

## *Canariella* (*Salvinia*), New Subgenus, and Three New Species of *Canariella* Hesse, 1918 (Gastropoda: Pulmonata: Hygromiidae)

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**Abstract.** Three new species of *Canariella* Hesse, 1918, *Canariella tenuicostulata*, sp. nov. and *Canariella squamata*, sp. nov., from La Gomera Island, and *Canariella tillieri*, sp. nov., from La Palma Island (mid-Atlantic Canary Islands), grouped in *Canariella* (*Salvinia*), subgen. nov. are described. The new subgenus is characterized by the following diagnostic character of the vagina: near the oviducal orifice, inner distal vaginal wall thickened like a cushion with two crossed furrows, one longitudinal and the other transverse. The species *Helix discobolus* Shuttleworth, 1852, from La Gomera Island also belongs to *Canariella* (*Salvinia*), subgen. nov.

### INTRODUCTION

All known living species of the genus *Canariella* Hesse, 1918, are endemic to the Canary Islands, in the mid-Atlantic Macaronesian archipelagoes. Each species of *Canariella* is restricted to one island, except *C. plutonia* (Lowe, 1861), which lives on two islands.

Thirteen living species (comprising 22 nominal taxa of specific and subspecific rank) are known, two of them belonging to the nominotypical subgenus, *Canariella* (*Canariella*) Hesse, 1918:

*C. hispidula* (Lamarck, 1822), from Tenerife and a recent new species from La Gomera (Alonso et al., in press).

Three species belonging to *Canariella* (*Alvaradoa*) Ibáñez & Alonso, 1994 (Groh et al., 1994):

*C. pthonera* (Mabille, 1883) from Tenerife.

*C. multigranosa* (Mousson, 1872) from La Gomera.

*C. huttereri* Ponte-Lira & Groh, 1994, from El Hierro.

One species belonging to *Canariella* (*Simplicula*) Ponte-Lira & Alonso, 1996 (Ponte-Lira et al., 1996):

*C. plutonia* (Lowe, 1861) from Lanzarote and Fuerteventura.

Three species belonging to a new subgenus of *Canariella* (Ibáñez et al., in press): the extinct species *C. pontelirae* Hutterer, 1994, from Tenerife, and two recent new species (one from La Gomera and the other from El Hierro).

And five species not yet assigned to any subgenus (Ibáñez et al., 1995) because some of them will be grouped with other species awaiting description.

*C. planaria* (Lamarck, 1822) from Tenerife.

*C. leprosa* (Shuttleworth, 1852) from Tenerife.

*C. discobolus* (Shuttleworth, 1852) from La Gomera.

*C. eutropis* (Shuttleworth in Pfeiffer, 1860) from Fuerteventura.

*C. gomerae* (Wollaston, 1878) from La Gomera.

Moreover, some other fossil species from Lanzarote (Gittenberger & Ripken, 1985) and Europe (Pfeiffer, 1929; Wenz, 1924; Zilch, 1960) have been described.

We have found three additional *Canariella* species, two from La Gomera and one from La Palma; they are assigned to a new subgenus, *Canariella* (*Salvinia*), subgen. nov., to which *C. discobolus* (Shuttleworth, 1852) is also assigned. In this article we describe the new taxa.

### MATERIALS AND METHODS

The biometric methodology used in the conchological descriptions is the same as that of Ibáñez et al. (1995). Calculation of the number of shell whorls follows Kerney & Cameron (1979:13). The terms “shell” and “specimen” in the enumerations of material refer to empty shells and live specimens, respectively, and “proximal” and “distal” refer to position in relation to the gonad. Figures 1A, *Canariella gomerae*, and 1C, *C. planaria*, conchologically similar to the new species, as well as the Figures 1E and 2D, *C. (Salvinia) discobolus*, are included for taxonomic comparisons.

The following abbreviations are used: AIT, Alonso & Ibáñez collection, Department of Animal Biology, University of La Laguna, Tenerife, Canary Islands, Spain; ANSP, Academy of Natural Sciences, Philadelphia, Pennsylvania, USA; CGH, K. Groh private collection, Hackenheim, Germany; DMNH, Delaware Museum of Natural History, Greenville, USA; FMNH, Field Museum of Natural History, Chicago, Illinois, USA; MNHN, Muséum National d'Histoire Naturelle, Paris, France; NHM, The Natural History Museum, London, UK; NMB, Naturhistorisches Museum, Bern, Switzerland; NMW, National Museum of Wales, Cardiff, UK; SMF, Natur-Museum



Senckenberg, Frankfurt/Main, Germany; TFMC, Museo de Ciencias Naturales de Tenerife, Canary Islands, Spain; ZMZ, Zoologisches Museum der Universität Zürich, Switzerland.

