

Catalogue of terrestrial gastropods from Galápagos (except Bulimulidae and Succineidae) with description of a new species of *Ambrosiella* ODHNER (Achatinellidae)

(Mollusca: Gastropoda)

SERGIO E. MIQUEL¹ & HENRI W. HERRERA^{2,3}

Abstract

Excluding the families Bulimulidae and Succineidae, 27 species of land shells were identified in the Galápagos Archipelago (Ecuador), recorded in 14 islands. Many of the species are endemic, belonging to Helicinidae (two species), Achatinellidae (two), Pupillidae (four), Vallonidae (two), Strobilopsidae (one), Pristilomatidae (two), and Euconulidae (three). The most abundant records are found in the human inhabited islands: Santa Cruz, San Cristóbal, Isabela and Floreana. None of the families or genera is exclusive to the archipelago; the only endemic subgenus is *Strobilops* (*Nesostrobilops*). The most widespread species is *Gastrocopta munita*, recorded from 12 islands. Only a few species are recorded as unique to a single island (e.g., *Nesopupa (Infranesopupa) galapagensis*). A new species of *Ambrosiella* (Achatinellidae) from Floreana is described: characterized by a parietal lamella in the aperture, this species is related to the Chilean insular fauna. Human inhabited islands host several exotic species of inadvertently introduced micromolluscs and slugs, and one intentional introduction (*Lissachatina fulica*). Although the introduced species are dominant in anthropogenic altered sectors of the islands, they have also invaded natural areas. New records extend the distribution of almost all terrestrial gastropod species in the Archipelago.

Key words: Molluscs, Neritimorpha, Pulmonata, South America, Ecuador, Galápagos.

Introduction

Numerous scientific expeditions have been undertaken to the Galápagos Islands, officially named the Archipiélago de Colón (Columbus Archipelago), (Map 1), in the course of the nineteenth and twentieth centuries, during which several specimens of flora and fauna were collected. Among the most important were the Petrel Expedition (1875), the U. S. Fish Commission Steamer “Albatross” (1887–1888), the Stanford-Hopkins Expedition (1898–1899) and the expedition organized by the

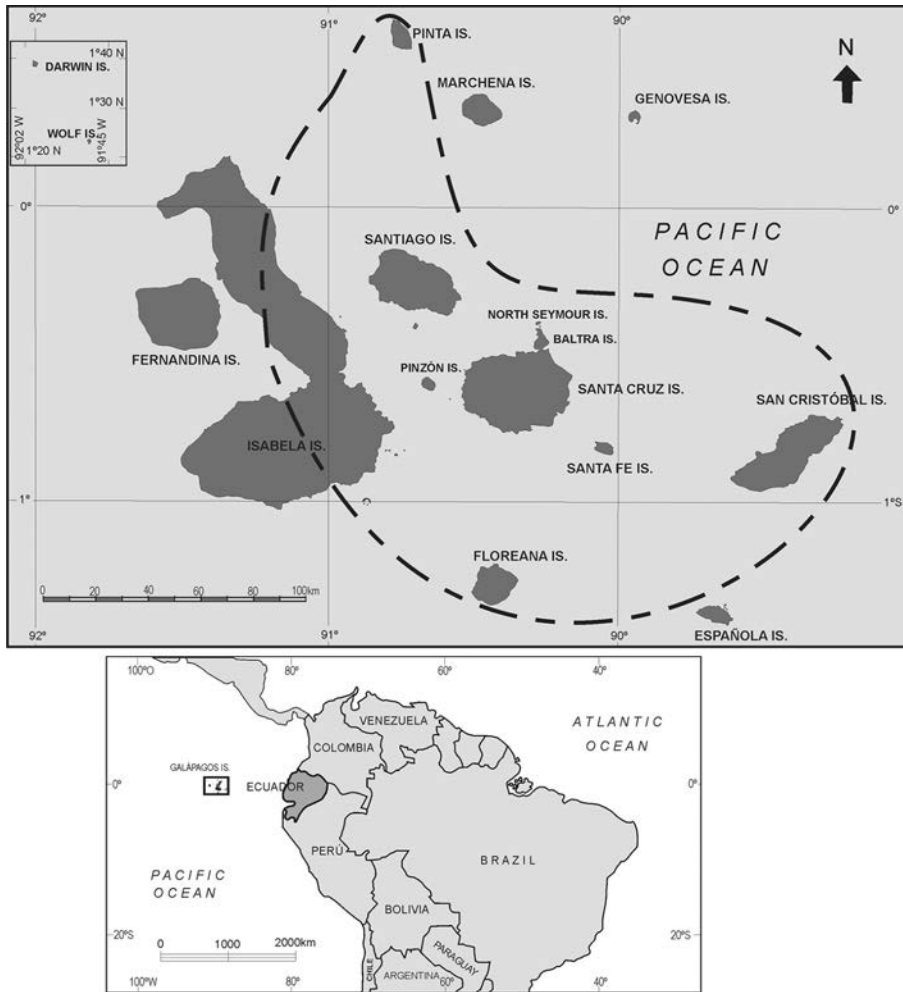
California Academy of Sciences (1905–1906). Currently, most of the specimens are deposited in institutions in the United States of America (Academy of Natural Sciences of Philadelphia, California Academy of Sciences and United States of Natural Museum).

In 1894, STEARNS summarized the malacological records published in the nineteenth century by REIBISCH (1893), DALL (1892, 1893) and others authors. DALL was the major contributor to the description of terrestrial gas-

Author’s addresses:

¹ Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Av. Ángel Gallardo 470, (1405) Ciudad Autónoma de Buenos Aires, República Argentina. Consejo Nacional de Investigaciones Científicas y Técnicas. semsnail@yahoo.com.ar

² Research and Curator of Terrestrial Invertebrate Collection, Charles Darwin Research Station, Puerto Ayora, Santa Cruz, Galápagos, Charles Darwin Foundation, Casilla 17-01-3891. Quito, Ecuador. ³ University of Ghent, Terrestrial Ecology, K.L. Ledeganckstraat 25, 9000 Gent, Belgium. henri.herrera@fcdarwin.org.ec



Map 1: Archipelago of Colón, Galápagos province, Ecuador.

Table 1: Spanish and English islands denomination and their acronyms.

Spanish	Acronym	English
Baltra	BAL	South Seymour
Daphne Mayor	DAP	Daphne Major
Española	ESP	Hood
Fernandina	FER	Narborough
Floreana/Santa María	FLO	Charles
Genovesa	GEN	Douwes/Tower
Isabela	ISA	Albemarle
Marchena	MAR	Bindloe
Pinta	PIN	Abingdon
Pinzón	PIZ	Duncan
San Cristóbal	SCB	Chatham
Santa Cruz/Chávez	SCZ	Indefatigable
Santa Fe	SFE	Barrington
Santiago/San Salvador	SAN	James
Seymour Norte	SEY	North Seymour

VOLGYI (1974) and WU & ITOW (1988) further contributed to the records of these micromollusc families.

This catalogue is mainly based on the study of the collection of terrestrial molluscs housed at the Charles Darwin Foundation (Puerto Ayora, Santa Cruz Island, Galápagos), whose history and objectives have been discussed by KRAMER (2009) and PARENT et al. (2012). It is intended to update the knowledge of such terrestrial molluscs through descriptions, illustrations, and distributions maps, with the exception of Bulimulidae and Succineidae, which are being subject of up-coming studies (Parent, pers.commun.), updating the old edited catalogue (DALL & OCHSNER, 1928) referred to these two families.

The genus *Ambrosiella* ODHNER 1963 is cited for the first time outside its native range in the San Ambrosio Island, Chile, with the description of a new species, *A. floreanae*, from Floreana Island.

Materials and methods

tropods from Galápagos, contributing to species of the families Helicinidae, Tornatellidae, Strobilopsidae, Pristilomatidae, and Euconulidae (DALL 1892, 1893, 1900, 1917). REIBISCH (1893), PILSBRY (1931, 1934), VAG-

The materials are housed in the Terrestrial Invertebrate Collection of the Charles Darwin Foundation in Puerto Ayora, comprising about 350 samples. Most of this collection is based on shells, many of them preserved in ethanol. Some of them were photographed

in the Service of Scanning Electron Microscopy of the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”. Material housed in foreign repositories (some of them types) and some other material, determined at specific and/or generic level, were included in the text and analysed in the Table 2. For the distributions, the islands are cited according to the official Spanish names currently in use, while for type localities, they are named as they appear in the original nomenclature (Table 1) (SNELL et al. 1996). The records for the generic discrimination are summarized in Table 2.

