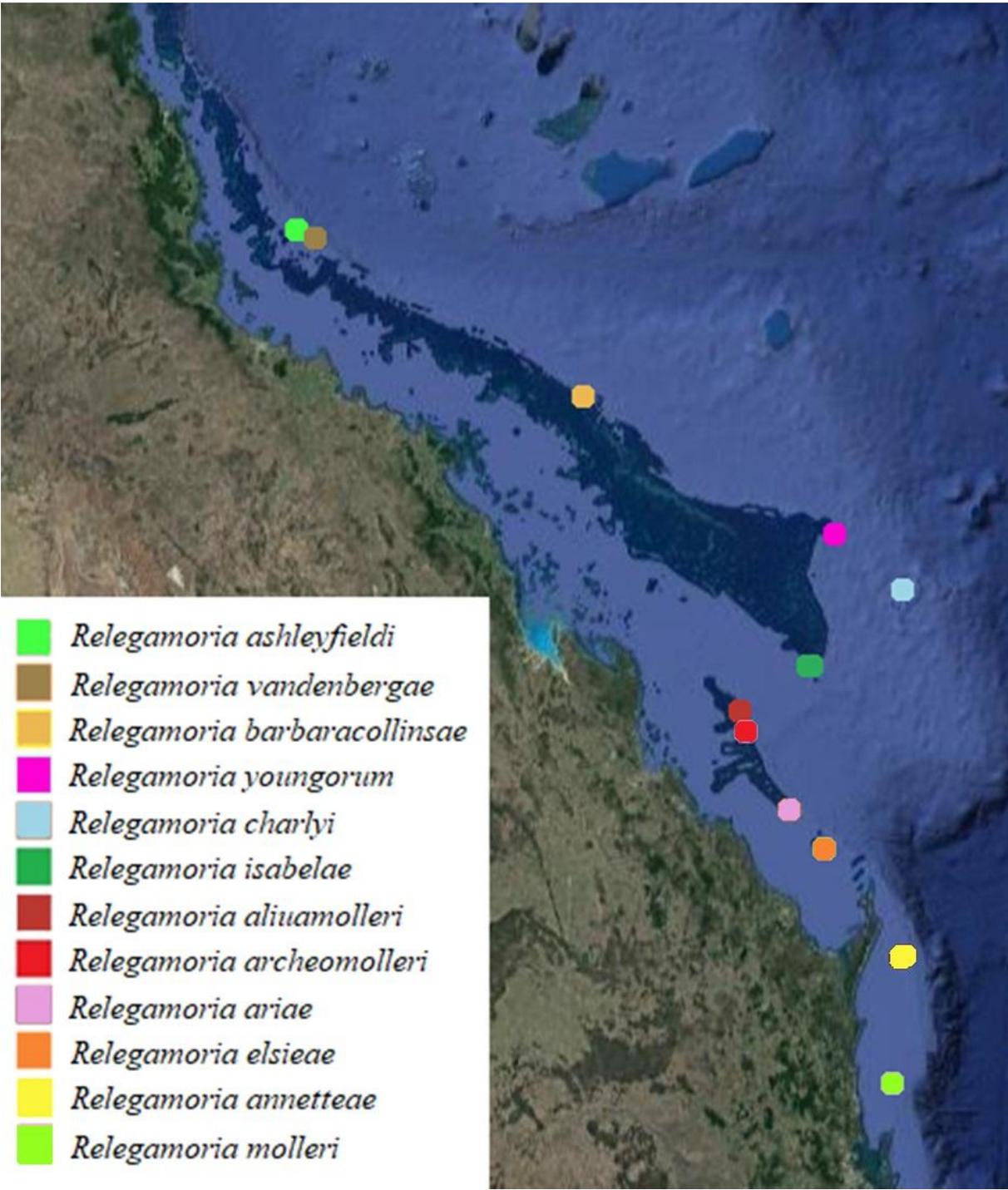


Figure 13. Map of type locations for Queensland *Relegamoria* Iredale, 1936 and an example of the northern range of *R. molleri* Iredale, 1936.



Plate 1. A comparative overview of *Relegamoria* Iredale, 1936 from Queensland: **A**= *Relegamoria isabelae* (Bail, Limpus & Poppe, 2001) Capricorn Channel, CTC (SH 108.0 mm); **B**= *Relegamoria elsieae* n. sp. Holotype – Trawled off Lady Elliot Island, BSRF TC015 (SH 77 mm); **C**= *Relegamoria ariae* n. sp. Holotype – Trawled off Lady Musgrave Island BSRF TC014 (SH 68 mm); **D**= *Relegamoria aliuamolleri* n. sp. Holotype – Trawled off North Reef, BSRF TC018 (SH 53 mm); **E**= *Relegamoria annetteae* n. sp. Holotype – trawled off K’gari, BSRF TC019 (SH 89 mm); **F**= *Relegamoria archeomolleri* n. sp. Holotype – Trawled Bunker Group, 205-215 meters, BSRF TC021 (SH 78 mm); **G**= *Relegamoria molleri* (Iredale, 1936) Off Cape Moreton, ARFC (SH 94.1 mm).



