

Three New Gastropods (Cypraeidae, Fascioliariidae, and Volutidae) from the Great Australian Bight

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ABSTRACT Three new gastropods, belonging to the families Cypraeidae, Fascioliariidae, and Volutidae, are described from the Great Australian Bight region of southern Australia. These new taxa, which encompass two new subspecies and a new species, include: *Austrocypraea reevei bishopi* new subspecies (Cypraeidae), *Fusinus bishopi* new species (Fascioliariidae), and *Mitraelyria mitraeformis grockeae* new subspecies (Volutidae).

KEY WORDS Cypraeidae, Fascioliariidae, Volutidae, South Australia, Great Australian Bight, *Austrocypraea*, *Fusinus*, *Mitraelyria*.

INTRODUCTION

The Great Australian Bight area of southern Australia, encompassing the coastal areas of southern Western Australia and South Australia, constitutes the largest embayment found on the Australian continent. Although the locus of the Bight is located directly south of the State of South Australia, the entire body of water is considered, by hydrographers, to be an extension of the Indian Ocean. Oceanographically, the entire embayment is, at best, considered to be temperate, with neritic water temperatures averaging only 58 degrees F (14 degrees C) and varying from 53.3 degrees F (11.8 degrees C) in mid-winter (September) and 62.2 degrees F (16.8 degrees C) during the summer (January). Based on fossil assemblages from adjacent coastal areas (*i.e.* the Roe Calcarene and Eucla Basin fauna), these cool oceanographic conditions have persisted within the Bight area since at least the late Miocene (Darragh, 2011; Ludbrook, 1978; Noel and

Bone, 2007), creating one of the longest-lasting stable temperate water systems found anywhere on Earth.

Because of the long-lasting oceanographic stability found within the Bight, a rich and highly-endemic resident molluscan fauna has evolved over the past 5 million years. Many normally-tropical components, such as species in the families Cypraeidae and Conidae, olivids of the genus *Acutoliva*, and volutes such as the genus *Melo*, invaded the area during the late Miocene and evolved a number of endemic species complexes that still persist into recent times. Since the Great Australian Bight malacofauna lacks some of the classical high-tropical index families, such as the Strombidae, Modulidae, and Melongenidae, it is here considered to be only “paratropical” in composition (resembling a tropical molluscan fauna but existing in water conditions below tropical temperatures; see Petuch, 2004: 22-23). Recent exploration into previously-unstudied

areas of the Bight has demonstrated that several family-level components of this paratropical molluscan fauna, particularly the Cypraeidae, Fascioliariidae, and Volutidae, have undergone intense speciation since the late Pleistocene. Some of these endemic radiations include a species swarm of cypraeids centered on the relict genus *Umbilia* (with newly-discovered taxa such as *U. diprotodon* Lorenz and Beals, 2013, *U. armeniaca clarksoni* Lorenz and Beals, 2013, and *U. andreysi* Lorenz and Beals, 2013), another cypraeid swarm centered on the relict genus *Notocypraea* (including *N. wilkinsi* (Griffiths, 1959), *N. euclia* (Steadman and Cotton, 1946), and several unnamed deep water species), and a small radiation of endemic fascioliariids centered on *Fusinus tessellatus* (Sowerby III, 1880). Many of these taxa represent deep-water offshoots of shallow water species and can be considered to be bathymetric subspecies of shallow water forms.

Recently, several inspired amateur malacologists and marine naturalists from South Australia, particularly Mr. Adrian Bishop of Yorketown and Ms. Joan Grocke of Streaky Bay, have conducted intensive field work and collecting in several relatively unexplored areas of the Great Australian Bight and have discovered many previously-unnamed taxa. Some of these new species were collected by divers who were investigating previously-unexplored offshore areas, some were collected along poorly-known and infrequently-collected shallow water areas, and some were trawled from deep water offshore areas by commercial fishermen. The material from these research and collecting trips was brought to our attention by Mr. Bishop and specimens of several new species and subspecies were kindly donated to us for research purposes and for subsequent deposition in museums.

