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To cite this article: Rodrigo B. Salvador & Carlo Cunha (2020) *Lanayrella*, a new Acteonidae genus (Gastropoda, Heterobranchia) from Tierra del Fuego, *Journal of Natural History*, 54:15-16, 1009-1018, DOI: [10.1080/00222933.2020.1777338](https://doi.org/10.1080/00222933.2020.1777338)

To link to this article: <https://doi.org/10.1080/00222933.2020.1777338>



Published online: 30 Sep 2020.



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## *Lanayrella*, a new Acteonidae genus (Gastropoda, Heterobranchia) from Tierra del Fuego

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### ABSTRACT

We introduce herein *Lanayrella* gen. nov. to accommodate two Acteonidae species that have proven resistant to stable classification: *Tornatella vagabunda* Mabilie, 1885 and *Acteon ringei* Strebel, 1905. The new genus is diagnosed by a protoconch fully immersed within the shell and a platform-like columellar region of the aperture, which bears a strong and sharp adapical fold. Both species are restricted to Tierra del Fuego: *Lanayrella vagabunda* comb. nov. on the Chilean part and *Lanayrella ringei* comb. nov. on the Argentinean side.

<http://www.zoobank.org/urn:lsid:zoobank.org:act:37EA6720-0E0E-4C81-A2A8-F85FA2E53929>

### ARTICLE HISTORY

Received 13 March 2020

Accepted 18 May 2020

### KEYWORDS

*Acteon ringei*; Acteonoidea; Euthyneura; subantarctic; *Tornatella vagabunda*

## Introduction

Acteonids are small marine gastropods typical of infralittoral environments. Those animals usually possess thick and well-developed shells, a conspicuous and smooth protoconch, a teleoconch sculptured by numerous spiral rows of punctae, and a narrow columellar region bearing a fold (Zilch 1959–1960; Salvador and Cunha 2016). Acteonidae is the largest family in superfamily Acteonoidea (Bouchet et al. 2017) with 13 extant genera, seven of which occur in the Western Atlantic. Recently, new species and a genus from Western Atlantic waters have been described (Simone 2006; Cunha 2011; Salvador and Cunha 2016; Cunha and Simone 2018), showing a high diversity of this group and the potential for still unrecognised taxa, especially in deep water environments or poorly surveyed regions. The genus *Acteon* Montfort, 1810 is the most species-rich in the family, living in the intertidal zone to deep waters around the world. In the Subantarctic region of the Western Atlantic, Acteonidae is represented by two species of *Acteon* and five of *Neactaeonina* Thiele, 1912.

Herein, we introduce a new genus to allocate two acteonid species from Tierra del Fuego that have until now proven resistant to stable classification: *Tornatella vagabunda* Mabilie, 1885 and *Actaeon ringei* Strebel, 1905. The former taxon, described from Cape Horn, Chile, was later assigned to *Acteon* Montfort, 1810 by Pilsbry (1894), given that *Tornatella* Lamarck, 1816 was recognised as a junior synonym of *Acteon*. Subsequently, Marcus (1976) transferred it to the genus *Toledonia* Dall, 1902, belonging to the family Cylichnidae. However, this was based on specimens from Alagoas, northeastern Brazil (see Marcus 1970), that were

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misidentified and thus, do not belong to *T. vagabunda* (see below). The second species, *A. ringei* Strebel, 1905, was described from Strait Le Maire, Argentina, and has long been considered synonymous with *T. vagabunda* (Castellanos et al., 1993). However, based on examination of type material we show that it should be considered a distinct taxon.

## Material and methods

Study material, including type specimens, was obtained from four museum collections worldwide: CMPHRM, Coleção Malacológica Prof. Henry Ramos Matthews [Série A], Universidade Federal do Ceará (Fortaleza, Brazil); MNHN, Muséum National d'Histoire Naturelle (Paris, France); USNM, National Museum of Natural History, Smithsonian Institution (Washington, D.C., USA); ZMH, Zoologisches Museum Hamburg (Hamburg, Germany). Only empty shells are available. For detailed examination, the shells were mounted on stubs and observed uncoated in a Zeiss EVO scanning electron microscope (SEM) at the Staatliches Museum für Naturkunde Stuttgart (SMNS, Stuttgart, Germany). Measurements were made with the software program ImageJ (Rasband 2012); the abbreviations used in the text are as follows: H, shell height, parallel to coiling axis; D, greatest shell width, perpendicular to H; h, aperture height (maximum length parallel to H); d, aperture width (maximum width, perpendicular to H); S, spire height (defined as 'H - h'). The ratios D/H, h/H and d/h are used as an additional indication of shell shape.