## SYSTEMATICS

### HYGROMIIDAE Tryon, 1866

#### *Canariella* Hesse, 1918

**Type species:** *Carocolla hispidula* Lamarck, 1822, by monotypical designation of Hesse (1918:106–107).

**Diagnosis:** Mantle collar with five lobes, left lateral lobe almost indistinguishable in several species. Kidney sigmurethric, without secondary ureter. Central and first lateral radular teeth with small but evident ectocones. Right ommatophore retractor passing between penis and vagina. Dart-sac complex absent. One or several crown-shaped vaginal glands, each with an independent, slender initial portion present. Distal male duct between atrium and penis retractor muscle insertion with a sheath. Differentiation of penis from epiphallus sometimes indistinguishable externally. Penis retractor muscle with epiphallar insertion. Penial nerve originating from right cerebral ganglion.

#### *Canariella* (*Salvinia*), subgen. nov.

**Type species:** *Canariella tenuicostulata*, sp. nov.

**Diagnosis:** *Canariella* with hairy, keeled and almost disc-shaped shell; umbilicus deep and large (larger than 15% of shell diameter). Penis with a small spoonlike, grooved penial papilla, arising from two longitudinal epiphallar folds that merge distally and extend into the penial cavity. Vagina with several vaginal longitudinal folds separated from that of the bursa copulatrix pedunculus; near the oviducal orifice, inner distal vaginal wall thickened like a cushion with two crossed furrows, one longitudinal and the other transverse, the cushion occupying almost the entire vaginal cavity.

**Remarks:** *Canariella* (*Salvinia*), subgen. nov., groups four species, *C. discobolus* (Shuttleworth, 1852) and three new species described below. They are similar in discoidal shell form to some other *Canariella* species, such as *C. gomerae* (Wollaston, 1878), *C. planaria* (Lamarck,

1822), and two new species now in press (Ibáñez et al., in press). But *Canariella* (*Salvinia*), subgen. nov. differs from all other *Canariella* taxa in the following diagnostic character of the vagina, indicated in the diagnosis: “near the oviducal orifice, inner distal vaginal wall thickened like a cushion with two crossed furrows, one longitudinal and the other transverse” (Figures 2A–D: b, f). The new subgenus appears to be restricted to La Gomera and La Palma, two of the westernmost islands of the Canarian archipelago.

**Etymology:** The name *Salvinia* is dedicated to Dr. Luitfried von Salvini-Plawén (Wien), in honor of his malacological research.

#### *Canariella* (*Salvinia*) *tenuicostulata*

Alonso, Ibáñez & Ponte-Lira, sp. nov.

(Figures 1F, 2A, 3; Table 1)

*Helix discobolus* Shuttleworth, Wollaston, 1878:393–394; Mabilie, 1884:84; Mabilie, 1898:98. *Non* Shuttleworth, 1852.