Abbreviations

AA	Agricultural area	CAS	California Academy of Sciences, California, USA
ANSP	Academy of Natural Sciences of Philadelphia, Philadelphia, USA	CDF	Charles Darwin Foundation
BPBM	Bishop Museum, Hawaii, USA	DM	Delaware Museum, Wilmington, USA
		ICCDRS	Invertebrates Collection of Charles Darwin Research Station
		IFML	Institute and Foundation Miguel Lillo, San Miguel de Tucumán, Argentina
		MCZ	Museum of Comparative Zoology, Harvard, USA
		NRS	Naturhistoriska Riksmuseet, Stockholm, Sweden
		SN/P	Sierra Negra / Pampa
		UCM	University of Colorado Museum, Boulder, USA
		USNM	United States National Museum of Natural History, Washington, USA
		VA	Alcedo volcano

Results

Helicinidae FÉRUSAC 1822

Helicina LAMARCK 1799

Helicina nesiotica DALL 1892

Figs 1–2, map 2

- 1892 *Helicina (Idesa) nesiotica* DALL: 97.
 1893 *Helicina Wolfi* REIBISCH: 29, Taf. II, Fig. 13.
 1894 *Helicina Wolfi* REIBISCH, – STEARNS: 416.
 1894 *Helicina (Idesa) nesiotica* DALL, – STEARNS: 418, 447.
 1896 *Helicina (Idesa) nesiotica* DALL: 451, pl. XV, figs. 1, 2; pl. XVII, fig. 12.
 1900 *Helicina nesiotica* DALL, – DALL: 96.
 1907 *Sturanya nesiotica* WAGNER: 45.
 1928 *Helicina nesiotica* DALL, – DALL & OCHSNER: 178.
 1951 *Helicina nesiotica* DALL, – ODHNER: 254.
 1971 *Helicina nesiotica* DALL, – SMITH: 7.
 1986 *Helicina nesiotica* DALL, – CHAMBERS & STEADMAN: 94.
 1988 *Helicina nesiotica* DALL, – WU & ITOW: 12, fig. 2.
 1991 *Helicina nesiotica* DALL, – CHAMBERS: 309.

Description (shell): Shell small, depressed, with rounded periphery; spire depressed; suture very distinct, not channelled; base moderately convex; peristome not thickened nor reflected; epidermis of a bright reddish chestnut, polished, but with obvious regular incremental lines; base with a thin white callus merging into the lower lip without notch or angle; operculum smooth, whitish, angulated only at the upper extreme; 2.3×3.3 mm (DALL 1896).

Measurements of figured specimen CDF: 3.50×2.70 mm (ICCDRS 0036988).

Type locality: “On leaves of plants on Chatham Is. at an elevation of 1,600 feet above the sea” (DALL 1896) (San Cristóbal, 525 m.a.s.l.).

Known distribution: Floreana, Isabela, San Cristóbal and Santa Cruz Islands; in San Cristóbal to 295 to 656 m.a.s.l., “among the mosses and rocks” (STEARNS 1894).

Records in CDF collection: Lives in areas of agriculture of Isabela and San Cristóbal and natural areas of Floreana.

Holocene distribution: Floreana and Santa Cruz Islands (CHAMBERS & STEADMAN 1986; see USNM Coll.).

Remark: WAGNER (1907–11) classified it in the Pacific genus *Sturanya* WAGNER 1905.

Type series: Lectotype: USNM 107324 (selected by CHAMBERS & STEADMAN 1986 as “Holotype”, R. HERSCHLER, pers. comm., 2011); Paralectotypes: USNM 887514/15; Paralectotypes (ex “paratypes”): MCZ Malacology 25420/10. San Cristóbal Is.

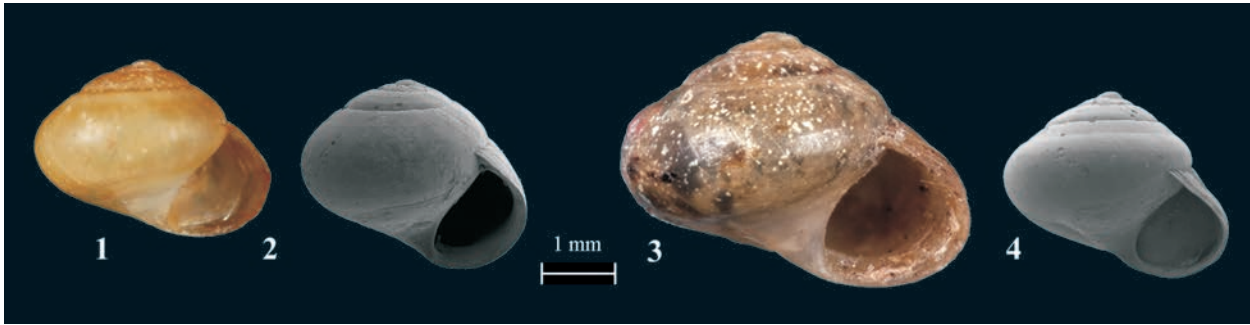
CDF material examined: FLO: ICCDRS 0036988/8. Cerro Pajas. $S1^{\circ}17'49.13''$ $W90^{\circ}27'23.04''$; ISA: ICCDRS 0036775/3. AA. $S00^{\circ}84'61.45''$ $W91^{\circ}00'65.04''$. ICCDRS 0036780/1; AA. SCB: ICCDRS 0036560/27. AA. $S0^{\circ}53'86.35''$ $W89^{\circ}32'88.19''$.

Helicina ochsneri DALL 1917

Figs 3–4, map 2

- 1917b *Helicina (Idesa) ochsneri* DALL: 382.
 1928 *Helicina (Idesa) ochsneri* DALL, – DALL & OCHSNER: 178, pl. 8, figs. 12–14.
 1991 *Helicina ochsneri* DALL, – CHAMBERS: 309.

Description (shell): Shell high, more conical and slightly larger, blackish periostracum which is raised on the spire between sutures into two or three fringed



Figs 1–2 *Helicina nesiotica* DALL 1892. Fig. 1 Lectotype. USNM 107324. San Cristóbal Island. Fig. 2 ICCDRS 0036988. Floreana, Cerro Pajas. — Figs 3–4 *Helicina ochsneri* DALL 1917. Fig. 3 CAS-IZ 66448.00. Lectotype. Isabela Island. Fig. 4 ICCDRS 0036566, Santa Cruz Island.

short spiral threads; the periostracum appears to be of an adhesive nature and all the specimens in their original condition are more or less covered with a blackish coating; 4.7 × 3.5 mm (DALL 1917).

Measurements of figured specimen CDF: 2.93 × 3.67 mm, 4.25 whorls (ICCDRS 0036566).

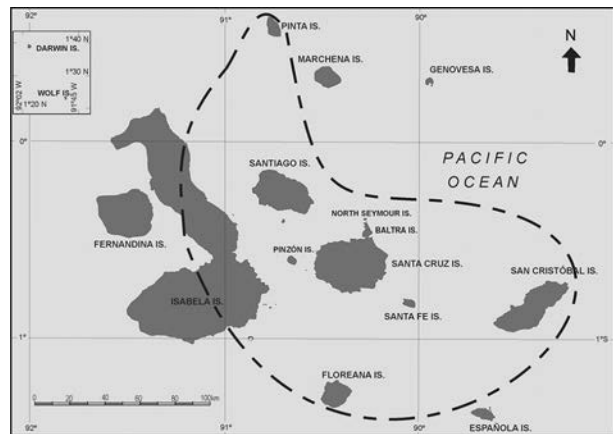
Type locality: “Albemarle Is., eight miles west of Turtle Cove, near salt lagoon; and at Cowley Mountain on moist ground, 350 to 500 feet above the sea” (DALL 1917) (Isabela Island, 115–164 m.a.s.l.).

Known distribution: Isabela and San Cristóbal Islands.

Records in CDF collection: Floreana, Isabela, Pinta, San Cristóbal, Santa Cruz and Santiago Islands. Reported in an urban area of Santa Cruz Island (Bellavista), in areas of agriculture of Isabela and San Cristóbal, and *Scalesia* zone and the interior of the crater of Cerro Pajas (Floreana).

Type series: Lectotype: CAS-IZ 66448.00; Paralectotypes: CAS-IZ 64158.00/5 (C. PIOTROWSKI, pers. comm., 2011); USNM 216021/5, USNM 216022/4. ISA, Cowley Mountain.