The studied material of each species is listed below in their respective entries. Additional examined specimens are as follows: *Acteon* sp.: BRAZIL. Alagoas: CMPHRM 701A (1 shell, R/V Akaroa, sta 05c, 09°01'S 34°51'10"W, 370 m depth, 11/ix/1965). *Toledonia perplexa*: CHILE. Strait of Magellan: USNM 109022 (holotype, R/V Albatross, USFC, sta 2778, 53°01'00.12"S 70°42'15.12"W, 112 m depth, 23/i/1888).

## Systematics

Superfamily **ACTEONOIDEA** d'Orbigny, 1842–1843

Family **ACTEONIDAE** d'Orbigny, 1842

***Lanayrella*** gen. nov.

### *Type species*

*Tornatella vagabunda* Mabille, 1885.

### *Included species*

*Lanayrella ringei* (Strebel, 1905), *Lanayrella vagabunda* (Mabille, 1885).

### *Etymology*

Named after the Lanayru Sea from the game 'The Legend of Zelda: Breath of the Wild' (Nintendo Co., Ltd.), following the precedent set by Salvador and Cunha (2016) when naming a new acteonid genus after a fictional city. Gender: feminine.

### Diagnosis

Protoconch fully immersed within the shell. Columellar region of aperture platform-like, with a sharp adapical fold.

### Description

Shell acteonoid, thick, elongated; last whorl with slightly rounded profile; imperforate; D/H ca. 0.5. Spire with slightly rounded whorls and faintly step-like profile; suture distinctly marked. Protoconch indistinct, nucleus fully immersed (Figures 1(g) and 2(h)). Teleoconch with ca. 4.5 whorls, entirely sculptured by narrow punctuated spiral grooves; grooves are more numerous in later whorls and more closely packed together towards umbilicus (Figures 1(c) and 2(c)). Grooves composed of small rounded-rectangular punctae, partially fused to the next one within each groove; punctae remain individually distinct or more completely fuse with their neighbours (Figures 1(f) and 2(g)). Aperture anteriorly rounded, slightly narrowed posteriorly; parietal region with thin well-delimited callus; columellar region broad, slightly expanded, with a sharp edge, bearing a thickened adapical fold; outer lip sharp, thickened externally.

### Discussion

The shells of *Lanayrella* gen. nov. present some features that are typical of the genus *Acteon* (which explains their former classification), namely: a thick shell wall and the presence of punctuated spiral grooves on the teleoconch (Zilch 1959–1960; Valdés 2008; Cunha 2011). However, *Acteon* has a conspicuous smooth protoconch, strikingly differing from the completely immersed protoconch of *Lanayrella* (Figures 1(g) and 2(h)). This type of protoconch is the main diagnostic feature of the genus newly introduced here. Noteworthy, a partially (but not fully) immersed protoconch is known from other non-acteonid heterobranchs, such as a few species of succineiform/lymnaeiform *Toledonia* (*T. perplexa* Dall, 1902, *T. neocaledonica* Valdés, 2008, *T. epongensis*, Valdés, 2008).

Finally, the columellar region in *Acteon* is usually narrow, sometimes with a fold, whereas *Lanayrella* has a broader platform-like columellar region, with a ‘sudden’ and sharp adapical fold. As such, *Lanayrella* presents a unique set of features that allows us to propose this distinct genus in Acteonidae.

