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# NEW RECORDS FOR *BOLMA GIRGYLLUS* (REEVE, 1861) AND *BOLMA RECENS* (DELL, 1967) (GASTROPODA: TURBINIDAE) EXTEND THEIR GEOGRAPHICAL DISTRIBUTIONS IN THE PHILIPPINES AND AUSTRALIA

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*Abstract* *New records for* Bolma girgyllus *(Reeve, 1861) are presented based on specimens collected at 165m depth West of Shark Bay, West Australia, and for* Bolma recens *(Dell, 1967) for specimens collected off Tinina, Balut Island, Mindanao, and off Luzon, Philippines. This is the first record of* B. *girgyllus in the entire Australian continent, and the southernmost record for the species, extending the previously known southern distribution record from New Caledonia by about three latitudinal degrees. Regarding* B. recens*, this is the first published record of this species in the Philippines, filling a gap in its extensive geographical range and extending its northern distribution in the Pacific Ocean. As deep-water species with a bentho-pelagic life cycle, it is probable that the present new records of* B. girgyllus *and* B. recens *reflect lack of sampling rather than migration; however, more sampling and Museum records analyses are needed to assess more accurate distributions for these turbinids.*

*Key words* *Extension range, Turbininae, deep water, turban shells.*

## Introduction

Turban shells (Mollusca: Turbinidae) are marine gastropods mostly recognized by their sturdy turbinate or top-shaped shells of few whorls, which most often have a nacreous interior of the shell and aperture, and a striking thickened and calcareous operculum (Keen 1971; Hickman & McLean 1990). In the turbinid subfamily Turbininae Rafinesque, 1815, the genus *Bolma* Risso, 1826, encompasses a group of small to relatively large species found in tropical and warm-temperate areas all around the world (except for the W Atlantic and E Pacific), most of them living in hard bottoms between 100 and 500–800m depth (Alf *et al.* 2010). *Bolma* species are characterized by their relatively thick shells, mainly with two angulations on the last whorl that bear nodules or spines in most species, and a simple columellar callus which, in mature shells of most species, spreads over much of the base adjacent to the columella (Beu & Ponder 1979; Alf & Kreipl 2009). Considering that most species of *Bolma* live in deep water, and that they have a bentho-pelagic life cycle, their records are normally scant, and some species are known from just a few specimens (see Bouchet & Métivier 1983; Alf & Kreipl 2004). However, in some cases, species which were previously restricted to single localities have been found to have extensive distributions, or to potentially represent several crypto species (Castelin *et al.* 2017).

In this work we present new records for *Bolma girgyllus* (Reeve, 1861) and for *Bolma recens* (Dell, 1967), extending the distributional ranges of these species to Australia and the Philippines, respectively.

## Materials and Methods

The empty shell specimen of *Bolma girgyllus* (Reeve, 1861) was collected by a Remotely Operated Vehicle at 165m depth West of Shark Bay (25°30' S; 113°30' E), WA, Australia; this specimen is deposited at the collections of the Museo de Zoología of the Universidad de Concepción, in Concepción, Chile (MZUC-UCCC, unnumbered). The specimens of *Bolma recens* (Dell, 1967) were collected by tangle net in about 150m depth off Tinina, Balut Island, Mindanao, Philippines (deposited in the collection of Axel