CDF material examined: FLO: ICCDRS 0036556/8 + 0036558/5 + 0036565/3. Cerro Pajas. Base. 350 m; ICCDRS 0036557/6. Cráter Cerro Pajas; ICCDRS 0036563/3. Mitad Cerro Pajas. 480 m; ICCDRS 0036567/12 + 0036568/1 + 0036570/1 juv.; ICCDRS 0036642/3. Cráter Cerro Pajas, Zona *Scalesia*; ISA: ICCDRS 0036562/1. AA. S00°51'00.53" W91°02'31.69"; ICCDRS 0036569/1. SN/P. IX/1990; ICCDRS 0036769/2. AA. S00°51' 56.31" W91°01'71.12"; ICCDRS 0036772/3. AA. S00°82'18.50" W91°04'24.88"; ICCDRS 0036773/2. AA. S00°81' 85.0" W91°10'42.88"; ICCDRS 0036774/49. AA. S00°83'59.96" W91°09'78.77"; ICCDRS 0036776/1. AA. S00°83'05.94" W91°06'65.59"; ICCDRS 0036777/1. AA. S00°83'59.96" W91°09'7877"; ICCDRS 0036778/2. AA. S00°84'58.02" W91°05'83.40"; ICCDRS 0036781/3. AA. ICCDRS 0036782/3. AA. ICCDRS 0036783/3. AA. ICCDRS 0036828/1. VA. Zona Guayabinos; PIN: ICCDRS 0036553/4. 1800 ft.; ICCDRS 0036559/17. 1300 ft.; SCB: ICCDRS 0036766/1. AA. S00°54'96.23" W89°33'08.82"; ICCDRS 0036767/22. AA. S00°54'14.99" W89°26'52.80"; SCZ: ICCDRS 0036555/1. Basurero, 4 km. 110 m.a.s.l.; ICCDRS 0036564/140 + 0036566/62 + 0036571/1 + 0036572/1



Map 2: Distribution of *Helicina* spp.

+ 0036573/2; ICCDRS 0036574/5 + 0036576/3; 750 ft. under “green zone”; ICCDRS 0036575/35 + 0036577/58 + 0036578/16; ICCDRS 0036579/2. El Mirador. 490 m.a.s.l.; ICCDRS 0036684/2. Mina Granillo Rojo; SAN: ICCDRS 0036554/1. La Trágica. 360 m; ICCDRS 0036853/2. Bellavista. Predio de la Universidad Central.

Achatinellidae GULICK 1873

Tornatellidinae COOKE & KONDO 1961

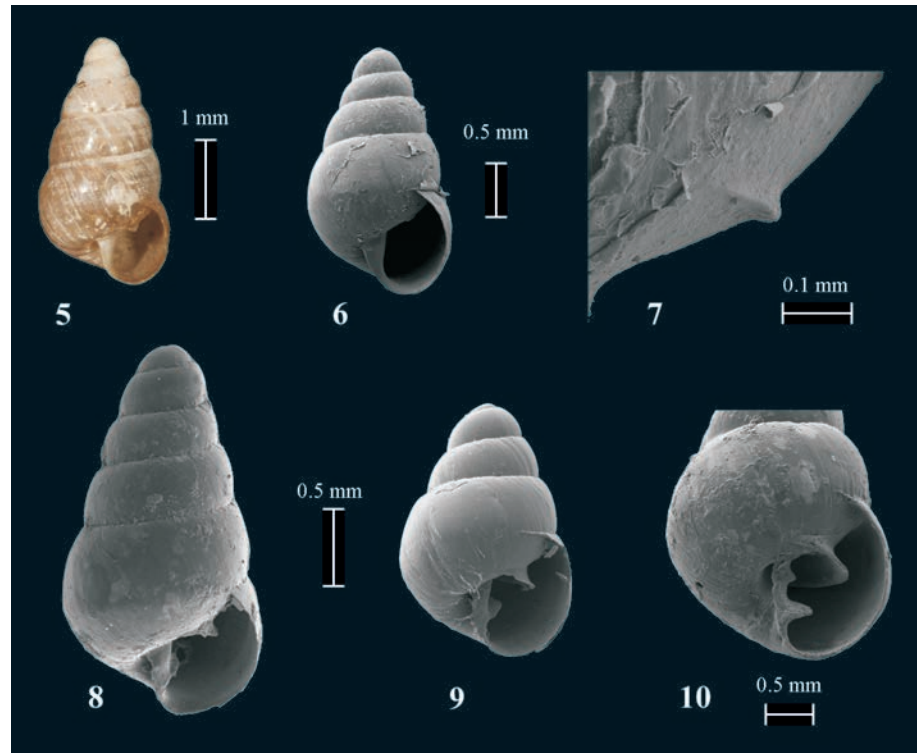
Tornatellides PILSBRY 1910

Tornatellides chathamensis (DALL 1892)

Figs 5–7, map 3

- 1892 *Leptinaria chathamensis* DALL: 98.
 1893 *Bulimulus (Pelecostoma) cymatoferus* REIBISCH: 26, Taf. II, Fig. 7.
 1894 *Bulimulus (Pelecostoma) cymatoferus* REIBISCH, – STEARNS: 415.
 1894 *Leptinaria chathamensis* DALL, – STEARNS: 418, 428.
 1896 *Leptinaria chathamensis* DALL, – DALL: 451, pl. XVI, fig. 9, pl. XVII, fig. 16.
 1900 *Tornatellina chathamensis* DALL, – DALL: 95.
 1915 *Tornatellides chathamensis* DALL, – PILSBRY: 201, pl. 44, figs. 17–19.
 1928 *Tornatellina chathamensis* DALL, – DALL & OCHSNER: 177.
 1951 *Tornatellides chathamensis* DALL, – ODHNER: 254.

Figs 5–7 *Tornatellides chathamensis* DALL 1892. Fig. 5 USNM 107322. Syntype. San Cristóbal Island. Fig. 6 ICCDRS 0036629. Isabela Island, Sierra Negra/Pampa. Fig. 7 ICCDRS 0036629. Isabela Island, Sierra Negra/Pampa. Detail of a parietal rib. — Figs 8–10 *Ambrosiella floreanae* n. sp. Fig. 8 Holotype ICCDRS 0036992. Ecuador, Galápagos province, Floreana Island, Pampa de Alviar. Fig. 9 Paratype ICCDRS 0037050. Ecuador, Galápagos province, Floreana Island, Cerro Alieri. Fig. 10 Paratype ICCDRS 0036932. Floreana Island, Pampa de Alviar, detail of aperture.



- 1966 *Tornatellides chathamensis* DALL, – SMITH: 248.
 1971 *Tornatellides chathamensis* DALL, – SMITH: 7.
 1986 *Tornatellides chathamensis* DALL, – CHAMBERS & STEADMAN: 94.
 1988 *Tornatellides chathamensis* DALL, – WU & ITOW: 12, fig. 2.
 1991 *Tornatellides chathamensis* DALL, – CHAMBERS: 309.

Description (shell): Shell small, with a blunt apex and six rounded whorls; suture very distinct; horn-colored; surface polished, delicately marked with lines of growth; base rounded, relatively rather widely umbilicated; aperture with the margin hardly thickened, rounded in front and at the suture; pillar broad, thin; body with a single elevated, thin, sharp lamina, extending spirally inward from a point a little behind the peristome and nearly equidistant from the inner and outer lips; 3.0×1.6 mm (DALL, 1896; PILSBRY 1915).

Measurements of figured specimen CDF: 2.33×1.33 mm, 4.25 whorls (ICCDRS 0036629).

Type locality of *T. chathamensis*: “Chatham Is., on ferns at 1,600–2,000 feet above sea level” (DALL, 1896) (San Cristóbal, 525–656 m.a.s.l.).

Type locality of *B. (P.) cymatoferus*: San Cristóbal Island.

Known distribution: Fernandina, Floreana, Isabela, Pinzón, San Cristóbal and Santa Cruz Islands. On the fronds of ferns (DALL & OCHSNER 1928).

Records in CDF collection: Floreana, Isabela, Santa Cruz, San Cristóbal and Santa Cruz Islands. In areas of agriculture of Floreana, San Cristóbal and Santa Cruz; in Sierra Negra/Pampa and Cerro Pajas (*Scalesia*

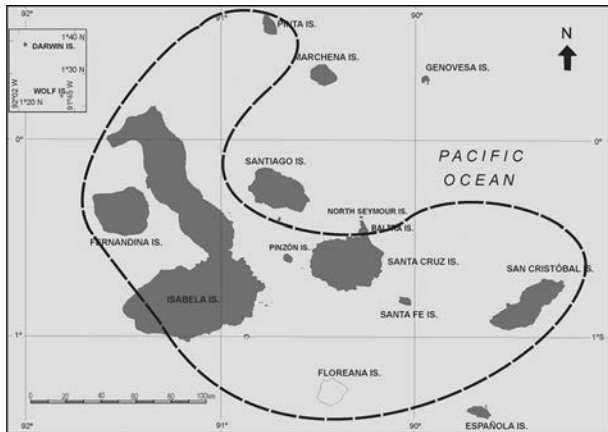
zone and crater) (Floreana), and in *Miconia* zone (Santa Cruz).