### *Lanayrella vagabunda* (Mabille, 1885) comb. nov. (Figure 1)

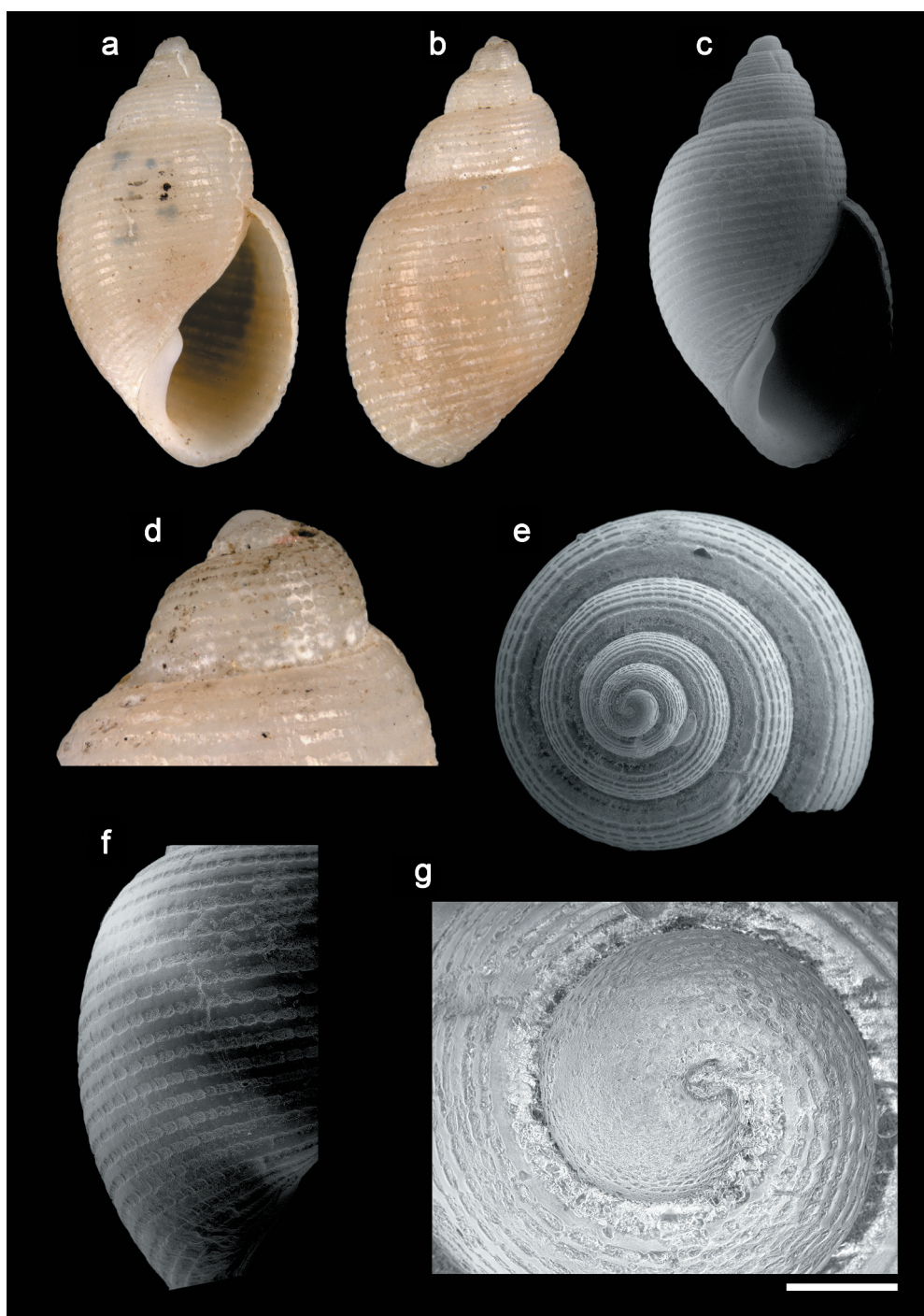
*Tornatella vagabunda* Mabille, 1885: 208; Rochebrune and Mabille 1889: 12–14, pl. 6, figs. 2a–b; Valdés and Héros 1998: 698, fig. 1C. *Acteon vagabunda*: Pilsbry 1894: 164, pl. 18, 95–96. *Acteon vagabundus*: Thiele 1912: 265; Linse 1999: 403; Forcelli 2000: 116. ‘*Acteon*’ *vagabundus*: Castellanos et al. 1993: 8, figs 5–6. *Toledonia vagabunda*: Rosenberg 2009 [in part]; Forcelli and Narosky 2015: pl. 7, fig. 18.