Plate 2. A comparative overview of *Relegamoria* Iredale, 1936 from Queensland: **A**= *Relegamoria youngorum* n. sp. Holotype – Off Swain Reefs 120 meters, BSRF TC020 (SH 68 mm); **B**= *Relegamoria barbaracollinsae* n. sp. Holotype – Trawled off the outer reef off Mackay, 200 meters, BSRF TC017 (SH 81.5 mm); **C**= *Relegamoria ashleyfieldi* n. sp. Paratype 1 – North of Pith Reef 280-300 meters, ARFC no. 5022 (SH 93.6 mm); **D**= *Relegamoria charlyi* n. sp. Holotype – East of Swain Reefs, BSRF no. TC016 (SH 50 mm); **E**= *Relegamoria vandenbergae* (Bail, Limpus & Poppe, 2001) ARFC no. 4916 (SH 69 mm).



Plate 3. Comparative plate of *Relegamoria molleri* Iredale, 1936: **A**= Off Cape Moreton, CTC (99 mm); **B**= Off Cape Moreton, CTC (101 mm); **C**= Off Cape Moreton, CTC (SH 96.5 mm); **D**= Off Cape Moreton, 140-160 meters, ARFC no. 3270 (SH 97.1 mm); **E**= Moreton Bay, VCC (89.7 mm); **F**= off Cape Moreton, BCC (SH 72 mm); **G**= Tweed Heads, BCC (SH 79 mm); **H**= Off Cape Moreton, 140-160 meters, ARFC no. 0561 (SH 94.1 mm).