Holocene distribution: Santa Cruz Island (CHAMBERS & STEADMAN 1986; see USNM, NRS w/n and BPBM Colls. (ODHNER 1951 and CHAMBERS & STEADMAN 1986).

Remark: see DALL (1896) and CHAMBERS & STEADMAN (1986) for more synonyms.

Type series: *L. chathamensis*: Syntypes: USNM 107322/6.

CDF material examined: FLO: ICCDRS 0036632/34. AA. S01°30'95.51" W90°44'09.07"; ICCDRS 0036633/24. AA. S01°30'91.97" W90°44'40.34"; ICCDRS 0036634/4. AA. S01°30'38.64" W90°44'70.38"; ICCDRS 0036635/9. AA. S01°19'56.66" W90°26'44.99"; ICCDRS 0036636/16. AA. 01°30'66.38" / 90°44'41.41"; ICCDRS 0036637/1. Cerro Pajas. Base. 350 m. 2–12/V/1992; ICCDRS 0036639/1 + 0036643/13 + 0036640/3. Cráter Cerro Pajas. Zona *Scalesia*; ICCDRS 0036644/1 + 0036646/12 + 0036648/8 + 0036650/2 + 0036651/13 + 0036652/4; ICCDRS 0036674/19. Finca “La Primavera”. 300 m.a.s.l.; ICCDRS 0036718/1. AA. 01°17' 84.02" / 90°26'63.53"; ICCDRS 0036719/4. AA. S01°30'91.97" W90°44'40.34"; ICCDRS 0036720/5. AA. S01°30'66.38" W91°44'41.41"; ICCDRS 0036721/1. AA. S01°19'56.44" W90°26'65.49"; ISA: ICCDRS 0036627/1 + 0036628/2 + 0036629/18 + 0036630/2 + 0036631/112 + 0036638/19 + 0036645/18 + 0036649/1 + 0036653/1 + 0036654/16. SN/P; ICCDRS 0036839/21. AA. S0°82'97.85" W91°06'89.76"; PIN: ICCDRS 0036625/2. 1800 ft.; ICCDRS 0036626/1. 1300 ft.; ICCDRS 0036841/1. 1800 ft. *Zanthoxylum* forest; SCB: ICCDRS 0036716/1. AA. S0°53'2015" W89°29'36.45"; SCZ: ICCDRS 0036647/92 + 0036655/10 + 0036683/75. Mina Granillo Rojo; ICCDRS 0036717/1. AA.



Map 3: Distribution of *Tornatellides chathamensis* (broken line) and *Ambrosiella floreanae* n. sp. (white area).

Ambrosiella ODHNER 1963

Ambrosiella floreanae n. sp.

Figs 8–10, Map 3

1988 *Tornatellides kahoolavensis* WU & ITOW 1988: 12.

Diagnosis (shell): Shell turritid, with 6 whorls convex, imperforate, last whorl larger than the spire, parietal edge of the aperture with a medial, sharp and concave lamella; columella with one or two lamellae, the lower is strong, the upper is weak and not always present; colour nearly uniform brown.

Description (shell): Shell turritid, with 6 whorls slightly convex, imperforate, thin, 1.75 higher than wide, apex acute, suture rather deep; last whorl larger than the spire (between 60–65 % respect to the length), aperture is somewhat oblique, tight, almost 2/3 respect to the last whorl, parietal edge with a medial, sharp and concave lamella, internal wall of aperture is smooth; columella straight, with one or two lamellae, the lower is strong, the upper is weak and not always present (can be inadvertent when its position is very internal); growth lines faintly marked; colour nearly uniform weakly brown.

Measurements of holotype ICCDRS 0036992-1: 2.50 × 1.30 mm, 6 whorls (ICCDRS 0036992).

Type locality: Ecuador, Galápagos province, Floreana Is., Pampa de Alviar, S1°18'47.99" W90°26'6.72". Coll. R. Martínez, 15/I/2011.

Actual distribution: Floreana Island, Galápagos province, Ecuador.

Type series: holotype ICCDRS 0036992-1; 13 paratypes ICCDRS 0036992-2; 1 paratype: ICCDRS 0036932. — Additional paratypes: Ecuador, Galápagos province, Floreana Island, Pampa de Alviar, 1°18'47.99"S 90°26'6.72"W. Coll. R. Martínez, 15/I/2011; 5 paratypes: ICCDRS 0037032. Ecuador, Galápagos province, Floreana Island, Pampa de Alviar, 1°18'47.99"S 90°26'6.72"W. 18/I/2011. P. New 32. Coll. R. Martínez, 15/I/2011; 12 paratypes: ICCDRS 0037050.

Ecuador, Galápagos province, Floreana Island, Cerro Alieri, S1°17'24.47" W90°27'9.00", Coll. R. Martínez, 15/I/2011.

Measurements of some type specimens of *Ambrosiella floreanae* n. sp. (all of them show the described lamellae).

Types	height × width	whorls
Holotype ICCDRS 0036992	2.50 × 1.30	6.00
Paratype ICCDRS 0036932	1.30 × 0.90	3.50
Paratype ICCDRS 0037032	2.00 × 1.20	4.75
Paratype ICCDRS 0037032	1.05 × 0.80	3.50
Paratype ICCDRS 0037050	2.35 × 1.45	5.25
Paratype ICCDRS 0037050	1.70 × 1.15	3.50
Paratype ICCDRS 0037050	1.20 × 0.90	2.25

Remark: *Tornatellides kahoolavense* Pilsbry & Cooke, 1915 (p. 211, pl. 46, figs. 3,4,7), from Hawaii, was cited by Wu & Itow (1988) for Santa Cruz and Floreana Islands (*Tornatellides kahoolavense*: UCM 34089. 1 spec. broken. Coll. Syuzo Ito, 2/II/1964. Galápagos Islands, Floreana Island, 470 m altitude, from *Macrea* plant). It was not possible to confirm this record, but the image of the specimen is similar to *A. floreanae* n. sp.

Comparisons with related species: *Ambrosiella kuscheli* ODHNER 1963, type species by monotypy of *Ambrosiella* ODHNER 1963 from San Ambrosio Island (Desventuradas Islands, Chile) is characterized by 6 × 2.6 mm and 6 to 7 whorls, and a protoconch with a weakly spiral sculpture. *Tornatellides kahoolavense* differs in the aperture (number and size of lamellae), its protoconch lacks spirals grooves, and it has 6 whorls and 3.2 × 1.5 mm.

A photograph of a unique specimen of *T. kahoolavense* (UCM 34089) shows its similarities with *A. floreanae*. *Tornatellina bilamellata* ANTON 1839 from Pascua Island and Archipelago Juan Fernández and *Tornatellides idae* PILSBRY & COOKE 1915 and *T. diptyx* PILSBRY & COOKE 1915, both from Hawaii, are different in number of columellar lamellae and the presence of internal ribs on the inner wall of the aperture.