### Type locality

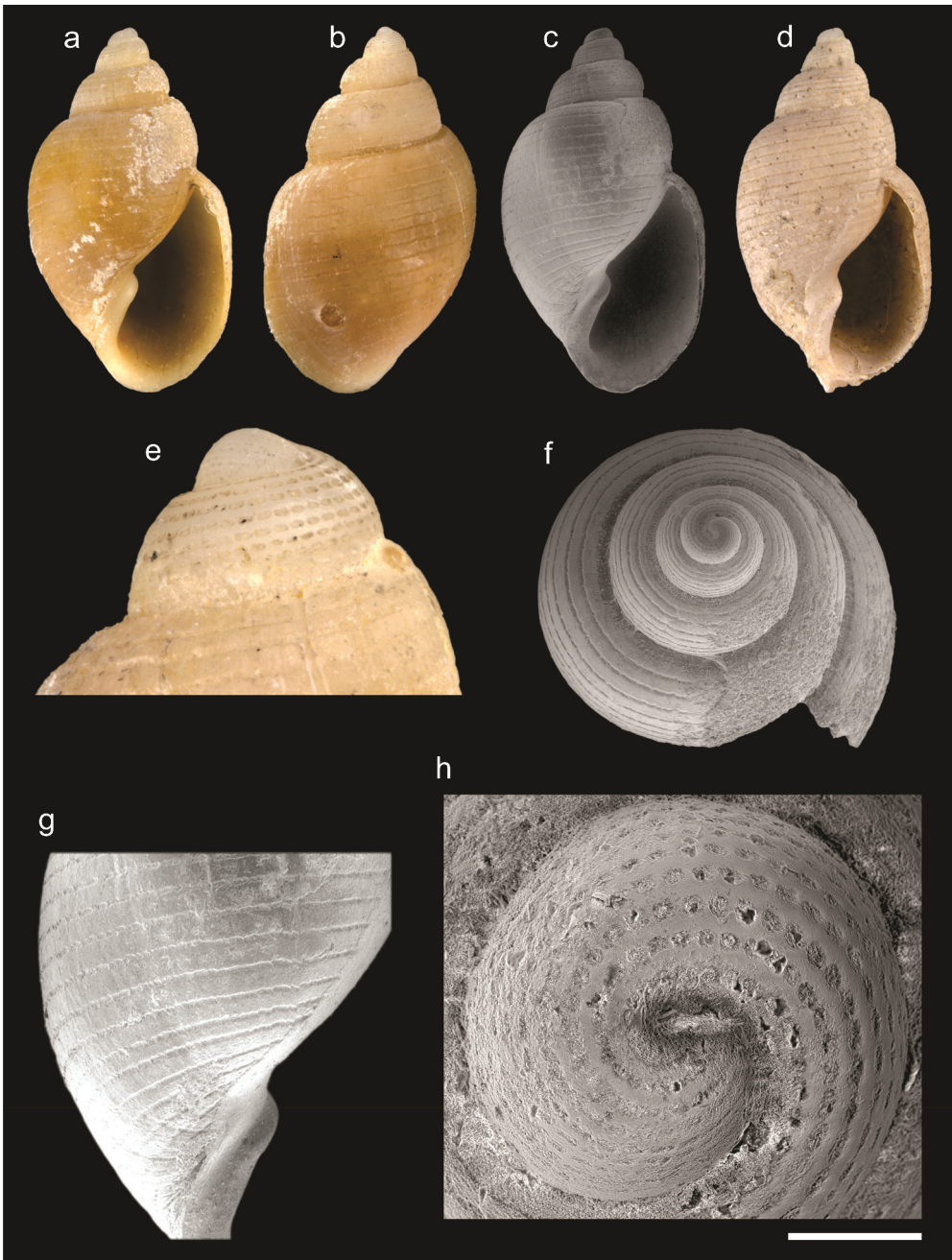
Chile: Magallanes Province, Cape Horn. ‘*In insulis Magellanicis* (de la Mission au Cap Horn, 1882–1883)’ (Rochebrune and Mabille 1889).

### Type material

Syntype MNHN-IM-2000-23191.



**Figure 1.** *Lanayrella vagabunda*, syntype; H = 8.2 mm. **A.** Apertural view. **B.** Dorsal view. **C.** Apertural view, under SEM. **D.** Detail of spire top showing teleoconch sculpture. **E.** Apical view, under SEM. **F.** Detail of body whorl showing teleoconch sculpture under SEM. **G.** Detail of spire top, under SEM, showing fully immersed protoconch. Scale bar = 200  $\mu$ m.