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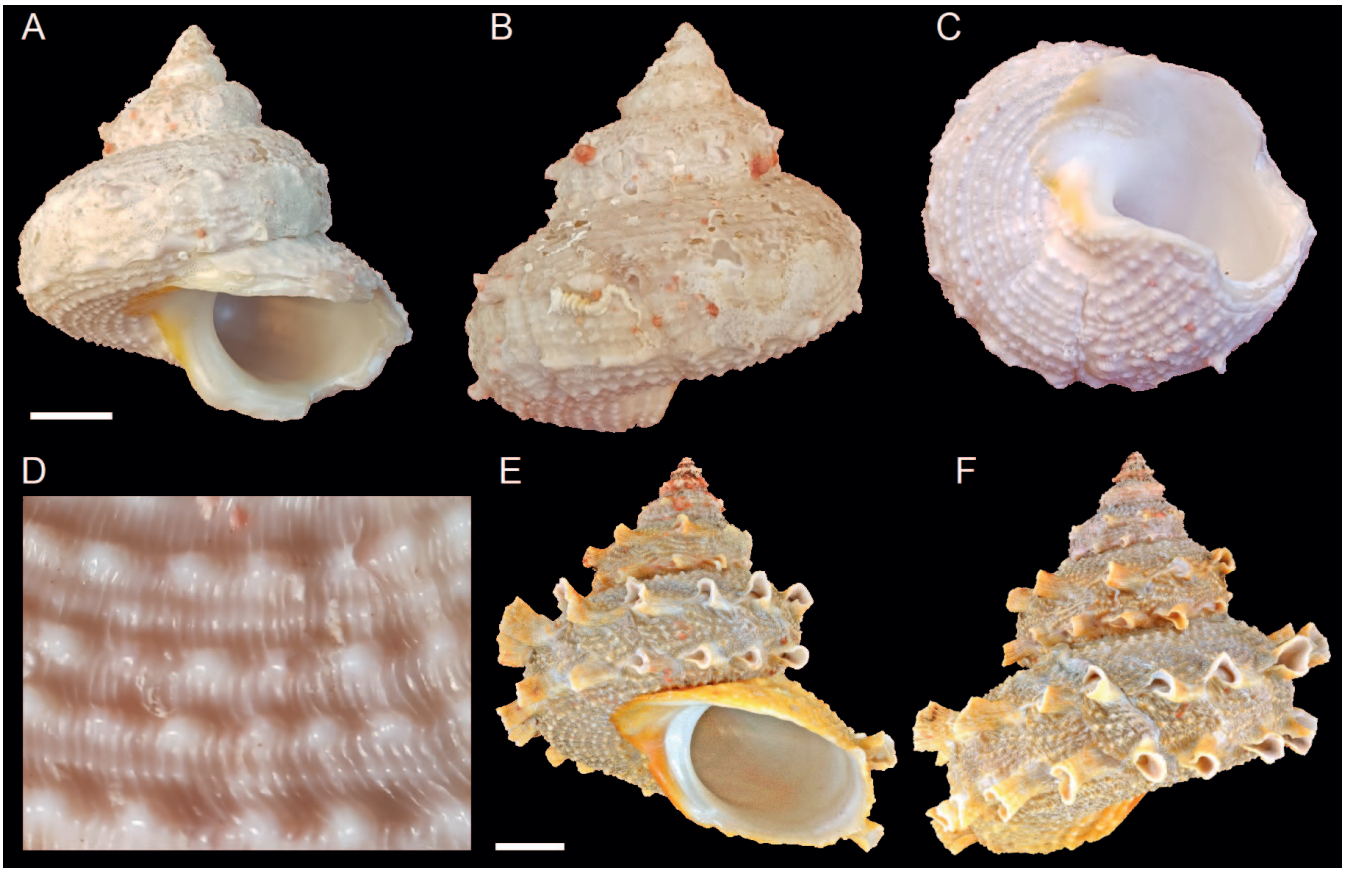


**Figure 1** *Bolma girgyllus* (Reeve, 1861), Shark Bay, West Australia, Australia MZUC-UCCC (unnumbered) **A** apertural view **B** abapertural view **C** adapical view **D** Detail of basal sculpture. *Bolma girgyllus* (Reeve, 1861), off Nha Trang, Vietnam **E** apertural view **F** abapertural view. Scale bars are 10mm.

Alf, registration number 112121c, Zoological State Collection, Munich (ZSM)); and in 538m depth off Luzon (15°53,4'N, 121°53,6'E), Philippines, deposited at the Malacology collection of the Museum National D'Histoire Naturelle at Paris, France (MNHN). The terminology of shell morphology and the measurements follow the works of Dell (1967), Beu & Ponder (1979), and Alf & Kreipl (2011).

## Results

FAMILY Turbinidae Rafinesque, 1815

Genus *Bolma* Risso, 1826
Type species *Turbo rugosus* Linnaeus, 1767
(= *Bolma rugosa* Risso, 1826), by monotypy.

*Bolma girgyllus* (Reeve, 1861)
Figs 1A–D

For a complete synonymy see Beu & Ponder (1979).

*Description of examined specimen* Shell with a diameter of about 49mm, thick-shelled; only slightly wider than tall (h/d about 0.99), with spines reduced or eroded. Protoconch and first whorls eroded and partly covered by bryozoans. Teleoconch of about 5 whorls, rounded, peripheral angle at center of whorls. Whorls sculptured with fine axial lamellae; a spiral row of long hollow, leaf-like spines on both the peripheral and the basal angles; remnant spines only on the periphery of the shell. Subsutural zone slightly convex, with 9 spiral rows of gemmules. Sculpture on body whorl consisting of spiral rows of weak nodules. Base sculptured with distinct axial lamellae and 11 spiral rows of small, beaded spines; the 2 rows closest to umbilical area separated by a broad gap from the others. Suture impressed. Columella smooth and evenly rounded, white; columellar callus narrow, thin, of orange colour in its border; aperture oval, of whitish colour, outer lip broken in the present specimen; no umbilicus. Colour of shell pale pinkish.