In this paper, we describe three new gastropods from the Great Australian Bight area, adding to our knowledge of the biodiversity of this unusual temperate water fauna. The holotypes of the new species and subspecies are deposited in the molluscan collection of the South Australian Museum, Adelaide, South Australia, (herein "SAMA") and bear SAMA numbers.

SYSTEMATICS

Class Gastropoda
 Subclass Sorbeoconcha
 Order Prosobranchia
 Infraorder Mesogastropoda
 Superfamily Cypraeoidea
 Family Cypraeidae
 Subfamily Austrocypraeini
 Genus *Austrocypraea* Cossmann, 1903

Austrocypraea reevei bishopi Petuch and
 Berschauer, new subspecies
 (Figures 1D-F)

Description: Shell of average size for genus, thin and fragile, highly inflated, bulliform and globose, with high domed dorsum; extremities blunt, poorly-developed; shell margins only slightly produced, rounded; base rounded; dorsum and sides ornamented with distinct malleated pattern of numerous small rectangular pits; shell color pale white-cream or pale whitish-yellow; anterior and posterior extremities colored very pale pinkish-purple; aperture uniformly narrow, slightly arcuate; columella with 26-27 small, thin elongate teeth; lip edged with 32-36 small, pointed teeth; fossula well-developed, ornamented with 9-10 large rounded teeth, located deep within aperture; interior of aperture colored dark yellowish-tan.

Type Material: HOLOTYPE - length 40 mm, width 26 mm, from 145 m depth off Eucla,

Western Australia, SAMA D4323 (Figure 1D-F); **Other Study Material** - 2 specimens, lengths 35 mm and 32 mm, from the same locality and depth as the holotype, in the collection of Adrian Bishop, Yorketown, South Australia; length 38 mm, from the same locality and depth as the holotype, in the research collection of the senior author.

Type Locality: Trawled by commercial fishermen from 145 m depth, due south of Eucla, Western Australia, Great Australian Bight, Australia.

Distribution: At present, known only from deep water (145-300 m depths) in the Great Australian Bight area, extending from Albany, Western Australia to the Eyre Peninsula, South Australia (Lorenz and Hubert, 2000: p. 86).

Ecology: The new subspecies lives on open, sponge-covered sea floors in depths of 145-300 m.

Etymology: Named for Adrian Bishop of Yorketown, South Australia, who recognized the subspecies as new and who kindly donated the holotype and other study material.

Discussion: The new taxon is named as a deep water bathymetric subspecies of the littoral and shallow sublittoral *Austrocypraea reevei* (Sowerby I, 1832) (Figure 1A-C). The new subspecies differs from the nominate subspecies in six distinct ways: (1) in being a thinner, more delicate shell; (2) in being a much more inflated and globular shell; (3) in having a higher and more domed dorsum (as seen in the comparisons of Figures 1C and 1F); (4) in having a much lighter shell color, being pale yellow-white as opposed to the dark gray or grayish-brown color of the nominate subspecies; (5) in having much paler-colored extremities, being pale pink as opposed to dark pinkish-

purple; (6) and in having a proportionally much larger and much better developed fossula within the aperture. This bathymetric and geographical subspecies of *Austrocypraea reevei* was first recognized by Lorenz and Hubert (2000: p. 86), but was never given a name.

Infraorder Neogastropoda
Superfamily Buccinoidea
Family Fasciolaridae
Subfamily Fusininae
Genus *Fusinus* Rafinesque, 1815

Fusinus bishopi Petuch and Berschauer,
new species
(Figure 2A, B)