**Figure 2.** *Lanayrella ringei*, syntypes; spm #1: H = 8.0 mm; spm #2: H = 7.7 mm. **A.** Spm #1, apertural view. **B.** Spm #1, dorsal view. **C.** Spm #1, apertural view, under SEM. **D.** Spm #2, apertural view. **E.** Spm #1, detail of spire top showing teleoconch sculpture. **F.** Spm #1, apical view, under SEM. **G.** Spm #1, detail of body whorl showing teleoconch sculpture under SEM. **H.** Spm #1, detail of spire top, under SEM, showing fully immersed protoconch. Scale bar = 200  $\mu$ m.

### Diagnosis

Whorls and spire proportionately taller than in *L. ringei*; shell wall thinner; aperture more elongated. Teleoconch sculptured by more numerous punctate spiral grooves, closely packed together; punctae rectangular, large and well defined throughout the entire shell.

### Redescription

Shell elongated, last whorl with a slightly rounded profile, imperforate; D/H 0.49–0.52. Spire with slightly rounded whorls and faintly step-like profile; suture distinctly marked. Colour light brown. Protoconch indistinct, nucleus fully immersed (Figure 1(g)); first whorl width 0.42 mm. Teleoconch with 4.5 whorls, entirely sculptured by narrow punctuated spiral grooves (~26 grooves on last whorl), separated from each other by a distance of unsculptured shell of roughly the width of each groove (0.14 mm); grooves become more numerous in later whorls and are more closely packed together towards umbilicus (Figure 1(c)). Grooves composed of small rounded-rectangular punctae, partially fused to next one within each groove, but still individually distinct (Figure 1(f)). Aperture anteriorly rounded, slightly narrowed posteriorly; h/H 0.70; parietal region 0.5 h, with thin well-delimited callus; columellar region broad, slightly expanded, with a sharp edge, bearing a thickened adapical fold; outer lip sharp, thickened externally.

### Measurements

Syntype: H = 8.2 mm, D = 4.3 mm, S = 2.5 mm, h = 5.7 mm, d = 2.6 mm.

### Distribution

Tierra del Fuego, Cape Horn. Literature data: Magellan region (Linse 1999: defined as the Patagonian shelf south of ca. 41°S on both Pacific and Atlantic sides, including the Falkland Islands/Islas Malvinas); or 55–56°S 65–68°W (Castellanos et al. 1993; Rosenberg 2009; Rosenfeld and Aldea 2011). Depth: 10 m (Rosenberg 2009; Rosenfeld and Aldea 2011).

### Discussion

For a comparison with its congener, see *L. ringei* below.

### Remarks

Records of *L. vagabunda* were also published from Brazil, but we consider those as incorrect, as they represent a species of *Acteon*.

Marcus (1970: 924, figs. 6–7) reported '*Acteon vagabundus*' from Brazil based on four empty shells collected off Alagoas state, in the northeastern part of the country. Later reports were largely a repetition of Marcus (1970) (e.g. Marcus 1972, 1977; Rios 1994, 2009; Padula et al. 2012), but there has been a new report from off SE Brazil based on Marcus' identification (Benkendorfer and Soares-Gomes 2009). Marcus was also responsible for transferring the species to *Toledonia* (Marcus 1976). The examination of the material originally studied by Marcus (1970: CMPHRM 701A) suggested that it does not belong to *L. vagabunda*. In fact, the Brazilian shells differ from *L. vagabunda* by having an additional whorl (ca. 5.5), fewer spiral grooves (ca. 4), a much thicker shell wall, a shorter spire, a shorter columellar region of the aperture (length ~33% of parietal region's length), and a smooth protoconch. All these characters are consistent with the

genus *Acteon*, so Marcus' specimens are here referred to as *Acteon* sp., belonging to a species still under study (CMC, unpublished data). On the other hand, the material of Benkendorfer and Soares-Gomes (2009) was never deposited in any collection and is now considered lost. However, since their identification was based on the works of Marcus (1970 and onwards), we suggest that they also misidentified the same taxon. Therefore, we here rectify the distribution of *L. vagabunda*: it does not occur in Brazil or tropical waters at all.