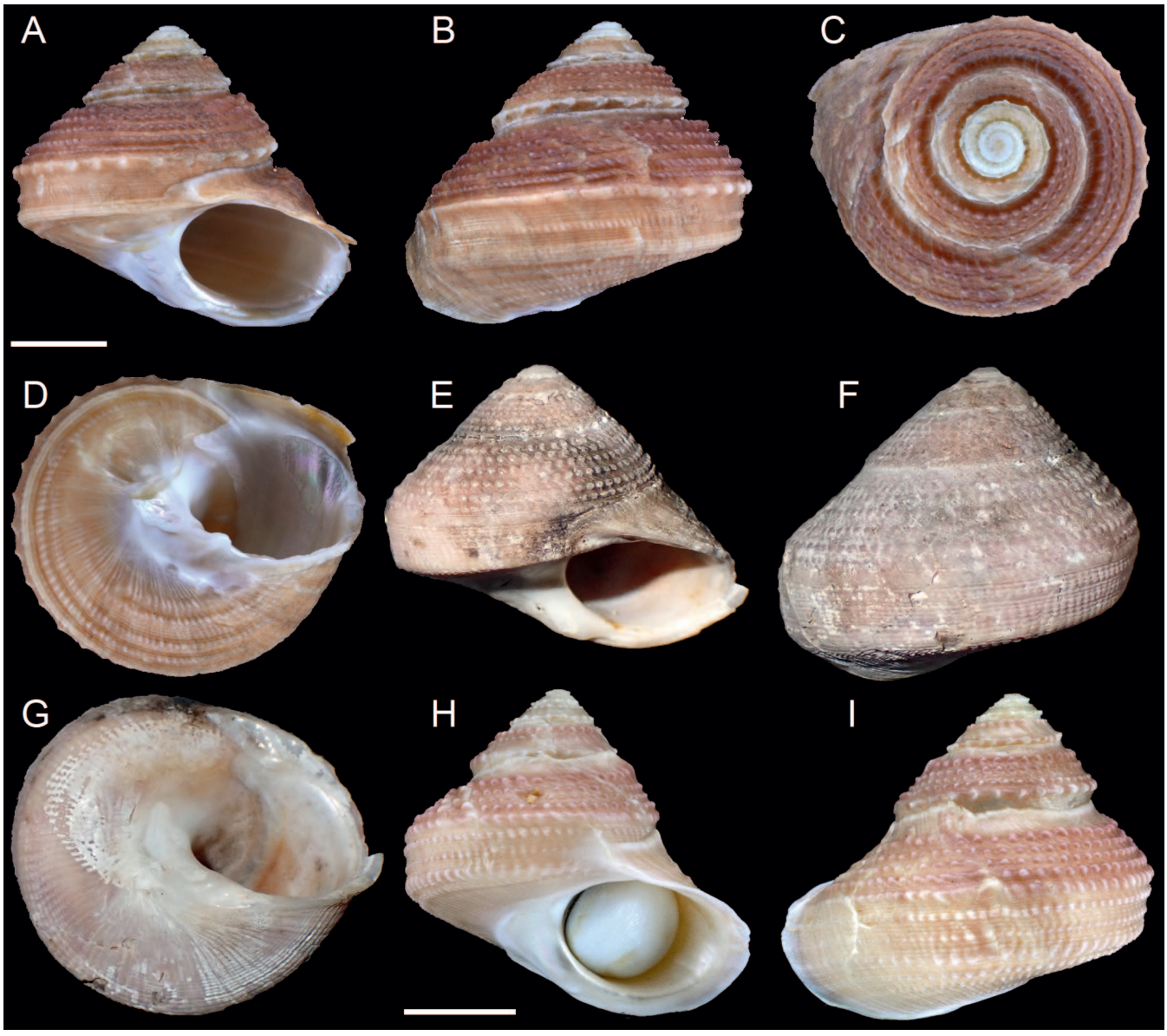


**Figure 2** *Bolma recens* (Dell, 1967), Balut Island, Mindanao, Philippines **A** apertural view **B** abapertural view **C** apical view **D** adapical view.
*Bolma recens* (Dell, 1967), Off Luzon, Philippines (MNHN) **E** apertural view **F** abapertural view **G** adapical view.
*Bolma recens* (Dell, 1967), New Caledonia (ZSM) **H** apertural view **I** abapertural view. Scale bars are 10mm.