Description: Shell small for genus, thin and delicate, extremely elongated, with high, protracted spire and very long, narrow siphonal canal; shoulder distinctly sloping; shoulder sharply angled, subcarinate, ornamented with 12-13 elongated knobs; body whorl and spire whorls ornamented with 12-13 low, narrow, evenly-spaced longitudinal ribs; ribs end abruptly at body whorl-siphonal canal juncture, producing sharply-angled anterior edge of body whorl; body whorl encircled with 9 large raised spiral cords; juncture of spiral cords and longitudinal ribs producing a small raised bead; siphonal canal smooth, ornamented with very small and thin spiral threads; spire whorls ornamented with 8 spiral cords; shell color pale cream-white, overlaid with scattered faint brown patches and flammules; areas between shoulder knobs and between small knobs of anterior body whorl angle marked with large dark brown dots or small dark brown patches; anterior tip of siphonal canal colored light brown; protoconch proportionally large, composed of 2 whorls, white in color; aperture proportionally small, circular, pure white in color, with inside of lip ornamented with 16 elongated, narrow ribs.

Type Material: **HOLOTYPE** - length 72 mm, width 23 mm, trawled from 145 m depth, due south of Eucla, Western Australia, SAMA D40324 (Figure 2A, B); **Other Study Material** - length 39 mm (incomplete), from the same locality and depth as the holotype, in the collection of Adrian Bishop, Yorketown, South Australia; length 53 mm (incomplete), from the same locality and depth as the holotype, in the research collection of the senior author.

Type Locality: Trawled by commercial fishermen from 145 m depth, due south of Eucla, Great Australian Bight, Western Australia, Australia.

Distribution: At present, only known from the type locality, 145 m depth off Eucla, Western Australia.

Ecology: The type lot was trawled on a sand and shell rubble sea floor in 145 m depth.

Etymology: Named for Adrian Bishop of Yorketown, South Australia, who recognized the species as new and who kindly donated the type lot for study.

Discussion: Of the known southern Australian *Fusinus* species, *F. bishopi* most closely resembles *F. wellsi* Snyder, 2004 from Western Australia, but differs in the following ways: (1) in having less tabulate and much more sloping shoulders, with a much greater shoulder angle; (2) in having a proportionally much higher and more protracted spire; (3) in having more numerous longitudinal ribs on the body whorl (13-14 on *F. bishopi* and 10-11 on *F. wellsi*); (4) and in having more numerous shoulder knobs (14 per whorl on *F. bishopi* and 10 per whorl on *F. wellsi*). The two shells are very similar and definitely represent a sibling species pair, with *F. wellsi* being found in deep water areas along Western Australia and with the more elongated

and delicate *F. bishopi* being restricted to deep water areas within the Great Australian Bight. Both species share the same color pattern and ornamentation as *F. tessellatus* (Sowerby III, 1880) from shallow water areas along the southwestern area of Western Australia, but differ in being more delicate and elongated and in having much longer and better-developed siphonal canals. All three species constitute a closely-knit species complex that is restricted to Western Australia and the Great Australian Bight.

Superfamily Volutoidea
Family Volutidae
Subfamily Lyriinae
Genus *Mitraelyria*

Mitraelyria mitraeformis grockeae Petuch and
Berschauer, new subspecies
(Figure 2E-H)

Description: Shell of average size for genus, heavy and thickened, stocky, with inflated body whorl; shell smooth and shiny, with a distinct frosted or silky appearance; shoulder only slightly angled, with constriction along subsutural area; body whorl and spire whorls ornamented with 13-16 large, prominent, evenly-spaced smooth longitudinal ribs; edge of rib along shoulder slightly angled, producing low, flexed knob; siphonal canal short and stubby, open and flaring; spire proportionally low, only slightly protracted; anterior end of body whorl and siphonal canal ornamented with 6-8 deeply-incised spiral sulci; shell color uniform pale yellow or Canary yellow; aperture proportionally large and flaring, oval in shape; parietal shield only slightly developed; columella with 12-14 very thin, elongated plications, with the anterior 3 being the largest, roughly 3 to 4 times larger; interior of aperture colored deep yellow-orange; protoconch proportionally large, bulbous, with flattened top,

composed of 1 ½ whorls, pale yellow-white in color.