### ***Lanayrella ringei* (Strebel, 1905) comb. nov. (Figure 2)**

*Actaeon ringei* Strebel, 1905: 576–577, pl. 22, figs 31, 31a–b.

#### **Type locality**

Argentina: Tierra del Fuego, Strait Le Maire.

#### **Type material**

Syntypes ZHM 12833 (3 shells).

#### **Diagnosis**

Whorls and spire proportionately shorter than *L. vagabunda*; shell wall thicker; aperture less elongated. Teleoconch sculptured by less numerous punctate spiral grooves, more widely spaced than *L. vagabunda*; punctae rectangular, large and well defined only on first whorls, becoming more elongated and less defined individually on later whorls.

#### **Redescription**

Shell thick, elongated, last whorl with a slightly rounded profile, imperforate; D/H 0.49. Spire short, with slightly rounded whorls and faintly step-like profile; suture distinctly marked. Colour light brown. Protoconch indistinct, nucleus fully immersed (Figure 2(h)); first whorl width 0.34 mm. Teleoconch with 4.5 whorls, entirely sculptured by narrow punctuated spiral grooves (~20 grooves on last whorl), separated from each other by a distance of unsculptured shell of twice to thrice the width of each groove (0.09 mm); grooves become more numerous in later whorls and more closely packed together towards umbilicus (Figure 2(c)). Grooves composed initially of small rounded-rectangular punctae on first whorls, partially fused to the next one within each groove but still individually distinct (Figure 2(c)). On later whorls, punctae become narrower and more fused with their neighbours, becoming less distinct individually; the groove takes the appearance of an almost continuous furrow (Figure 2(g)). Aperture anteriorly rounded, lightly narrowed posteriorly; h/H 0.58; parietal region 0.5 h, with thin well-delimited callus; columellar region broad, slightly expanded, with a sharp edge, bearing a thickened adapical fold; outer lip sharp, thickened externally.

#### **Measurements**

Syntype #1, H = 8.0 mm, D = 4.2 mm, S = 3.2 mm, h = 4.8 mm, d = 2.1 mm. Syntype #2, H = 7.7 mm, D = 4.0 mm, S = 3.3 mm, h = 4.4 mm, d = 1.8 mm. Syntype #3 (fragmentary), H = 7.1 mm, D = 3.5 mm, S = 3.0 mm, h = 4.1 mm, d = 1.6 mm.



### Distribution

Tierra del Fuego, Strait Le Mare. Further occurrences and bathymetric range uncertain due to species being long considered synonymous with *L. vagabunda*.

### Discussion

The synonymy of *L. ringei* with *L. vagabunda* was proposed by Castellanos et al. (1993). However, by analysing the type specimens of both taxa aided by high-resolution SEM images, a consistent set of diagnostic features can be seen, supporting their status as distinct species: the shell is much thicker and apparently sturdier than *L. vagabunda*; the whorls and spire are proportionately shorter; the teleoconch sculpture differs in bearing much narrower spiral grooves with less defined punctae (like a continuous furrow), which are much more spaced from one another (Figure 2(c,g)); the number of spiral grooves is lower in *L. ringei*; the aperture is less elongated than *L. vagabunda*.

### Conclusion

The genus *Lanayrella* is herein established to house two acteonid species based on a unique set of conchological features. Unfortunately, given that both species' provenance is Tierra del Fuego, material is very scarce, restricted to the type specimens, all dry shells. Needless to say, further molecular-grade material will help to better elucidate the relationships of this new genus to other Acteonidae genera.

### Acknowledgements

We are deeply grateful to the following people for loaning specimens and/or providing photos and data: Cristina Rocha (CMPHRM), Virginie Héros and Philippe Maestrati (MNHN), Ellen Strong (USNM), and Bernhard Hausdorf (ZMH). We are also grateful to Karin Wolf-Schwenninger and Christina G. Martin (SMNS) for the SEM images; to Guido Pastorino (MACN, Argentina) and Daniel Forcelli (Argentina) for the help in obtaining part of the literature; and to Jann Vendetti and two anonymous reviewers for their helpful suggestions. RBS acknowledges the support of the SMNS for the SEM analysis.

### Disclosure statement

The authors declare that no competing interests exist.

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