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The illustration of *Retizafra intricata* Hedley, 1912 (Gastropoda: Columbellidae) from the coastal central Queensland: Citizen Scientists and their role in systematic practice

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ABSTRACT Many Australian small molluscan taxa are often overlooked, falling by the wayside and therefore, and remaining relatively unknown to the wider collecting community. This paper redescribes and illustrates *Retizafra intricata* Hedley, 1912, a species that has not been illustrated within the literature for over a century. Many species are listed in databases, but they are often void of illustrative examples making positive identification problematic. Furthermore, this paper refines the syntypes and declares a lectotype to give greater taxonomic clarity. Within the discussion of this paper, the role of the citizen scientist is elucidated. Issues of how attitudinal change within some institutions can lead to the alienation of individuals, particularly those with life-long knowledge in their chosen field.

KEY WORDS Columbellidae, Australia, *Retizafra*, Mollusca, citizen science

INTRODUCTION

The genus *Retizafra* Hedley, 1914 consists of a few dozen relatively small shells that are infrequently encountered by collectors. Many modern publications show illustrations of new species that facilitate recognition (Willson, 1994; Monsecour and Monsecour, 2016, 2018). However, many older texts have not been illustrated or annotated since the original description was written (Brazier, 1877; Hedley, 1901). These original descriptions often failed to provide adequately illustrated material that aid field workers to identify many species that maybe encountered (Brazier, 1877). There has been a renewed interest in the micro-mollusca, particularly as a consequence of the work of the Muséum National d'Histoire Naturelle in the New Caledonian region (Monsecour and Monsecour, 2016).

This renewed interest and subsequent publications containing *Retizafa* has led to an increase in citizen scientists actively looking for these new taxa. The lack of literary material on historically described taxa that is readily available to the amateur is problematic. The failure to provide adequate identification of small historically described taxa in the modern literature has created a reference gap for the citizen scientist. Therefore, the need to illustrate and describe the species contained within this paper, *Retizafra intricata* Hedley, 1912, is a consequence of practical engagement with citizen scientists and their quest for taxonomic certainty in identification.

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SYSTEMATICS

Superfamily Buccinoidea Rafinesque, 1815
Family Columbellidae Iredale, 1916

Retizafra Hedley, 1914

Type Species. *Pyrene gemmulifera* Hedley, 1907 (= *Retizafra gemmulifera* Hedley, 1907).
Originial Description. "For some small 'Columbella" do noatt quite conform to *Zafra*, I suggest a division *Retizafra*. In size and form they correspond [to *Zafra*], but differ by the clathrate sculpture. Also *Retizafra* inhabit deeper water" (Hedley, 1914: 326).

Retizafra intricata Hedley, 1912
(Figures 1 and 2)

Type locality. Katow, Papua New Guinea (now known as Mawatta, Papua New Guinea).

Type material. There are 8 syntypes in the original Australian Museum lot C. 8069 (Brazier, 1877). Hedley (1901, pl. 16, fig. 6) illustrated an 8 mm high example out of the syntype set, and we herein declare that specimen to be the lectotype (Figure 1).

Synonymy.

Columbella (*Anachis*) *clathrata* Brazier, 1877, p. 229.
= *Columbella clathrata* Brazier - Hedley, 1901, p. 123, pl. 16, fig. 6.

Pyrene intricata Hedley, 1912, p. 151.
= *Retizafra intricata* Hedley - Hedley, 1914, p. 326.

Original Description. "Shell ovately fusiform, yellowish white, polished, longitudinally roundly ribbed, ribs smooth, interstices clathrate, suture canaliculated, noduled above and below, whorls 6, convex, the last lower half transversely grooved on the back giving the surface a noduled appearance; aperture white, nearly oblong ovate, columella straight, with thin lip, having three white nodules, peristome thin at edge, thickened internally, having eight tubercules, the second upper one prominent, somewhat lirate, sinuate at the upper part, canal short, narrow" (Brazier, 1877: 229-230).

Figure 1: The lectotype of *Columbella clathrata* Brazier, 1877 (synonyn = *Retizafra intricata* Hedley, 1812) (Hedley, 1901, p. 123, pl. 16, fig. 6).