Vertiginidae FITZINGER 1833

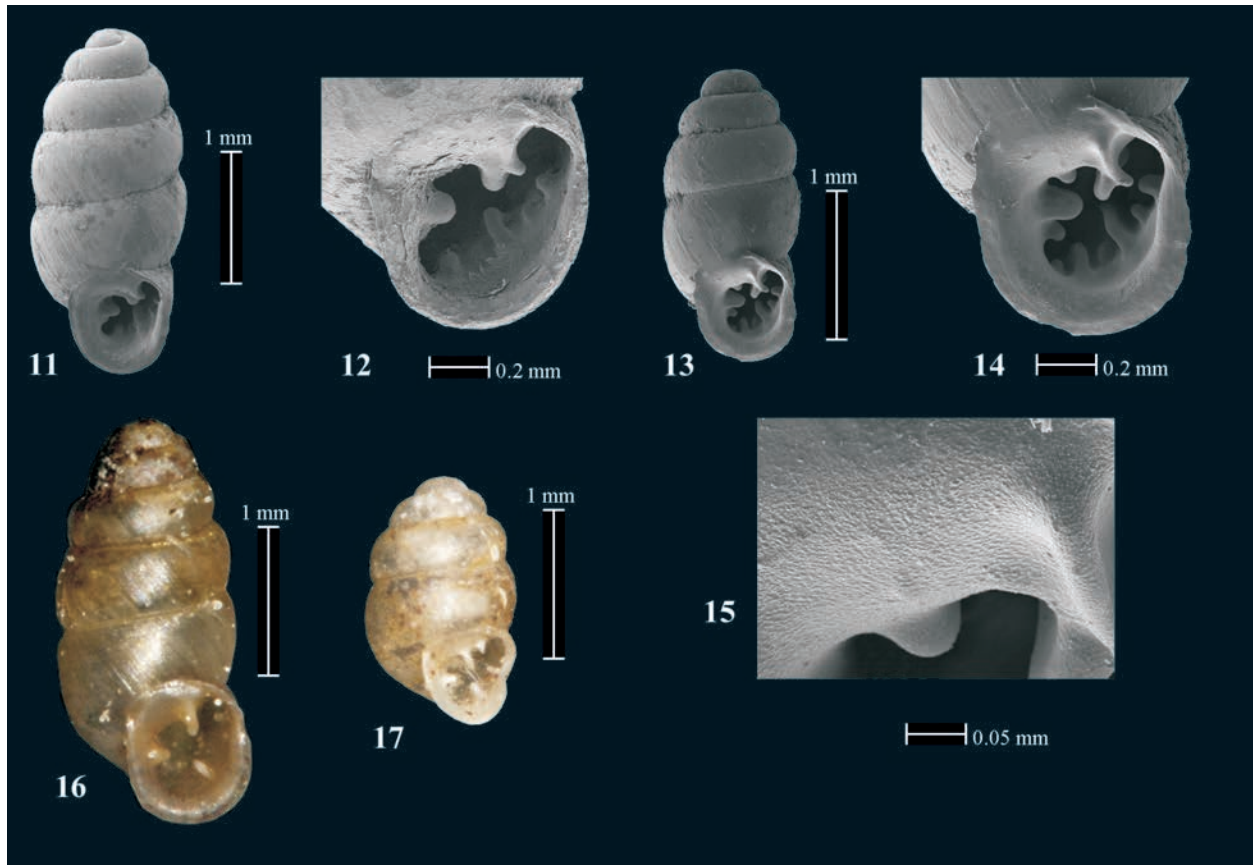
Gastrocoptinae PILSBRY 1918

Gastrocopta WOLLASTON 1878

Gastrocopta munita (REIBISCH 1893)

Figs 11–12, map 4

- 1893 *Pupa (Leucochila) munita* REIBISCH: 27, Taf. II, Fig. 9.
 1894 *Pupa (Leucochila) munita* REIBISCH, – STEARNS: 415.
 1916 *Gastrocopta munita* REIBISCH, – PILSBRY: 96, pl. 19, figs. 1–7, 8, 10, 11.
 ?1917a *Pupilla reibischi* DALL: 10.
 1928 *Pupilla munita* REIBISCH, – DALL & OCHSNER: 155.
 ?1928 *Pupilla reibischi* DALL, – DALL & OCHSNER: 155.
 1928 *Pupilla (Gastrocopta) munita* REIBISCH, – DALL & OCHSNER: 173.
 1932 *Gastrocopta munita* REIBISCH, – HERTLEIN: 69.



Figs 11–12 *Gastrocopta munita* (REIBISCH 1893). Fig. 11 ICCDRS 0036663. Seymour Norte Island. Fig. 12, ditto, detail of aperture. — Figs 13–15 *Gastrocopta clausa* (REIBISCH 1893). Fig. 13 ICCDRS 0037038. Floreana Island. Lechosos. Fig. 14, ditto, detail of aperture. Fig. 15, ditto, detail of aperture. — Fig. 16 *Gastrocopta duncana* PILSBRY 1931. ANSP 152689. Lectotype. Pinzón Island. Fig. 17: *Nesopupa (Infranesopupa) galapagensis* VAGVOLGYI 1974. Holotype. ANSP 332451. Peak 2974', central highlands, Santiago Island.

1972 *Gastrocopta munita* REIBISCH, – HERTLEIN: 31.

1991 *Gastrocopta munita* REIBISCH, – CHAMBERS: 309.

Description (shell): Shell ovate-cylindric, whorls 5 to 5 1/3, convex; deeply rimate, with obtuse apex; thin, diaphanous, smooth, opaque, pale corneous or whitish; suture moderately deep; aperture subvertical, rounded, calloused; a bituberculate entering fold on the parietal wall of the aperture, another simple, somewhat receding one on the columella, as well as 4 smaller denticles within the outer lip, which, however, are often lacking, excepting the one opposite the parietal lamella; the broad peristome is reflected and the margins are connected by a rounded callous; 2.5 × 1.5 mm (REIBISCH 1893; PILSBRY 1916).

Measurements of figured specimen CDF: 2.30 × 1.27 mm, 5 whorls (ICCDRS 0036663).

Type locality: “Albamarle Is., on shrubs near the seashore” (REIBISCH 1893). By PILSBRY (1916: 97), Tagus Cove could be considered its typical locality (Isabela Is.).

Known distribution: Baltra, Daphne Mayor, Fernardina, Floreana, Genovesa, Isabela, Pinzón and Santa Fe. Dubiously, in San Cristóbal Island.

Records in CDF collection: Fernardina, Floreana, Genovesa, Isabela, Pinta, Pinzón, Santa Cruz, Santiago and Seymour Norte. In natural environments of Genovesa Island (Darwin Bay), in *Scalesia* zone and Cerro Pajas of Floreana Island, in Sierra Negra/Pampa and the arid high area, in “guayabillos” and in Pega-Pega forest of Volcán Alcedo in Isabela Island; in “guayabillos” of Santiago Island, and areas of agriculture of Isabela Island.

Remarks: It is the most common and widely distributed species of *Gastrocopta* of the Galápagos Islands (DALL & OCHSNER 1928), HERTLEIN (1932) report it “under bushes, on top of the plateau on the southeast part of South Seymour Is.” SMITH (1971) cited *Gastrocopta* cf. *G. munita* for San Cristóbal. REIBISCH (1893: 29, Taf. II, Fig. 13) reported *Gastrocopta wolffi* (MILLER 1879) to “900–2,000 feet” in San Cristóbal Island, but PILSBRY (1918: 357) said that *G. wolffi* lives in continental Ecuador, and it is absent in Galápagos. *Pupilla reibischi* DALL in DALL & OCHSNER 1928 from Isabela Island, could be a similar species to *G. munita* (PILSBRY 1918: 358; 1931: 67), although DALL & OCHSNER (1928: 174) considered it a different species.

DALL & OCHSNER (1928) said that *Gastrocopta* (as *Pu-pilla*) lives in Marchena Island, although we did not see specimens from this island (Table 2). VAGVOLGYI (1979) indicated the existence of 8 species of *Gastrocopta* in Galápagos, but he never edited details of this opinion; none of the specimens were located.

Type series: Syntype ANSP 5613/1 (*G. (P.) reibischi* DALL). Isabela (Albemarle) Is. Tajus Cove; Syntypes CAS-IZ 1905-06 (C. PIOTROWSKI, pers. comm., 2011).

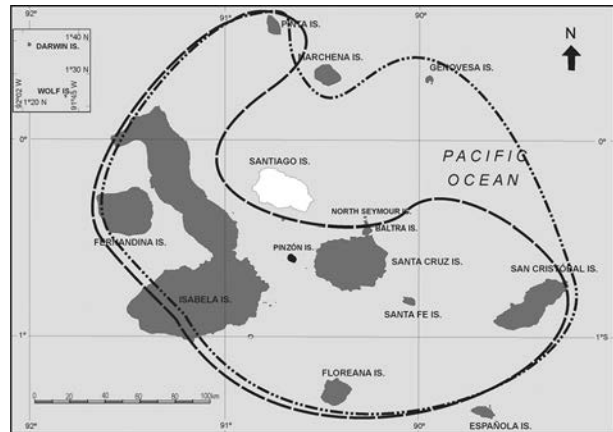
CDF material examined: FLO: ICCDRS 0036664/1. Cráter Cerro Pajas. Zona *Scalesia*; ICCDRS 0036667/6; ICCDRS 0036677/1. Finca Las Palmas. 120 m.a.s.l.; ICCDRS 0036659/15; ICCDRS 0036660/1. GEN: Plateau above Campsite, Darwin Bay, P.R. Grant; ISA: ICCDRS 0036658/2; ICCDRS 0036672/4. SN/P. ICCDRS 0036722/4. VA. Zona Árida Alta. 200 m.a.s.l.; ICCDRS 0036723/2. VA. Guayabillos. 900 m.a.s.l.; ICCDRS 0036724/26 + 0036726/2 + 0036727/43 + 0036728/4 + 0036731/9 + 0036734/4. VA. Bosque Pega-Pega; ICCDRS 0036725/2 + 0036729/1 + 0036730/15 + 0036732/3 + 0036768/1 + 0036834/1. VA. Zona Guayabillos; ICCDRS 0036733/2 + 0036735/14. VA. Zona Árida Alta; ICCDRS 0036736/1. AA. S00°52'39.80" W91°00'87.92"; ICCDRS 0036737/1. AA. ICCDRS 0036738/1. AA. S00°86'46.6" W91°01'51.1"; ICCDRS 0036739/8. AA. S00°86'46.63" W91°01'51.1"; ICCDRS 0036740/1. AA. S00°85'99.91" W91°00'50.56"; ICCDRS 0036741/1. AA. S00°84'61.45" W91°00'65.04"; PIN: ICCDRS 0036665/15. 1300 ft.; ICCDRS 0036666/30. 15 ft.; PIZ: ICCDRS 0036662/39. 278 m; SCZ: ICCDRS 0036656/1. N. 1200 ft. along Puerto Ayora, Baltra Road; ICCDRS 0036657/5 + 0036661/1; ICCDRS 0036686/53. Mina Granillo Rojo; SAN: ICCDRS 0036676/5. SE, Guayabillos. 230 m.; ICCDRS 0036842/3. East side "Los Guayabillos". On ground + vegetation; under rocks. 230 m.; SEY: ICCDRS 0036663/50.