*Geographical distribution and depth* This species has been previously found from Southern Japan to Taiwan, China, Vietnam and the Philippines and Indonesia (Alf & Kreipl 2011), with unpublished records in New Caledonia, from specimens collected at the Ile des Pins (22°43' S; 167°18' E), deposited at the MNHN (MNHN-IM-2012–17744), but also from Grand Passage, North New Caledonia, Chesterfield Island, and Solomon Islands and Vanuatu, all in the MNHN collections, in depths between 100–200m. The present specimen represents the southernmost distribution record for the species, extending its previous distributional range from New Caledonia by about three latitudinal degrees, and it is also the first record of *B. girgyllus* in Australian waters,

*Bolma recens* (Dell, 1967)
Figs 1E–H

*Incilaster recens* Dell, 1967: 305, figs. 6, 7, 8.
*Bolma recens* Beu & Ponder, 1979: 32, figs. 11h, i.
Alf & Kreipl, 2011: 37, pls. 152–154.

*Description of examined specimen* Shell with a diameter of about 35mm, medium-shelled; wider than tall (h/d about 0.9). Protoconch and first whorls slightly eroded and of paler colour than the rest of the shell. Teleoconch of about 5 whorls with straight sides, with distinct peripheral and basal angle. Whorls sculptured with fine axial lamellae; shoulder with 5 rows of beads; peripheral angle marked by small triangular spines turning into a ridge towards the aperture; basal angle marked by a prominent ridge. Space between peripheral and basal angle with densely set spirals and a central row of closely set fine beads. Sculpture on body whorl consisting of spiral rows of small nodules. Base sculptured with distinct axial lamellae and about 4 spiral rows of small, beads; the 2 rows closest to umbilical area separated by a broader gap from the others. Suture impressed. Columella smooth and evenly rounded, white; columellar callus narrow, thin, transparent white; aperture oval, of whitish colour, outer lip expanded and broken in its middle part in the present specimen; no umbilicus. Colour of shell purplish brown, pinkish fawn below periphery.

*Geographical distribution and depth* *B. recens* was originally described from the Kiwi Seamount, off New Zealand (Dell 1967), and has been subsequently recorded from New Caledonia, Mozambique, and Madagascar (Alf & Kreipl 2011), and also known from Tonga, Solomon Islands, Papua New Guinea and North Philippines, only by very few dead specimens and all in the MNHN collections. The present specimens represent the first published record from the Philippines, bridging a gap in the distribution of this species between the South Pacific and Western Indian Ocean specimens.

## Discussion

There are no remarkable differences between the examined specimens and their respective original descriptions and further descriptions of both species (Dell 1967; Alf & Kreipl 2011); the almost complete lack of spines of the specimen of *B. girgyllus* may represent, apart from the natural erosion of the specimen, just an extreme of the natural range of sculpture variation on the shell of the species, as already described by Alf & Kreipl (2011). Regarding *B. recens*, the colouration is slightly darker than that of previous specimens depicted in the literature, however the shell sculpture also agrees with previous descriptions for the species (Alf & Kreipl 2011).

The presence of *B. girgyllus* in Australia is not surprising; in fact, it is expected that additional, but not yet proven *Bolma* species may be present in Australian waters and surrounding areas, most probably living in deep waters, as a similar case for the recent records of *Bolma* species from New Caledonia (Bouchet & Métivier 1983; Alf & Kreipl 2009; Alf & Kreipl 2011, and references therein). However it is not possible to discard the influence of increasing water temperature, which may allow the transport of *Bolma* larvae into southern waters, as already documented for related turbinid species (Son *et al.* 2020). The presence of *B. recens* in the Philippines is not surprising either, given the wide range of distribution already known before for this species, which include New Zealand and New Caledonia to Mozambique and Madagascar.

Considering the deep-water habitat of *B. girgyllus* and *B. recens*, and their bentho-pelagic life cycle, it is probable that the new records for these species in this work merely reflect a lack of sampling rather than migration of these species, however, more sampling and the revision of Museum samples is needed to assess more accurate distributions for these deep-water turbinids. This work highlights the need to review material in collections, considering the biodiversity revealed with only a few specimens, and the collaboration of staff from the Natural Museum of Natural History in Paris, France.

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