Secondary Text. "It has been shown in Paeleontology the name of *Columbella clathrata* has been thrice proposed. As Brazier's choice of this name is thereby invalidated a substitute is here suggested" (Hedley, 1912: 151).

Supplementary Diagnosis. The shell is small, fusiform, and solid. The shell has a uniformly cream colouration. The triangulate and orthostrophic protoconch is smooth and glossy, consisting of 4 whorls, with a well defined indented suture. The teleoconch has 16 to 18 axial costae. These are transected by three or four spiral cords that form distinctive nodules as they cross the coastae, giving the teleoconch a

pustulated appearance. The first sub-sutural cord has more pronounced nodules that are slightly paler in colouration, and continue onto the body whorl. The body whorl is coarsely sculptured with axial costae that are crossed with raised spiral cords forming distinctive nodulations which diminish dorsally towards the outer lip. The base of the shell is distinctly convex, with the point of inflection on the lower quarter of the shell. This point of inflection also marks a change in form and colour, as the shell develops broad spiral pale cords that are smooth and separated by narrow incised interspaces. The aperture is ovate. The inner labrum is concave with seven centrally raised nodules. The inner lip is smooth and of the same colour of the shell. The parietal wall is sigmoid, with five cords that are located between the points of inflection. The shell has a terminal growth form that is represented by a thick calloused labrum.

Habitat. The original habitat records that came with the description indicate that the types were collected on a sandy mud substrate in 14 m (Brazier, 1877). The new examples were found intertidally on calcareous algae growing in fine sandy mud. The new location is famous for its extreme tidal range which leaves a large expanse of sandy mud tidal flats that are exposed at low tide. These flats are treacherous, with areas of quick sand. The neighbouring mangrove-lined creeks are inhabited by estuarine crocodiles, and the tidal flow is so great that the incoming tile may form a tidal bore. This is most pronounced in the nearby Styx River where the bore may reach 0.5 m (Department of Environment and Science, 2018).

Distribution. At present, this species is known to range from Karratha in Western Australian around the top of Australia, to Brisbane. The new collection site is Clairview, Queensland (22º07’34’’ S, 149º32’35’’ E): Collectors Trevor and Marguerite Young (2009).

Variability. There is very little variability found in the newly located population. All specimens examined show uniformity in colour of the shell as well as similarities in structural presentation. Brazier (1877) noted that the sculpture is variable in intensity.

DISCUSSION

There has been a long historical reliance on the role of amateur collectors to provide information to institutions on distributions of known species and the discovery of new taxa (Klemann-Junior, 2017). This relationship is under serious threat of being lost. Historically, the discovery of new taxa rested in the realm of academia, but with the dwindling numbers of professional taxonomists, there has been an increasing role for the citizen scientist as the source for many new taxa (Maxwell, *et al.,* 2016, 2017). This is particularly the case in Australia where there is a discord between the Government propaganda on the need for increased action on taxonomic conservation in contrast to practical taxonomy, specifically in terms of funding actual zoological discovery (Commonwealth of Australia, 2010). The authors would suggest this lack of practical advance of government policy is a reflection on the move away from taxonomic practice within universities to a more ecological and climate change focused science research programs. It is therefore critical to the future of systematics that the role of classical taxonomy in species descriptions not be discounted.

While the Australian Government lacks interest in scientific discovery in favour of monitoring, the call for more practical roles for citizen scientists increases. However, there is a growing disjunct between these amateur naturalists and

the institutionally molecular focused taxonomists. Often institutional professionals discount these dedicated amateurs' knowledge, or the material they present, on the basis of a lack of viable molecular material. This rejection extends to amateurs' distributional understanding of the biology and ecology of the organisms they study. One classical example was the discovery of a nudibranch from Queensland that was hereto only known from an isolated population in the Philippines. When reported to an institutional "expert", the record was rejected outright as false data (Tassey Weinreich, personal communication).