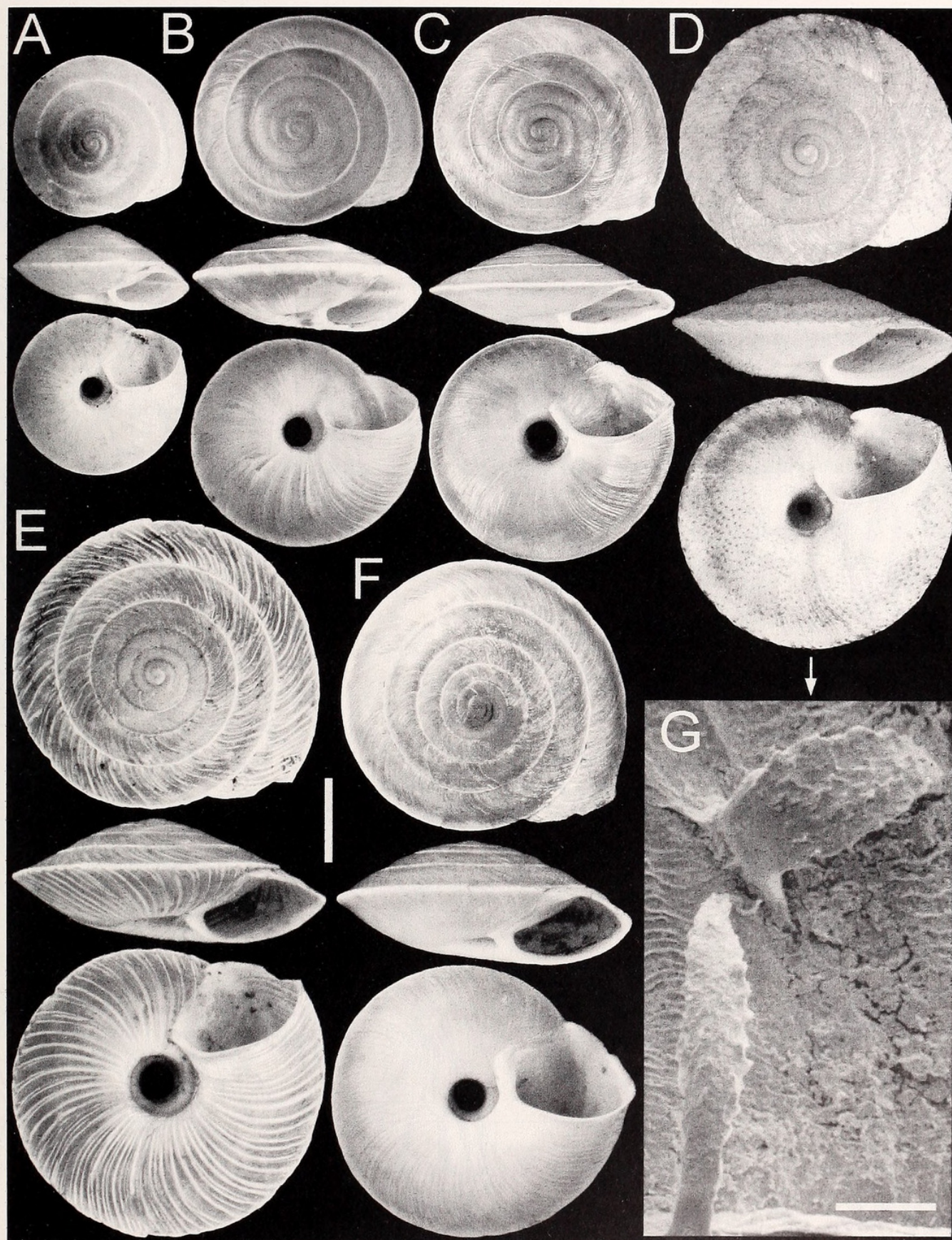
**Diagnosis:** A large *Canariella* (*Salvinia*) with strongly keeled, discoidal, umbilicate shell, 6–6¾ whorls. Penis with four longitudinal pilasters; penial papilla about ¼ length of penis. Vagina with two portions, distal tubular, long, and slender, and proximal shorter and thicker than distal, with two to three vaginal glands.

**Description:** Body yellowish pale brown, head with longitudinal lines of small darker brown spots. Shell discoidal, with nearly flat spire of 6–6¾ strongly keeled whorls; umbilicus slightly eccentric. Aperture ovate, angular at the shell periphery and with a very thin parietal thickening in old specimens. Basal and columellar peristome regions slightly reflected. Color uniform matte whitish brown. Teleoconch finely and radially ribbed dorsally, the ribs irregular on the last whorl; ventral ribs slightly more pronounced than dorsal ones. Thin periostracal hairs present on keel (up to 500 µm long) and umbilicus.