Gastrocopta clausa (REIBISCH 1893)

Figs 13–15, map 4

- 1893 *Pupa (Leucochila) clausa* REIBISCH: 27, Taf. II, Fig. 10.
 1894 *Pupa (Leucochila) clausa* REIBISCH, – STEARNS: 415.
 1896 *Pupa (Leucochila?) clausa* REIBISCH, – DALL: 447.
 1900 *Pupa clausa* REIBISCH, – DALL: 94.
 1916 *Gastrocopta clausa* REIBISCH, – PILSBRY: 99, pl. 19, figs. 9, 12, 13, 14.
 1928 *Pupilla clausa* REIBISCH, – DALL & OCHSNER: 155.
 1986 *Gastrocopta clausa* REIBISCH, – CHAMBERS & STEADMAN: 95.
 1991 *Gastrocopta clausa* REIBISCH, – CHAMBERS: 309.

Description (shell): Shell ovate cylindrical with obtuse summit, 4 2/3 convex whorls, deeply rimate, thin, smooth, matt, pale corneous or whitish, suture rather deep, aperture nearly vertical, round, narrowed by numerous teeth, the bipartite parietal tooth runs deeply into the throat, also the columellar tooth; in the outer wall there are two small denticles, something wanting, on each side of the strongly developed middle tooth, which stands opposite the parietal tooth; the peristome expands but little and is hardly reflected, the ends joined by a rounded callous; 2.20 × 1.25 mm (REIBISCH 1893; PILSBRY 1916).



Map 4: Distribution of *Gastrocopta munita* (broken and dotted line), *Gastrocopta clausa* (broken line), *Gastrocopta duncana* (black islands) and *Nesopupa (Infranesopupa) galapagensis* (white area).

Measurements of figured specimen CDF: 1.95 × 0.90 mm, 4.25 whorls (ICCDRS 0037038).

Type locality: "Indefatigable Is., on shrubs near the seashore" (REIBISCH 1893) (Santa Cruz Island).

Known distribution: Fernandina, Floreana, Isabela, Pinta, Pinzón, San Cristóbal and Santa Cruz Islands.

Records in CDF collection: Floreana Island (natural areas).

Holocene distribution: Floreana and Santa Cruz Islands (CHAMBERS & STEADMAN 1986; see USNM Coll.).

Type series: Syntypes: CAS-IZ 1905-06 (C. PIOTROWSKI, pers. comm., 2011); Syntypes: ANSP 152703. Pinzón (Duncan) Is., S. side; ANSP 152704. Floreana (Charles) Is., Black Beach; Syntypes: ANSP 152718. San Cristóbal (Chatham) Is., ½ mi above lagoon, Wreck Bay; Syntypes: MCZ Malacology 83935/40. Santa Cruz (Indefatigable) Is., Seymour Bay, Syntypes: MCZ Malacology 86390.

CDF material examined: FLO: ICCDRS 0037038/1. Lechosos. 1°19'28.70"S 90°26'36.60"W.

Gastrocopta duncana PILSBRY 1931

Fig. 16, map 4

- 1931 *Gastrocopta duncana* PILSBRY: 65.
 1934 *Gastrocopta duncana* PILSBRY, – PILSBRY: pl. 17, figs. 1–2.
 1986 *Gastrocopta duncana* PILSBRY, – CHAMBERS & STEADMAN: 95.
 1991 *Gastrocopta duncana* PILSBRY, – CHAMBERS: 309.

Description (shell): Shell oblong, 5 ½ whorls moderately convex, the last without wave or crest behind the outer lip; surface glossy, very weakly, finely marked with growth lines; colour translucent cinnamon, aperture tawny; the aperture is shortly oval; peristome reflected, strongly thickened within, the outer lip becoming nar-

rowed above; the terminations of lip are connected by a rather short, somewhat heavy parietal callus, thin at the edge; three or four teeth, angulo-parietal lamella strong, simple and straight, columellar lamella rather strong, horizontal, lower palatal fold rather strong, entering, the upper-palatal minute and tubercular, often wanting; the summits of the teeth are whitish; 2,75 × 1,2 mm (PILSBRY 1931).

Type locality: "Duncan Is., on the south side, from about 500 feet to near the summit" (PILSBRY 1931) (Pinzón Island, 164 m.a.s.l.).

Known distribution: Pinzón Island.

Holocene distribution: Santa Cruz Island (CHAMBERS & STEADMAN 1986; see USNM Coll.).

Type series: Lectotype + 3 paralectotypes: ANSP 152689/1+ 3; Paralectotypes ANSP 152690/8. Pinzón (Duncan) Is., Nr. summit; Paralectotypes: ANSP 152691/5. Pinzón (Duncan) Is., S. side (PILSBRY 1931; BAKER 1963; CHAMBERS & STEADMAN 1986); Paralectotype (ex "paratype"). MCZ Malacology 86391/1. Pinzón (Duncan) Is. South side.

Nesopupinae STEENBERG 1925

Nesopupa PILSBRY 1900

Nesopupa (Infranesopupa) COOKE & PILSBRY in PILSBRY 1920

Nesopupa (Infranesopupa) galapagensis VAGVOLGYI 1974

Fig. 17, map 4

1974 *Nesopupa (Infranesopupa) galapagensis* VAGVOLGYI: 86.

1975 *Nesopupa (Infranesopupa) galapagensis* VAGVOLGYI, – VAGVOLGYI: 475.

1991 *Nesopupa galapagensis* VAGVOLGYI, – CHAMBERS: 309.

Description (shell): Shell nearly cylindrical, cylindrical-oval or oval, whorls convex, sutures deep, particularly so in the cylindrical specimens; the last whorl ascends upon the penultimate one prior to the aperture; slightly in the oval specimens, more distinctly in the cylindrical ones; the umbilicus is minute; the aperture is oval-triangular with a notch on the outer lip formed by the inward and forward projecting middle part of the outer lip; the lips are slightly reflected; the parietal wall is covered by a weak callus that connects the origin of the outer and inner lips; corresponding to the lip swelling there is a weak and wide annular crest on the outside of the shell; 1,9 × 1.1 mm (VAGVOLGYI 1974).

Type locality: "Peak 2974', central highlands, Santiago Is." (VAGVOLGYI 1974).

Known distribution: Santiago Island.

Type series: Holotype: ANSP 332451; Paratypes ANSP 332452; DM Paratypes 70650.

Vallonidae MORSE 1864

Pupisoma STOLICZKA 1873

Pupisoma (Pupisoma?) galapagorum PILSBRY 1934

Figs 19–19, map 5

1934 *Pupisoma galapagorum* PILSBRY: 114, pl. 16, figs. 7–9.

1963 *Pupisoma galapagorum* PILSBRY, – BAKER: 201.

1988 *Pupisoma galapagorum* PILSBRY, – WU & ITOW: 12, fig. 2.

1991 *Pupisoma galapagorum* PILSBRY, – CHAMBERS: 309.

Description (shell): Shell globose, conic, or turbinate, with obtuse apex; umbilicate, the umbilicus contained about five times in the diameter; cinnamon-brown; whorls are strongly convex, joined by a very deeply impressed suture; the last whorl rounded basally around the open umbilicus; aperture rotund, slightly oblique; lip thin, the columellar margin broadly reflected, half covering the umbilicus in a front view, but scarcely imprinting upon it in a basal view; sculpture of fine, close wrinkles, irregularly developed, being weak or nearly effaced in places, and absent on the embryonic 1½ whorls; also a weak and very minute pitting, which is also quite irregularly developed, and in some places replaced by granulation; there is no spiral striation; 1.56 × 1.36 mm (PILSBRY 1934).

Measurements of figured specimen CDF: 1.67 × 1.47 mm, 4 whorls (ICCDRS 0036856).

Type locality: "Chatham Is., on a wooded hill on the right side of the road from Wreck Bay to Progreso, near the point where the road emerges into the grassy zone" (PILSBRY 1934) (San Cristóbal Island).

Known distribution: Floreana, San Cristóbal and Santa Cruz Islands.

Records in CDF collection: Anthropogenic and natural areas of Floreana, Isabela, and Santa Cruz.