The molecular fad within institutions has seen the decline in classical taxonomy (Tahseen, 2014). The professional molecular taxonomist is almost alienating the serious citizen scientist from the taxonomic process as the focus is moved from the shell to its molecular DNA contents. This can have a negative effect on those lifelong citizen scientists whose studies rely on classical taxonomic practice; but they need not fear. Classical taxonomic practice is the most reliable process of defining the extent of nature (Válka and Filho, 2007). Species are reference points that allow us to build the web of life in terms of connectivity and thereby resolve evolutionary theories of radiation based on field observations. When examining "cryptic species" that dwell in phylogenetic species conceptionalities, one must ask where is the test for reticulatory potential that was carried out when they were erected? Drawing the line of diversification in terms of genetic diversity is one of the ongoing debates with the use of molecular data where classical taxonomy still plays a crucial role (Pante *et al*., 2015). Classical taxonomy provides the basis of species delimitation with morphology and spatiotemporal positioning data and grounds species hypothesis in the real world. Genetically cryptic species are wonderful in theoretical conceptuality, however they are impractical taxonomically (*e.g.* Penny and Willan, 2014).

Unlike institutional collections that are often reflective of limited sampling of an area, the citizen shell collector may often visit an area repeatedly over an extended time period building an invaluable resource in terms of a longitudinal sampling and knowledge of changes in the species composition through time. Furthermore, as these avid collectors go about their private classification of material for their collections, they are often the first to uncover both novel taxa, and those taxa that have been lost within the literature, and this highlights the importance of citizen scientists in progressing taxonomy. Furthermore, it is imperative the citizen scientists who have decades of experience not be cast aside by molecular taxonomists along with those taxonomic practitioners who hold to a classical approach to the species identification.

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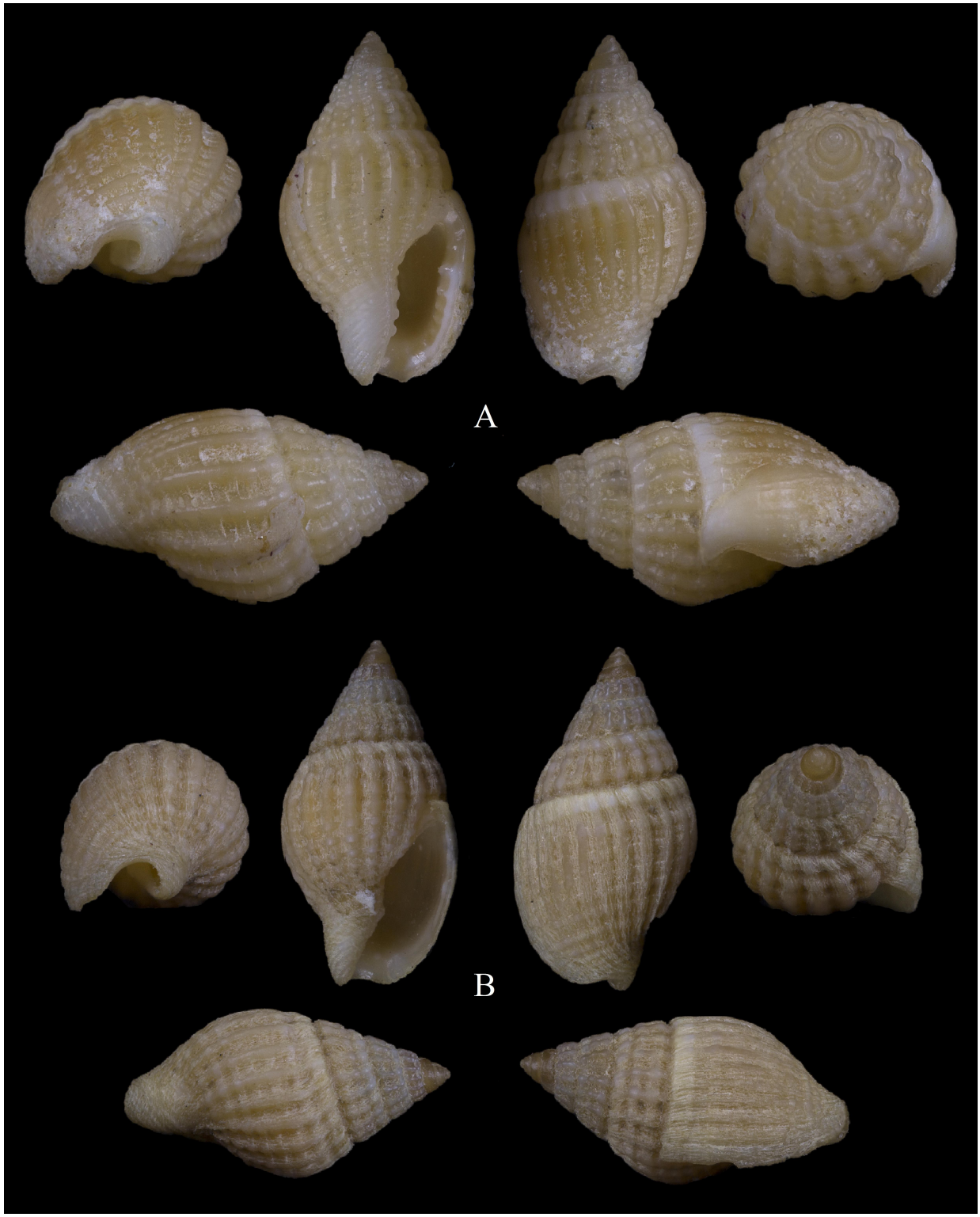