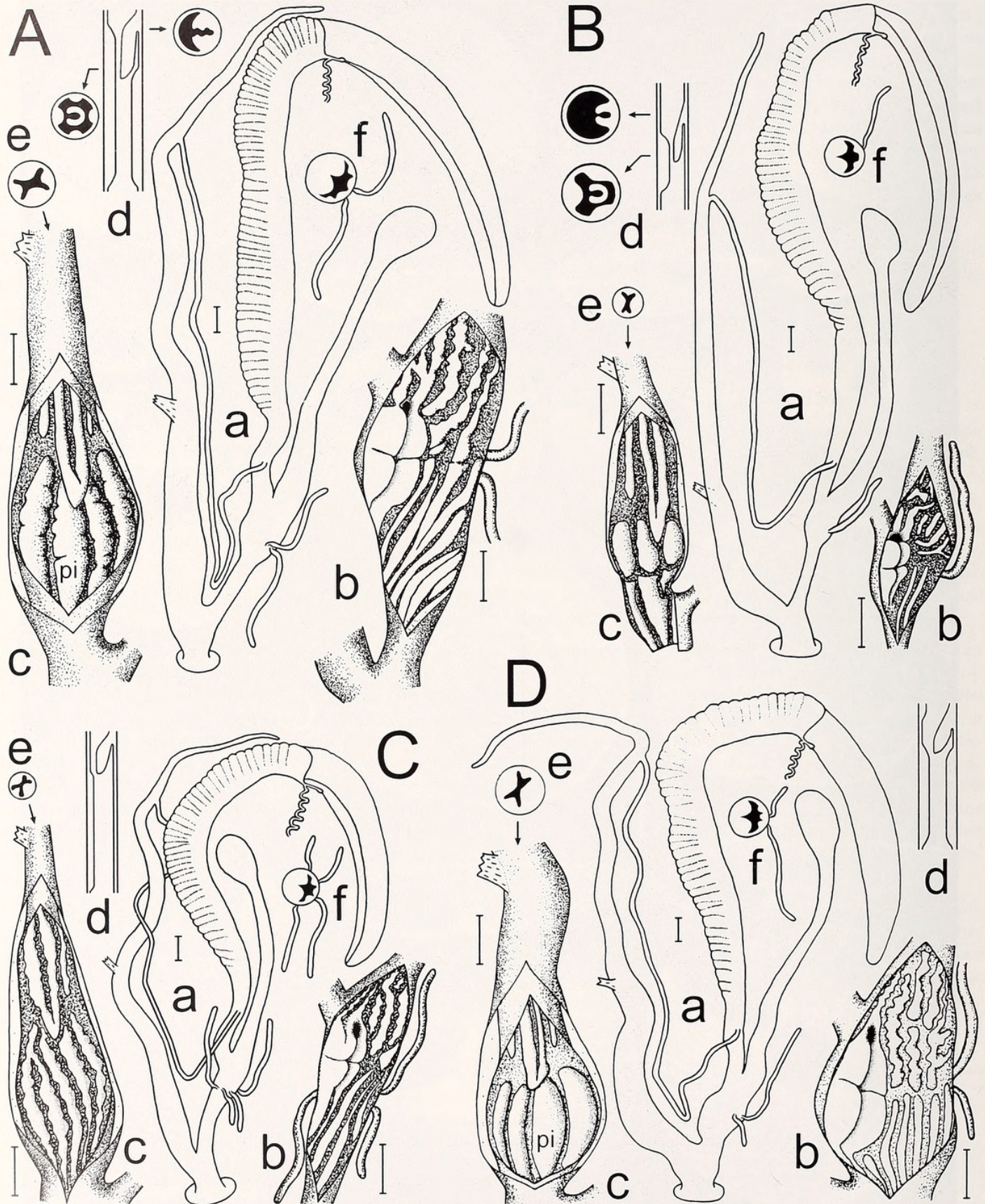
**Genital system (four specimens dissected):** Atrium short. Distal male duct longer than flagellum and shorter than epiphallar proximal portion. Epiphallus with four longitudinal folds, two ending distally as small papillae on the orifice connecting the penis and the other two extend in the penial cavity giving rise to a penial papilla of

Figure 1. Shell (scale line: 5 mm). A. Lectotype (Ibáñez et al., 1995) of *Canariella gomerae* (Wollaston, 1878) (NHM 95.2.216-19), from Hermigua, La Gomera. B. Holotype of *C. (Salvinia) tillieri* Alonso, Ibáñez & Ponte-Lira, sp. nov., from Faro de Punta Cumplida, La Palma. C. *C. planaria* (Lamarck, 1822), lectotype (Ibáñez et al., 1995) of *Helix afficta* Férussac, 1832 (MNHN, col Férussac), from Tenerife. D. Holotype of *C. (Salvinia) squamata* Alonso, Ibáñez & Ponte-Lira, sp. nov., from Agulo, La Gomera. E. *C. (Salvinia) discobolus* (Shuttleworth, 1852), from Barranco de La Rajita, La Gomera. F. Holotype of *C. (Salvinia) tenuicostulata* Alonso, Ibáñez & Ponte-Lira, sp. nov., from Lomo del Camello, La Gomera. G. *C. (Salvinia) squamata* Alonso, Ibáñez & Ponte-Lira, sp. nov., SEM detail of two irregular squamous hairs of dorsal side of shell (scale line = 100 µm).