Remark: HAUSDORF (2007) synonymized this species with *Pupisoma (Pupisoma?) comicolense* BAKER 1928, from México, for conchological comparison.

Type series: Lectotype: ANSP 152716a (BAKER 1963).

CDF material examined: FLO: ICCDRS 0036673/1. Finca "La Primavera". 300 m.a.s.l.; ICCDRS 0036931/1. Pampa de Alviar. 1°18'47.99" S90°26'6.72" W. ISA: ICCDRS 0036836/9 + 0036837/3. VA. Bosque Pega-Pega; ICCDRS 0039136/1. AA. S00°83'59.96" W91°09'7877". SCZ: ICCDRS 0036856/1 + 0036857/1 + 0037062/104. Mina Granillo Rojo.

Pupisoma (Ptychopatula) PILSBRY 1889

Pupisoma (Ptychopatula) dioscoricola (ADAMS 1845)

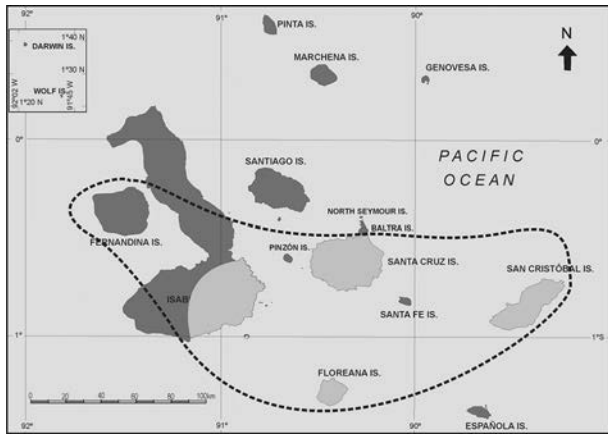
Figs 20–22, map 5

1845 *Helix dioscoricola* ADAMS: 16.

1886 *Helix (Conulus) dioscoricola* ADAMS, – TRYON: 174, pl. 53, figs. 46, 47.

1920 *Pupisoma discoricola* ADAMS, – PILSBRY: 36.

1934 *Pupisoma discoricola* ADAMS, – PILSBRY: 114.



Map 5: Distribution of *Pupisoma (Pupisoma?) galapagorum* (gray islands) and *Pupisoma (Ptychopatula) dioscoricola* (broken line).

- 1948 *Pupisoma discoricola* ADAMS, – PILSBRY: 1007, fig. 538 (1–5).
 1971 *Pupisoma discoricola* ADAMS, – SMITH: 7.
 2007 *Pupisoma (Ptychopatula) dioscoricola* ADAMS, – HAUSDORF: 1483, figs. 1, 2, 6.

Description (shell): Shell globose, conic, with obtuse apex, whorls strongly convex; perforate, cinnamon-colored, glossy; sculpture of unequal growth-wrinkles crossed by fine, impressed spiral lines about equally distinct over the whole last whorl; earlier whorls with granulate striae or somewhat irregular granulation, partly confluent into striae; the tip of the apex is slightly depressed; aperture truncate-rounded, oblique; peristome thin, the columellar margin whitish, dilated triangularly and broadly over the perforation; columella concave; 1.55×1.55 mm (PILSBRY 1948).

Measurements of figured specimen CDF: 1.80×1.87 mm, 3.50 whorls (ICCDRS 0036685).

Type locality: Jamaica.

Distribution: United States of America (Florida and Texas) to south Brazil and north Argentina. Some of this distribution could be anthropogenic (HAUSDORF 2007).

Known distribution: Fernandina, San Cristóbal and Santa Cruz Islands.

Records in CDF collection: Isabela Island (“guayabillos” zone in Volcán Alcedo) and Santa Cruz Islands (disturbed natural area).

Remark: This species is cited for “Galapagos” (PILSBRY (1948: 1008).

Type series: Syntypes MCZ Malacology 135518/3. Jamaica; Syntypes: MHNG INVE 38728/4. Jamaica (as “paratypes”, Y. FINET, pers. comm., 2011).

CDF material examined: ISA: ICCDRS 0036685/2. VA. Zona Pega-Pega. SCZ: ICCDRS 0036689/1 + 0036690/2 juvs. + 0036835/1. Mina Granillo Rojo.

Other repository (not seen): FER: CAS-IZ 80228/12. NW side, on greenbelt, under “Bursera” bark, ca. 1000 ft.; SCB: ANSP 152717. Road to Progreso; SCZ: CAS-IZ 80229/25.

Rancho place?, near trail, under leaves of different bushes, 1 to a few feet high, near 150 m.

Strobilopsidae WENZ 1915

Strobilops PILSBRY 1893

Strobilops (Nesostrobilops) PILSBRY 1931

Strobilops (Nesostrobilops) helleri (DALL 1900)

Fig. 23, map 6

- 1900 *Endodonta Helleri* DALL: 93, pl. VIII, figs. 7–9.
 1927 *Strobilops helleri* DALL, – PILSBRY: 41, pl. 6, figs. 1,2,3.
 1928 *Endodonta helleri* DALL, – DALL & OCHSNER: 155.
 1931 *Strobilops (Nesostrobilops) helleri* DALL, – PILSBRY: 62, pl. 16, figs. 1, 1a, 2, 2a.
 1959 *Strobilops (Nesostrobilops) helleri* DALL, – ZILCH: 177.
 1991 *Strobilops helleri* DALL, – CHAMBERS: 309.

Description (shell): Shell solid, much wider than high, dome-shaped above, with obtuse apex, convex beneath; whorls convex with an acutely carinate median periphery and a concavity just above the keel; a widely-open umbilicus contained about four times in the diameter; cinnamon-colored, with little gloss; first $1\frac{1}{2}$ whorls smooth, after which they are finely, sharply costate, the riblets becoming coarser and more spaced on the last whorl, weak on the projecting keel, rather close and somewhat irregular on the base; lip expanded, thickened, a little angular at the outer extremity, reflected at the columellar insertion; parietal callus heavy; parietal lamella rather low, enlarging near its end, which does not quite reach the edge of the parietal callus; very deep in the throat a low, infraparietal lamella can be observed in an oblique view in the mouth; at the last third of the base two basal folds can be seen by transparence through the base; 1.75×3.0 mm (DALL 1900; PILSBRY 1927).

Type locality: “Albamarle Is., near Iguana Cove, at an elevation of 2,000 feet” (DALL 1900) (Isabela Island, 656 m.a.s.l.).

Known distribution: Fernandina, Isabela, Santiago and Santa Cruz Islands (in *Miconia* areas).

Records in CDF collection: San Cristóbal.

Type series: Lectotype USNM 108515 (R. HERSHLER, pers. comm., 2011); Paralectotypes CAS-IZ 64868.00/2. Isabela (Albamarle) Is., near Iguana Cove (C. PIOTROWSKI, pers. comm., 2011).

CDF material examined: SCB: ICCDRS 0039115/1. AA. Goteras. $S00^{\circ}54'14.99''$ $W89^{\circ}26'52.80''$.