Figure 2. *Retizafra intricata* Hedley, 1812 from Clairview in central Queensland. A = 6.5 mm, in the Trevor & Marguerite Young Collection. B = 7.0 mm, in the David P. Berschauer Collection.

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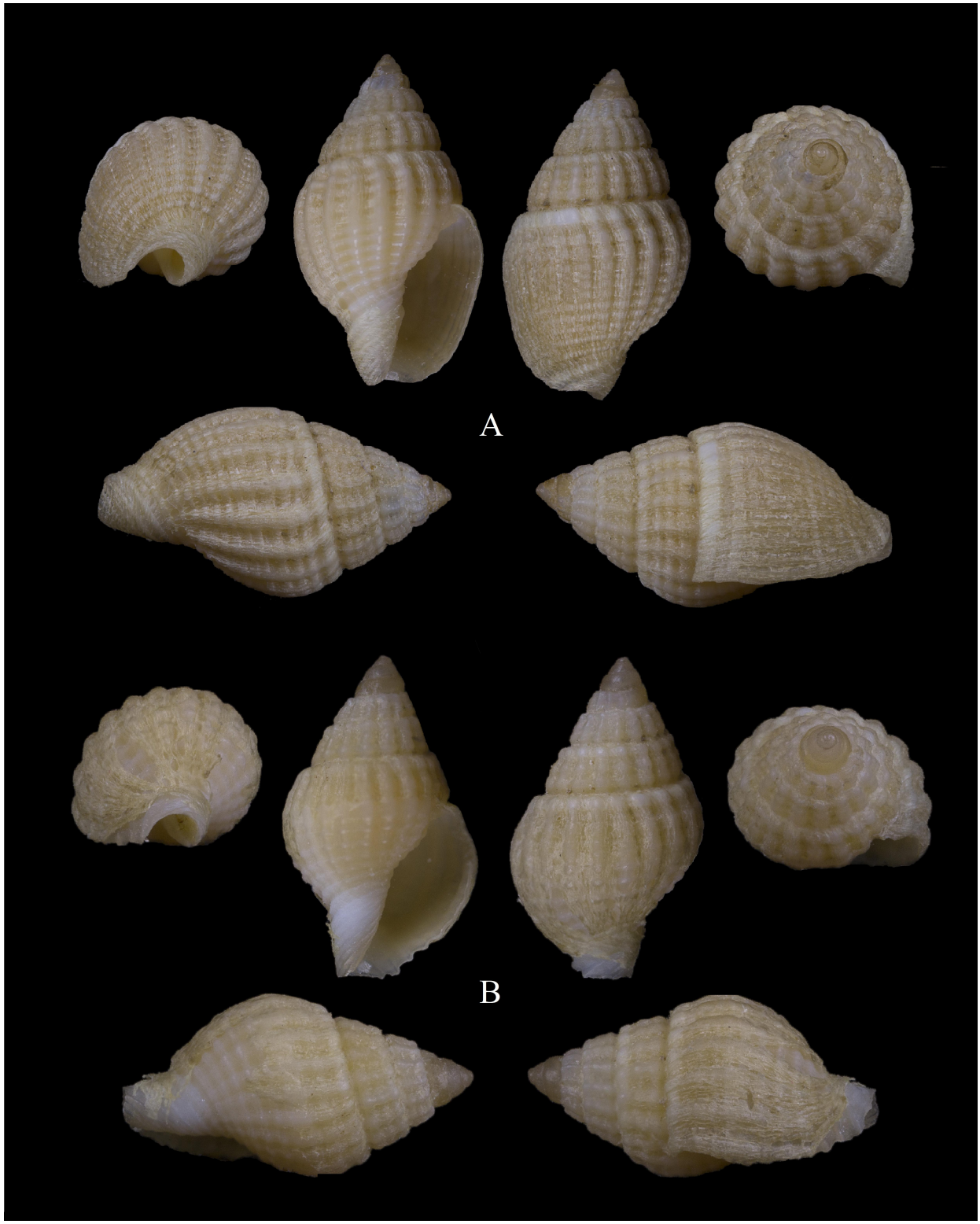