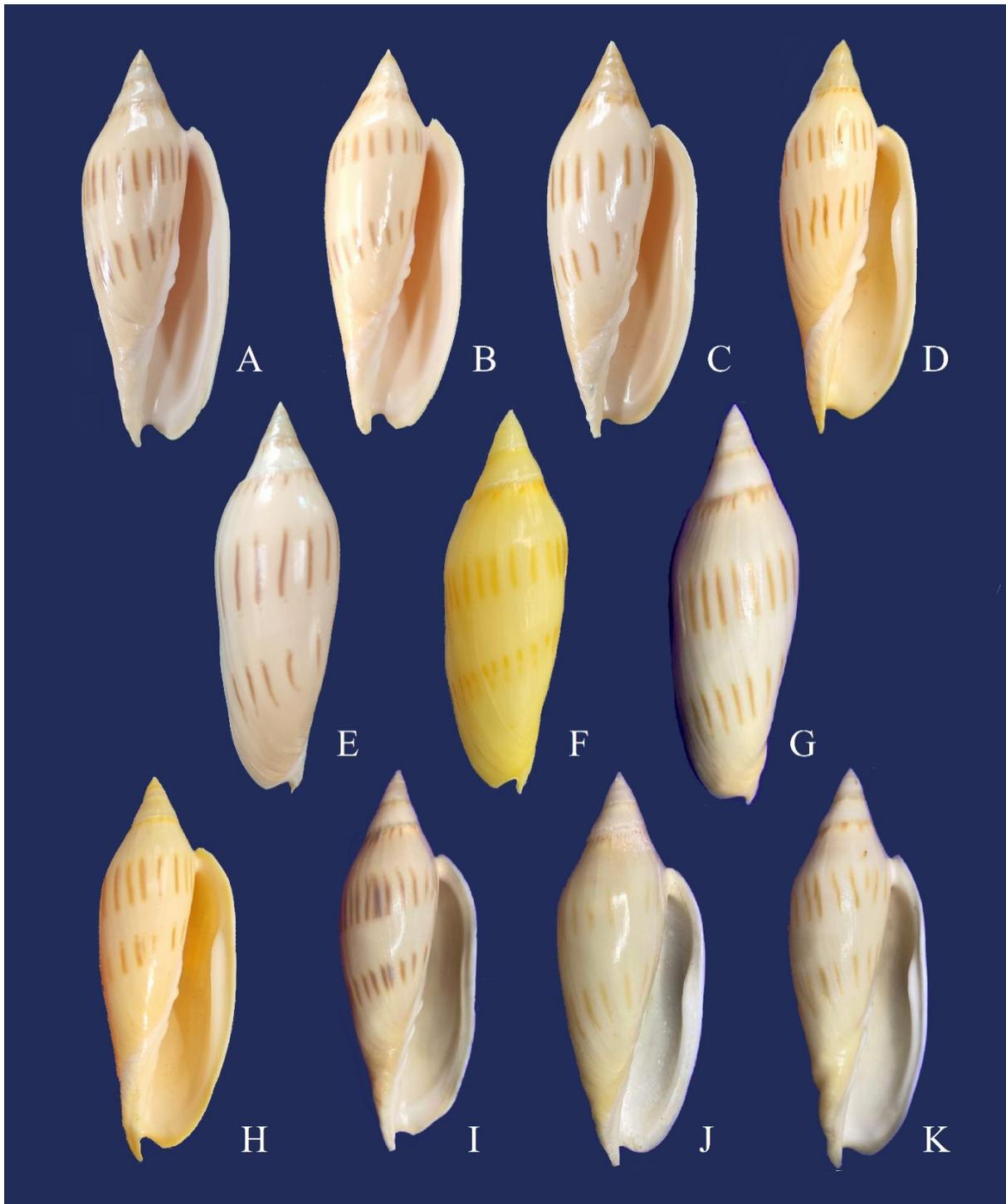


Plate 4. Comparative plate of *Relegamoria isabelae* (Bail, Limpus & Poppe, 2001): **A**= Hixson Cay, CTC (SH 95.5 mm); **B**= Hixson Cay, CTC (SH 89 mm); **C**= Off Swain Group, CTC (SH 101 mm); **D**= Hixson Cay, BCC (SH 114 mm); **E**= Capricorn Channel, CTC (SH 108 mm); **F**= Off Swain Reefs, BCC (SH 81 mm); **G**= Off Swain Reefs, VCC (SH 82.7 mm); **H**= Hixson Cay, BCC (SH 104 mm); **I**= Hixson Cay, VCC (SH 96.2 mm); **J**= Off Swain Reefs, 240 meters, VCC (SH 85.1 mm); **K**= Off Swain Reefs, VCC (SH 82.7 mm).



Plate 5. Comparative plate of *Relegamoria vandenbergae* (Bail, Limpus & Poppe, 2001): **A**= Off Pith Reef, CTC (SH 68.5 mm); **B**= Paratype 4 – Off Pith Reef, CTC (SH 51 mm); **C**= Off Townsville, BCC (SH 65.5 mm); **D**= North of Pith Reef, 280-300 meters, ARFC no. 4915 (SH 62 mm). **E**= Off Pith Reef, VCC (SH 64.9 mm); **F**= Off Pith Reef, CTC (SH 69 mm); **G**= Off Pith Reef, BCC (SH 59 mm); **H**= North of Pith Reef, 280-300 meters, ARFC no. 4916 (SH 69 mm).



Plate 6. Comparative plate showing the variability of *Relegamoria elsieae* n. sp.; **A**= Paratype 1 – Trawled off Lady Elliot Island, BCC (SH 84 mm); **B**= Paratype 2 – Trawled off Lady Elliot Island, (SH 95 mm); **C**= Paratype 3 – Trawled off Lady Elliot Island, BCC (SH 81 mm); **D**= Paratype 4 – Lady Musgrave Island ARFC no. 4886 (SH 90.8 mm); and *Relegamoria ariae* n. sp.: **E**= Paratype 1 – off northern K’gari, BCC (SH 102 mm); **F**= Paratype 2 – off northern K’gari, BCC (SH 71 mm); **G**= Paratype 3 – Lady Musgrave Island, ARFC no. 4886 (SH 99.1 mm).



Plate 7. Comparative plate showing the variability of *Relegamoria ashleyfieldi* n. sp.: **A**= Paratype 2 - North of Pith Reef, 280-300 meters, BCC (SH 71 mm); **B**= Paratype 3 - North of Pith Reef, 280-300 meters, BCC (SH 86 mm); and **C**= Paratype 1 - North of Pith Reef, 280-300 meters, ARFC no. 5022 (SH 93.6 mm).



Plate 8. Comparative plate showing the variability of *Relegamoria annetteae* n. sp.: **A**= Paratype 1 – trawled off K’gari, BCC (SH 97.5 mm); **B**= Paratype 2 – trawled off K’gari, BCC (SH 105 mm); **C**= Paratype 3 – trawled off K’gari, BCC (SH 82 mm); and *Relegamoria aliuamolleri* n. sp.: **D**= Paratype 1 – trawled off North Reef, CTC (50 mm); **E**= Paratype 2 – trawled off North Reef, CTC (52 mm); **F**= Paratype 3 – trawled off North Reef, CTC (54.5 mm); **G**= Paratype 4 – trawled Swain Reefs, CTC (54.5 mm); **H**= Paratype 5 – trawled Swain Reefs, 200 meters, VCC (45.6 mm); **I**= Paratype 6 – trawled east of Bundaberg, VCC (56.4 mm); **J**= Paratype 7 – trawled off Capricorn Group, ARFC no. 1624 (SH 45.8 mm); **K**= Paratype 8 – trawled off Lady Elliot Island, ARFC no. 1623 (SH 50 mm).