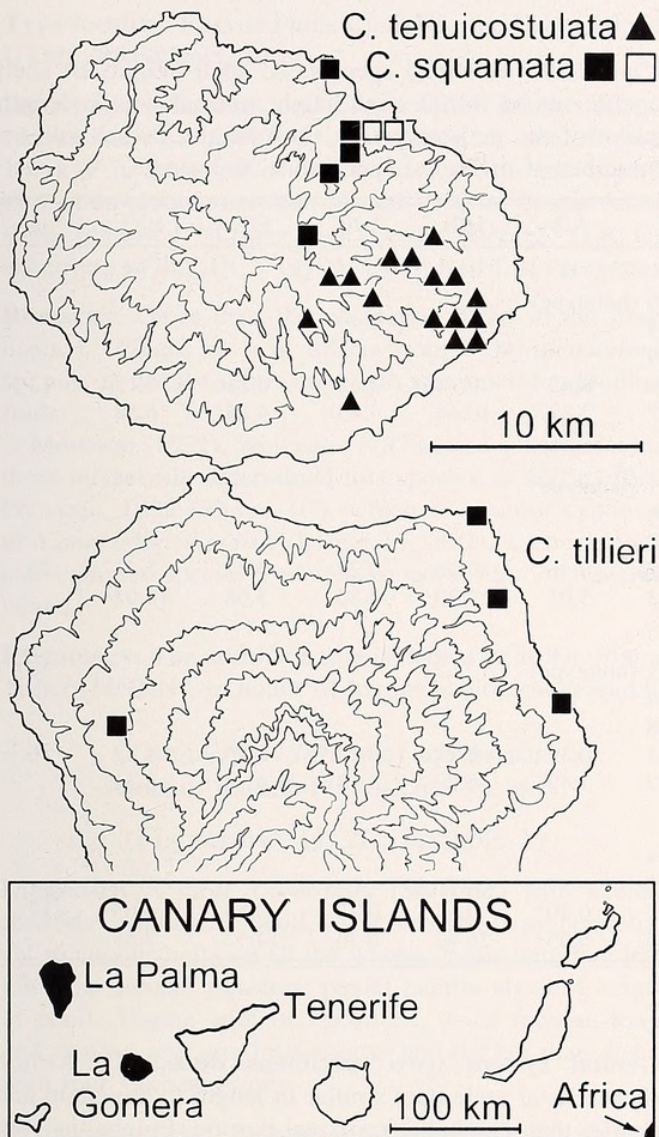


Figure 3. Recent (full symbols) and fossil/subfossil (empty symbols) geographical distribution of the species; contour line interval: 400 m; symbols represent  $1 \times 1$  km UTM squares.

about  $\frac{1}{4}$  length of penis. Distal portion of penis with four longitudinal wavy pilasters. Vagina with two portions, distal tubular, long, and slender with several small longitudinal folds, and proximal shorter and thicker than distal, with two or three fingerlike vaginal glands which

open together near the distal portion. Distal bursa copulatrix duct with numerous irregular longitudinal folds.

**Type material:** Holotype (TFMC MT 0376): Collected by E. Ponte-Lira, F. C. Henríquez, and M. J. Valido (27 January 1989). Paratypes: 27 specimens and 115 shells collected between 1983 and 2001; deposited in AIT (141 paratypes) and MNHN (1 paratype). Also, 2 paratypes (ANSP 6139; col. Hesse, Boettger, 1913, San Sebastián); 1 paratype (DMNH 128693; ex. R. Jackson, San Sebastián); 4 paratypes (FMNH 158207; exch. A. Cobos, San Sebastián); 7 paratypes (TFMC MT 0275/1, Lomo del Camello and TFMC MT 0282/2, 0287/3 y 0288/1, San Sebastián); 6 paratypes (ZMZ 508680/3, leg. Fritsch, 1863 and ZMZ 508679/3, leg. Wollaston, 1870, San Sebastián surroundings).

**Type locality:** Lomo del Camello (La Gomera Island; UTM: 28RBS8908, 500 m).

**Distribution, habitat and conservation status:** A species endemic to La Gomera, occurring in an area of about 50 km<sup>2</sup> in the south-east of the island with lowland vegetation, at an altitude between 100 and 1000 m. Conservation status proposed: "Lower Risk (Least Concern)" (LR, lc), according to the IUCN (1994, 1996) Red List categories.

**Remarks:** Of all the described *Canariella* species, *C. tenuicostulata*, sp. nov. shares only with *C. discobolus* the diagnostic character of the vaginal "cushion." The main differences between them are related to the shell and the vagina: *C. discobolus* has the shell bigger and with stronger ribs than that of *C. tenuicostulata*, sp. nov., and the vagina without the slender distal tubular portion present in *C. tenuicostulata*, sp. nov.

Wollaston (1878) and Mabile (1884, 1898) incorrectly determined this new species as *Helix discobolus* Shuttleworth, 1852 (Figure 1E), also from La Gomera Island; but Shuttleworth's original conchological description (Shuttleworth, 1852) jointly with the drawing (Shuttleworth, 1975) of *H. discobolus* show the stronger conchological ornamentation of the last species.

**Etymology:** The name *tenuicostulata* derives from the Latin *tenuis* (thin) and *costula* (small rib) and refers to the shell ornamentation.

Figure 2. Genital system and anatomical details. A. *Canariella (Salvinia) tenuicostulata* Alonso, Ibáñez & Ponte-Lira, sp. nov., from Lomo del Camello, La Gomera (AIT). B. *C. (Salvinia) tillieri* sp. nov., from Faro de Punta Cumplida, La Palma (AIT). C. *C. (Salvinia) squamata* Alonso, Ibáñez & Ponte-Lira, sp. nov., from La Chichara, La Gomera (AIT). D. *C. (Salvinia) discobolus* (Shuttleworth, 1852), from Barranco de La Rajita, La Gomera (AIT). Key: a: genital system; b: vagina; c: penis; d: diagram of a penis longitudinal section (without scale); e: epiphallus cross section; f: vagina cross section level of thickened wall, showing arrangement of vaginal digitiform glands; pi: pilaster. Scale line = 1 mm.