Type Material: HOLOTYPE - length 37 mm, width 19.5 mm, 1 m depth in Streaky Bay, South Australia, SAMA D40352 (Figure 2E, F); **Other Study Material** - length 44 mm, from the same locality and depth as the holotype, in the collection of Adrian Bishop, Yorketown, South Australia (Figure 2G, H); length 38 mm, from the same locality and depth as the holotype, in the research collection of the senior author.

Type Locality: Found in sand and sea grass beds, in 1 m depth at low tide, in Streaky Bay, South Australia.

Distribution: At present, only known from Streaky Bay and the Eyre Peninsula of South Australia.

Ecology: The new subspecies prefers sandy sea floors with prolific sea grass growth, within quiet sheltered bays, in intertidal and shallow subtidal depths.

Etymology: The new subspecies is named for Joan Grocke of Streaky Bay, South Australia, who collected the holotype and generously donated the type lot for scientific study.

Discussion: The new taxon is named as a subspecies of the widespread southern and western Australian (Flindersian and Maugean Molluscan Provinces) *Mitraelyria mitraeformis* (Lamarck, 1811) (Figure 2C, D). *Mitraelyria mitraeformis grockeae* differs from the common and widespread nominate subspecies in being a smaller, heavier, and more compact shell with a proportionally lower and less protracted spire, and in completely lacking any color pattern on the body whorl and spire, being, instead, a uniform bright yellow-white color. The nominate subspecies characteristically has three

wide bands of large purple-brown rectangular patches around the body whorl; one around the shoulder and subsutural area, one around the mid-body, and one around the anterior end and siphonal canal. Typical *M. mitraeformis* also is profusely marked with very numerous fine dark brown spiral lines that are particularly well-developed on the longitudinal ribs (shown here on Figure 2C, D). The new subspecies *grockeae*, on the other hand, is completely devoid of any type of color pattern and is only uniformly yellow.

The variety of *M. mitraeformis* that was given the name *kimberi* by Sowerby III (1900) is similar in shape and size to *grockeae*, but exhibits a faint version of the typical pattern seen on *mitraeformis*, with pale brown spiral lines on the ribs and with distinct pairs of thin brown flammules along the edge of the outer lip (as seen on the *M. mitraeformis* shown here on Figure 2C, D). The new subspecies has a completely unmarked outer lip and has never been found with the pairs of brown flammules that are seen on *M. mitraeformis* and its color form *kimberi*. Specimens of the variety *kimberi*, that have been collected recently in the Port Lincoln area of South Australia (several specimens in the Adrian Bishop collection), all have a faint color pattern reminiscent of typical *mitraeformis* and none of them have the intense Canary yellow color seen on *grockeae*.