Figure 3. *Retizafra intricata* Hedley, 1812 from Clairview in central Queensland. A = 7.5 mm, in the Aart Dekkers Collection. B = 5.0 mm, in the Henk Dekkers Collection.

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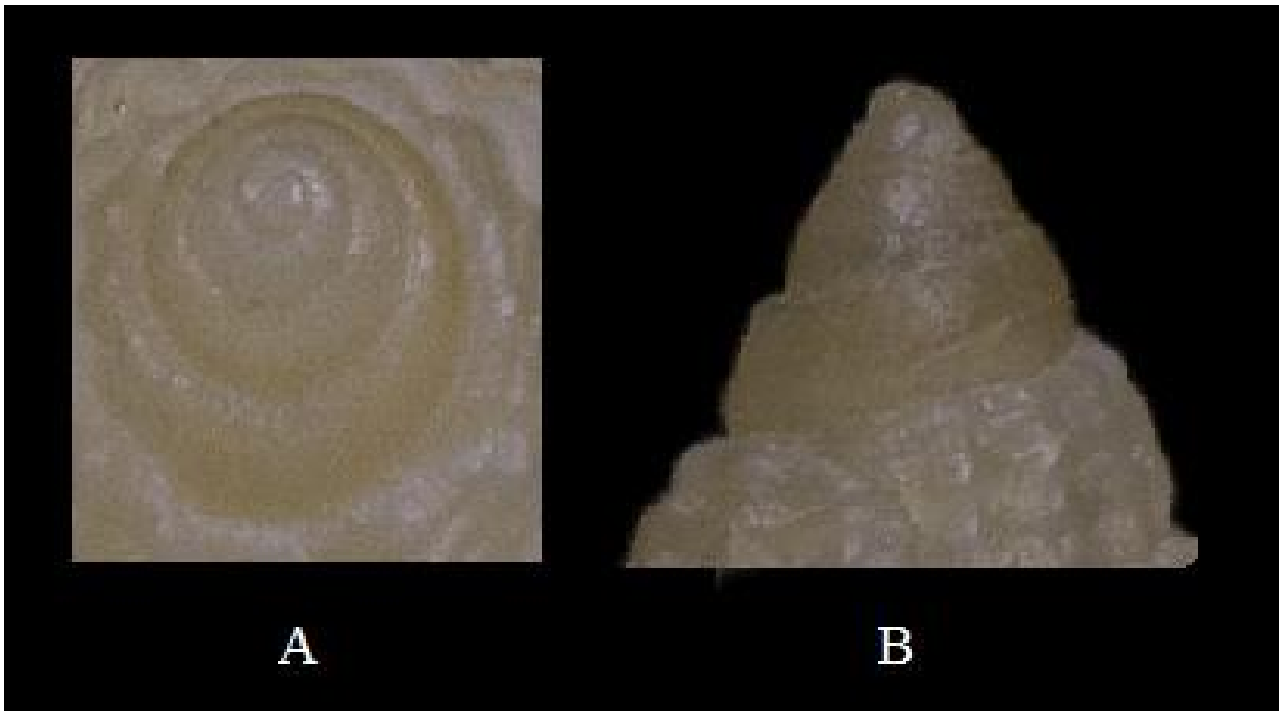

Figure 4. *Retizafra intricata* Hedley, 1812 - protoconch views. A = top view, B = side view.