Table 1

Shell biometric data (dimensions in mm) and indices of the *Canariella* (*Salvinia*) species. A: shell height; B: shell diameter; C: shell, body whorl height; CV: Pearson's variation coefficient (in %); D: shell height, ventral side; E: length of aperture; F: width of aperture; G: umbilicus diameter (exclusive of the peristome); H: shell height, dorsal side (= A - D); M: maximum value; m: minimum value; n: number of measured specimens; X: average.

	A	B	C	D	E	F	G	A/B	H/B	D/B	E/F	B/G	n
<i>Canariella tenuicostulata</i>													
	7.44	17.88	5.88	4.81	6.43	7.65	2.76 (holotype)						
M	8.19	19.10	6.29	5.66	7.04	8.99	3.35						
m	6.94	15.98	5.02	3.85	6.00	7.21	2.39						
X	7.35	17.51	5.66	4.89	6.41	7.94	2.86	0.42	0.14	0.28	0.81	6.15	12
CV	3.29	4.14	4.92	6.53	4.30	5.12	6.97	2.82	10.48	4.43	4.24	6.58	
<i>Canariella tillieri</i>													
	5.94	13.80	4.84	3.96	5.20	6.09	2.81 (holotype)						
M	6.53	14.17	5.07	4.03	5.45	6.30	3.84						
m	5.60	11.94	3.90	3.19	4.06	5.02	1.89						
X	5.99	13.07	4.56	3.59	5.05	5.78	2.46	0.46	0.18	0.27	0.87	5.41	23
CV	4.00	3.64	5.38	6.48	4.75	4.42	11.63	5.01	12.20	4.80	3.68	10.01	
<i>Canariella squamata</i>													
	6.61	16.88	5.25	4.46	6.18	8.08	3.22 (holotype)						
M	6.71	17.58	5.41	4.61	6.18	8.08	3.94						
m	6.36	16.44	4.86	4.15	5.74	7.86	3.08						
X	6.54	16.77	5.20	4.46	6.07	7.97	3.51	0.39	0.12	0.27	0.76	4.82	6
CV	1.76	1.82	2.34	2.29	1.98	1.07	9.07	1.49	6.29	3.98	1.98	8.31	
<i>Canariella discobolus</i> (Shuttleworth, 1852)													
M	7.81	20.21	5.97	5.56	7.11	9.73	4.94						
m	6.62	16.08	5.14	4.21	5.67	3.56	2.95						
X	7.16	18.14	5.61	5.03	6.41	7.93	3.95	0.40	0.12	0.28	0.85	4.65	17
CV	4.68	4.78	3.45	7.03	5.43	9.52	9.95	5.65	26.42	6.36	14.52	7.88	

*Canariella* (*Salvinia*) *tillieri*

Alonso, Ibáñez & Ponte-Lira, sp. nov.

(Figures 1B, 2B, 3; Table 1)

*Helix afficta* Férussac, Mousson, 1872: 65; Wollaston, 1878: 392. *Non* Férussac, 1832.

**Diagnosis:** A medium-sized *Canariella* (*Salvinia*) with keeled, discoidal, umbilicate shell,  $5\frac{1}{2}$ – $6\frac{1}{4}$  whorls. Penis with three longitudinal pilasters; penial papilla about  $\frac{1}{2}$  length of penis. Vagina with two portions, distal tubular, long, and slender, and proximal shorter and thicker than distal, with one to two vaginal glands.

**Description:** Body whitish grey-brown, head with longitudinal lines of small darker brown spots. Shell discoidal, with a flattened spire of  $5\frac{1}{2}$ – $6\frac{1}{4}$  keeled whorls; umbilicus slightly eccentric. Aperture ovate, angular at the shell periphery. Basal and columellar peristome regions slightly reflected. Color uniform matte whitish brown, the keel whitish. Shell finely and radially ribbed, the ribs slightly more pronounced dorsally in the last whorl; ventral ribs slightly more pronounced than dorsal ones. Thin periostracal hairs present on keel (up to 400  $\mu$ m long) and umbilicus (up to 70  $\mu$ m long).

**Genital system (two specimens dissected):** Atrium short. Distal male duct similar in length to flagellum and shorter than epiphallar proximal portion. Epiphallus with four longitudinal folds, one ending inside the epiphallus, another ending distally as small papilla on the orifice connecting the penis and the other two extend in the penial cavity giving rise to a penial papilla of about  $\frac{1}{2}$  length of penis. Penis distal portion with three short and thick longitudinal pilasters. Vagina with two portions, distal tubular, long, and slender with two small longitudinal folds, and proximal shorter and thicker than distal, with one or two fingerlike vaginal glands. Distal bursa copulatrix duct with numerous irregular longitudinal folds.