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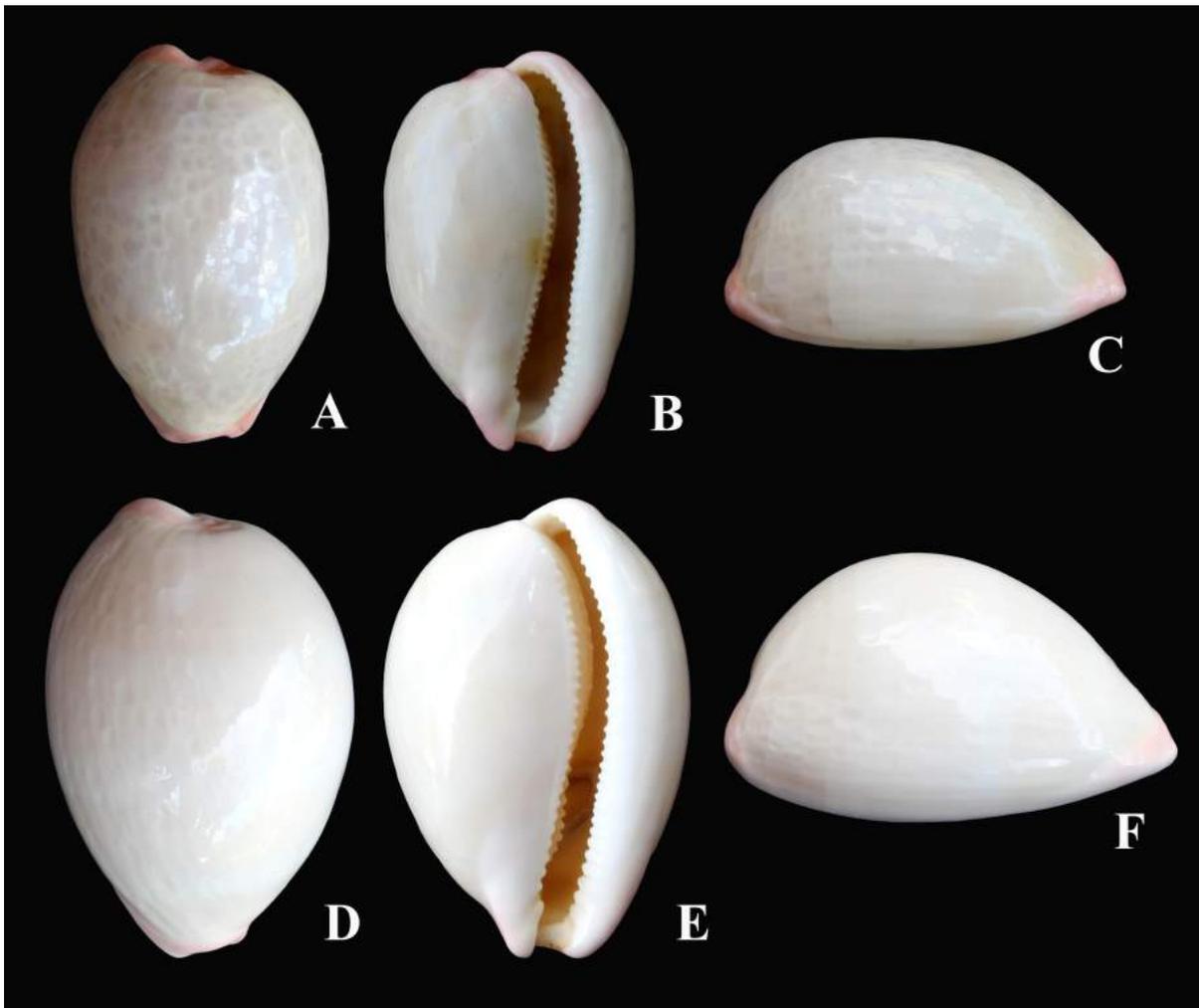


Figure 1. *Austrocypraea* Cowries from Western Australia and the Great Australian Bight.

A, B, C= *Austrocypraea reevei* (Sowerby I, 1832), length 36 mm, 6 m depth under ledges, off Fremantle, Western Australia (for comparison with *A. reevei bishopi*). **D, E, F= *Austrocypraea reevei bishopi*** new subspecies. Holotype (SAMA D4323), length 40 mm, trawled from 145 m depth, due south of Eucla, Western Australia, Great Australian Bight.