**Type material:** Holotype (TFMC MT 0378): Collected by E. Ponte-Lira, F. C. Henríquez, and M. J. Valido (19 February 1989). Paratypes: 9 specimens and 86 shells collected between 1984 and 1989; deposited in AIT (88 paratypes), ANSP (A17993/1 and 396998/1), CGD (1 paratype), NHM (1 paratype), MNHN (1 paratype), SMF (309878/1) and TFMC (MT 0290/1). Also, 2 paratypes (NMB 289/2) and 1 paratype (NMW 1955.158.1525/1) from "La Palma."



**Type locality:** Faro de Punta Cumplida (La Palma Island; UTM: 28RBS2893, 10 m).

**Distribution, habitat, and conservation status:** A species endemic to La Palma, occurring in an area of about 100 km<sup>2</sup> in the north of the island with lowland vegetation, at an altitude between 10 and 1000 m. Conservation status proposed: "Lower Risk (Least Concern)" (LR, lc), according to the IUCN (1994, 1996) Red List categories.

**Remarks:** Other than the characters listed in the diagnosis, *C. tillieri*, sp. nov. differs from *C. tenuicostulata*, sp. nov. in distal vagina, only with two small longitudinal folds.

Mousson (1872), Wollaston (1878), and subsequent authors incorrectly determined this species as *Helix afficta* Férussac, 1832 (Figure 1C), which is a junior synonym of *Canariella planaria* (Lamarck, 1822), a conchologically similar species endemic to north-east of Tenerife Island.

**Etymology:** The specific name is dedicated to Dr. Simon Tillier (MNHN), in honor of his malacological research.

*Canariella (Salvinia) squamata*  
Alonso, Ibáñez Ponte-Lira, sp. nov.

(Figures 1D, G; 2C; 3; Table 1)

**Diagnosis:** A large *Canariella (Salvinia)* with keeled, discoidal, umbilicate shell, 6–6¾ whorls; large periostracal squamous hairs on all the whorls. Penis with five longitudinal slender pilasters; penial papilla about ⅓ length of penis. Vagina with two portions, distal tubular, long, and slender, and proximal shorter and thicker than distal, with four vaginal glands.

**Description:** Shell discoidal, with a nearly flat spire of 5¾–6 keeled whorls; umbilicus slightly eccentric. Aperture ovate, angular at the shell periphery and with a very thin parietal thickening in old specimens. Basal and columellar peristome regions slightly reflected. Color uniform matte whitish brown. Teleoconch finely and radially ribbed dorsally with ribs slightly more pronounced in the last whorl; ventral ribs slightly smoother than dorsal ones; the ribs are crossed by delicate spiral lamellae, visible under magnification. Large periostracal squamous hairs present on all the whorls, up to 600 µm long on keel and only up to 80 µm long in umbilicus.

**Genital system (three specimens dissected):** Atrium short. Distal male duct longer than epiphallar proximal portion, and the last longer than flagellum. Epiphallus with four longitudinal folds, one ending inside the epiphallus, another ending distally as small papilla on the orifice connecting the penis, and the other two extend in the penial cavity giving rise to a penial papilla of about ⅓ length of penis. Penis distal portion with five longitudinal slender and wavy pilasters. Vagina with two por-

tions, distal tubular, long, and slender, with several longitudinal folds, and proximal shorter and slightly thicker than distal, with four fingerlike vaginal glands. Distal bursa copulatrix duct with numerous irregular longitudinal folds.

**Type material:** Holotype (TFMC MT 0377): Collecting by P. Oromí (25 December 1986). Paratypes: 7 specimens, 59 fresh shells and 38 subfossil shells, collected between 1978 and 1989; deposited in AIT (103 paratypes) and TFMC (MT 0276/1).

**Type locality:** Agulo (La Gomera Island; UTM: 28RBS8420, 100 m).

**Distribution, habitat, and conservation status:** A species endemic to La Gomera, occurring in an area of about 20 km<sup>2</sup> in the north-east of the island with lowland vegetation and also with fayal-brezal, at an altitude between 100 and 1100 m. Conservation status proposed: "Lower Risk (Near Threatened)" (LR, nt), according to the IUCN (1994, 1996) Red List categories.

**Remarks:** *C. squamata*, sp. nov. is distinguished from *C. tenuicostulata*, sp. nov. and *C. tillieri*, sp. nov. by some characters listed in the diagnosis, as the number of penial pilasters and vaginal glands, as well as the size of the penial papilla in relation to the penis length. *Canariella squamata*, sp. nov. also differs from all the known *Canariella* species by the squamous hairs of the shell.

**Etymology:** The specific name derives from the Latin *squamatus* (scaly), and refers to the shell hairs, like scales.

## LITERATURE CITED

- ALONSO, M. R., M. IBÁÑEZ & C. E. PONTE-LIRA. In press. *Canariella (Canariella) falkneri* new species (Gastropoda: Pulmonata: Hygromiidae) from La Gomera (Canary Islands) in K. Groh (ed.), *Miscellanea Malacologica, Conchbooks*.
- GITTENBERGER, E. & TH. E. J. RIPKEN. 1985. Seven Late Miocene species of terrestrial gastropods (Mollusca: Gastropoda: Pulmonata) from the island of Lanzarote, Canary Islands. *Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen*, B 88(4):397–406.
- GROH, K., C. E. PONTE-LIRA, M. R. ALONSO & M. IBÁÑEZ. 1994. Revision of the genus *Canariella* P. Hesse 1918. *Alvaradoa* n. subgen., with description of one new species from El Hierro (Gastropoda Pulmonata: Hygromiidae). *Archiv für Molluskenkunde* 123(1/6):89–107.
- HESSE, P. 1918. Die Subfamilie Helicodontinae. *Nachrichtsblatt der Deutschen malakozoologischen Gesellschaft* 50(3):99–110.
- IBÁÑEZ, M., C. E. PONTE-LIRA & M. R. ALONSO. 1995. El género *Canariella* Hesse, 1918, y su posición en la familia Hygromiidae (Gastropoda, Pulmonata, Helicoidea). *Malacologia* 36(1–2):111–137.
- IBÁÑEZ, M., M. R. ALONSO & C. E. PONTE-LIRA. In press. A new subgenus and two new species of *Canariella* Hesse, 1918 (Gastropoda Pulmonata: Hygromiidae). *American Malacological Bulletin*.



- IUCN, 1994. IUCN Red List Categories. Prepared by the IUCN Species Survival Commission. The World Conservation Union. 21 pp.
- IUCN, 1996. 1996 IUCN Red List of Threatened Animals. The IUCN Species Survival Commission. J. Baillie & B. Groombridge (eds.), the World Conservation Union. 70 + 368 + 10 pp.
- KERNEY, M. P. & R. A. D. CAMERON. 1979. A Field Guide to the land Snails of Britain and North-West Europe. William Collins Son & Company: London. 288 pp.
- MABILLE, J. 1884. Matériaux pour une faune malacologique des Iles Canaries. II. Nouvelles Archives du Muséum d'Histoire naturelle (2)8:17-182.
- MABILLE, J. 1898. Notitiae malacologicae. Bulletin de la Société philomatique de Paris (7)9:78-102.
- MOUSSON, A. 1872. Révision de la faune malacologique des Canaries. Neue Denkschriften der allgemeinen Schweizerischen Gesellschaft für die gesammten Naturwissenschaften 25: 1-176, 6 pls.
- PFEFFER, G. 1929. Zur Kenntniss tertiärer Landschnecken. Geologische und paläontologische Abhandlungen, Neue Folge 17(3):153-380, pls. 15-17.
- PONTE-LIRA, C. E., M. R. ALONSO & M. IBÁÑEZ. 1996. *Canariella (Simplicula)* n. subgen. (Gastropoda, Pulmonata, Hygromiidae), de las Islas Canarias. Bollettino Malacologico 31(9-12):221-230.
- SHUTTLEWORTH, R. J. 1852. Diagnosen neuer Mollusken. Mittheilungen der naturforschenden Gesellschaft in Bern 260/261: 289-304.
- SHUTTLEWORTH, R. J. 1975. Tabulae ineditae Molluscorum Insularum Canariensium. W. Backhuys(ed.) 43 pp., 8 pls. [with the original plates made in 1853]. Krefeld (Goecke & Evers Verlag).
- WENZ, W. 1924. Über zwei fossile Helicodontinae: *Canariella disciformis* (Wenz) und *Caracollina noerdingensis* n. sp. Archiv für Molluskenkunde 56 (1):13-17.
- WOLLASTON, T. V. 1878. Testacea atlantica or the land and freshwater shells of the Azores, Madeiras, Salvages, Canaries, Cape Verdes and Saint Helena. Reeve & Company: London. 588 pp.
- ZILCH, A., 1960. Gastropoda, Euthyneura. Pp. 601-835 in W. Wenz (ed.), Handbuch der Paläozoologie. Gebr. Borntraeger: Berlin.





Alonso, María Rosario. and Ibáñez Genís, Miguell. 2003. "Canariella (Salvinia), new subgenus, and three new species of Canariella Hesse, 1918 (Gastropoda : Pulmonata : Hygromiidae)." *The veliger* 46, 69–76.

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