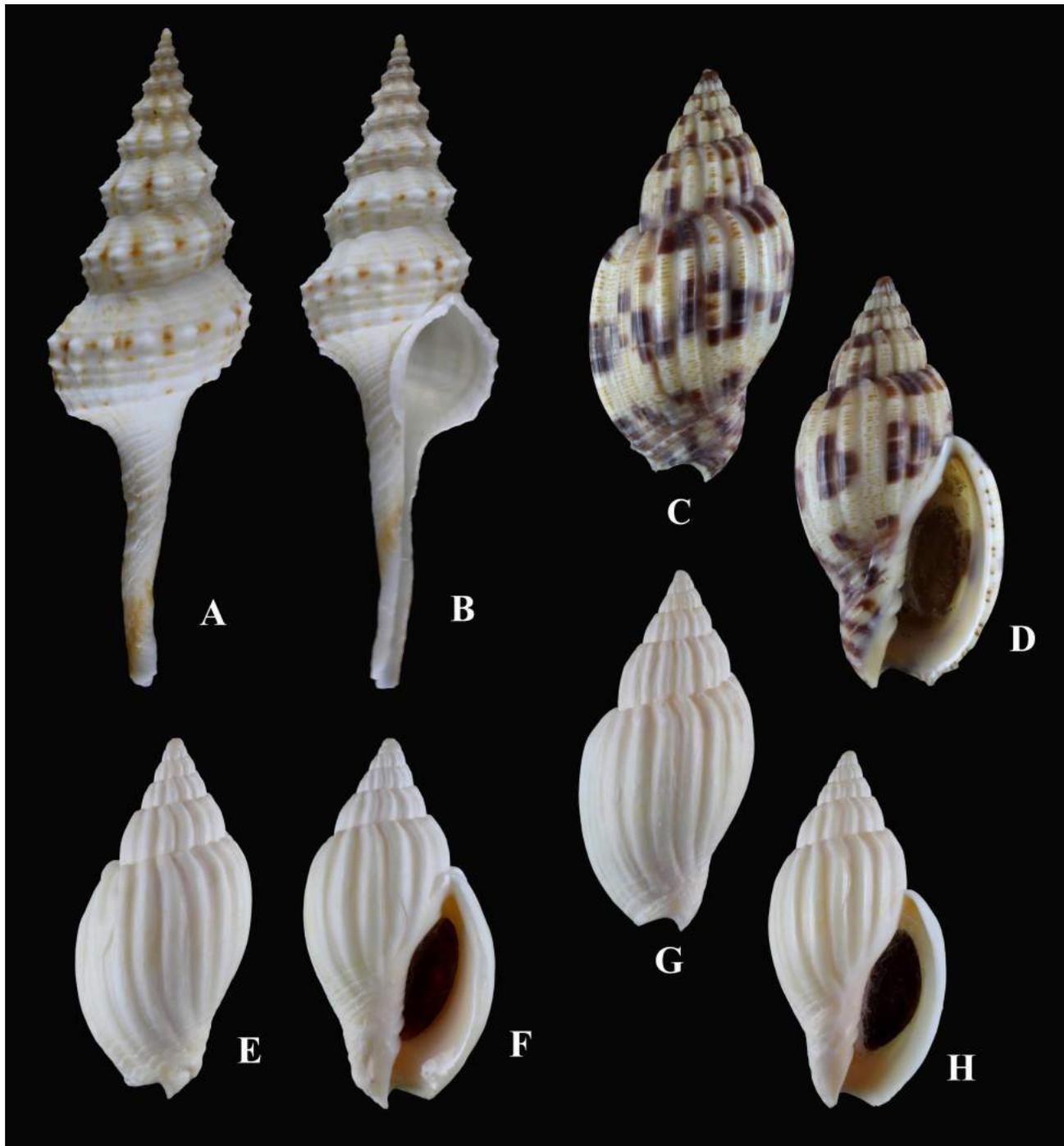


Figure 2. Species of *Fusinus* and *Mitraelyria* from the Great Australian Bight.

A, B= *Fusinus bishopi* new species. Holotype (SAMA D40324), length 72 mm, trawled from 145 m depth, due south of Eucla, Western Australia, Great Australian Bight. **C, D**= *Mitraelyria mitraeformis* (Lamarck, 1811), length 51 mm, 2 m depth, Apollo Bay, Victoria, Australia, for comparison with *M. mitraeformis grockeae*. **E, F**= *Mitraelyria mitraeformis grockeae* new subspecies. Holotype (SAMA D40325), length 37 mm, 1 m depth in sand and sea grass, Streaky Bay, South Australia, Australia. **G, H**= *Mitraelyria mitraeformis grockeae* new subspecies, 44 mm specimen from Streaky Bay, South Australia, Australia (Adrian Bishop collection).