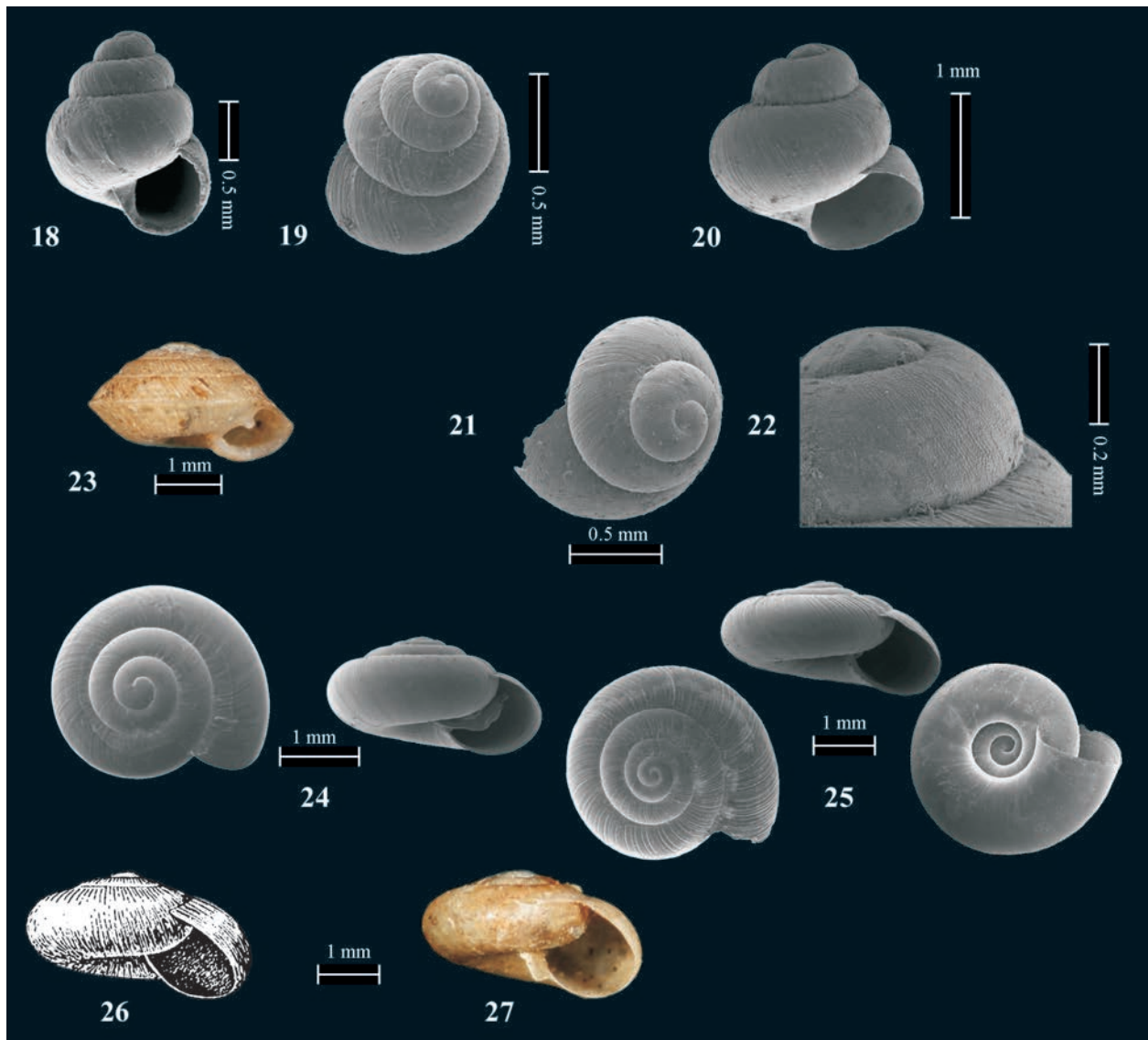
Gastrodontidae TRYON 1866

Zonitoides LEHMANN 1862

Zonitoides (Zonitoides) arboreus (SAY 1816)

Fig. 24, map 10

- 1816 *Helix arboreus* SAY: no. 2, pl. 4, fig. 4.
 1924 *Zonitoides arboreus* SAY, – HENDERSON: 147.



Figs 18–19 *Pupisoma* (*Pupisoma*?) *galapagorum* PILSBRY 1934. Fig. 18 ICCDRS 0036856. Santa Cruz Island, Mina Granillo Rojo. Fig. 19 ICCDRS 0036931. Floreana Island, Pampa de Alviar. — Figs 20–22 *Pupisoma* (*Ptychopatula*) *dioscoricola* (ADAMS 1845). Fig. 20 ICCDRS 0036685. Santa Cruz Island, Mina Granillo Rojo. Fig. 21 ditto, apical view. Fig. 22 ditto, detail of protoconch. — Fig. 23 *Strobilops* (*Nesostrobilops*) *helleri* (DALL 1900). USNM 108515. Lectotype. Isabela Island. — Fig. 24 *Zonitoides* (*Zonitellus*) *arboreus* (SAY 1816). ICCDRS 0036610. San Cristóbal Island, El Chino (R. Guamanquispe). — Fig. 25 *Retinella*? *chathamensis* (DALL 1893). ICCDRS 0036593 Santa Cruz Island. — Figs 26–27 *Retinella*? *actinophora* (DALL 1900). Fig. 26, original figure of a syntype. Fig. 27 USNM 108513. Syntype. Top of mountain near Tagus Cove, Isabela Island.

- 1928 *Zonitoides* (*Zonitellus*) *arboreus* SAY, – BAKER: 39, pl. 8, figs. 6–9.
 1929 *Zonitoides* (*Zonitellus*) *arboreus* SAY, – BAKER: 255, pl. 8, fig. 7.
 1941 *Zonitoides* (*Zonitellus*) *arboreus* SAY, – BAKER: 327, pl. 61, figs. 10–12.
 1946 *Zonitoides* (*Zonitellus*) *arboreus* SAY, – PILSBRY: 480, figs. 261, 262.
 1999 *Zonitoides* (*Zonitoides*) *arboreus* SAY, – BARKER: 119, figs. 67, 96, 137, 164, 190, 218, 244, C32, M31, M110–112, M125, M126, Map 29.

Description (shell): Shell depressed, of about 4.5 moderately convex and regularly increasing

whorls; translucent olive buff; glossy in appearance but weakly sculptured with growth wrinkles an extremely faint, minute spiral striae, the base smoother; umbilicus about 0.2 of shell diameter; aperture deeply lunate, wider than high; columella scarcely reflected; peristome thin; protoconch of 1.5 whorls, smooth but for microscopic growth lines and spiral striae at periphery; up to 3 mm high by 6 mm in diameter (BARKER 1999).

Measurements of figured specimen CDF: 4.60×2.00 mm, 4.75 whorls (ICCDRS 0036610/2).

Type locality: North America (BAKER 1999).

Natural distribution: Nearctic region and Central America (BAKER 1999).



Fig. 28 *Habroconus* (*Pseudoguppya*) aff. *pacificus* (PFEIFFER 1846). ICCDRS 0036624. Santa Cruz Island. — Figs 29–30 *Habroconus?* *galapaganus* (DALL 1893). Fig. 29 ICCDRS 0036830. Isabela Island Volcán Alcedo. Fig. 30 USNM 107315. Syntype. San Cristóbal Island. — Figs 31–32 *Guppya bauri* (DALL 1892). CAS-IZ 81500. Santa Cruz Island, Horneman's Ranch, "Scalesia" zone. Fig. 32 Original figure of a holotype. — Fig. 33: *Cecilioides* (*Karolus*) *consobrina* (ORBIGNY 1841). ICCDRS 0036824. Isabela Island Volcán Alcedo. — Fig. 34 *Cecilioides* (*Cecilioides*) *acicula* (O. F. MÜLLER 1774). CAS-IZ 81526. Santa Cruz Island (El Chato). — Fig. 35 *Cecilioides* (*Geostilbia*) *aperta* (SWAINSON 1840) (after Pilsbry, 1946, fig. 89b).

Guppya MÖRCH 1867

Guppya bauri (DALL 1892)

Figs 31–32, map 7

- 1892 *Zonites* (*Hyalinia*) *Bauri* DALL: 98.
 1894 *Zonites* (*Hyalinia*) *Bauri* DALL, – STEARNS: 418 [emendation].
 1896 ?*Trochomorpha Bauri* DALL, – DALL: 447, pl. 15, figs. 8, 9.
 1900 *Guppya bauri* DALL, – DALL: 92.
 1928 *Guppya bauri* DALL, – DALL & OCHSNER: 155.
 1941 *Habroconus?* *Bauri* DALL, – BAKER: 223.
 1986 *Guppya bauri* DALL, – CHAMBERS & STEADMAN: 101.
 1991 *Guppya bauri* DALL, – CHAMBERS: 309.

Description (shell): Shell small, with four whorls (probably pre-adult specimen); horn-colored, polished; periphery subangular or rounded; dome of the base more elevated than that of the spire; suture distinct; surface with delicate incremental lines and finely grooved throughout by sharp but microscopic spiral striae; aperture rounded-lunate without sharp angles, wider than high; lip sharp, unreflected; base minutely perforate; 1.5 × 2.2 mm (DALL 1892).

Type locality: "South Albemarle Is., on weathered bones of tortoises" (DALL 1892) (Isabela Island).

Known distribution: Española, Genovesa, Isabela, Pinta, Pinzón and Santa Cruz Islands.

Holocene distribution: Santa Cruz Island (CHAMBERS & STEADMAN 1986; see USNM Coll.).

Remark: Its actual generic assignment must be revised.

Type series: Holotype (broken): USNM 107317. South Isabela (Albemarle) Is. (R. HERSHLER, pers. comm., 2012).

Achatinidae SWAINSON 1840

Lissachatina BEQUAERT 1950

Lissachatina fulica (BOWDICH 1822)

Fig. 36, map 10

- 1822 *Achatina fulica* BOWDICH: pl. 13, fig. 1.
 1904 *Achatina fulica* BOWDICH, – PILSBRY: 55, pls. 36–37.
 1950 *Achatina* (*Lissachatina*) *fulica* BOWDICH, – BEQUAERT: 50, 54, pls. 7, fig. 1; fl. 16, fig. 3; pl. 19, fig. 3; pl. 20,



Fig. 36 *Lissachatina fulica* (BOWDICH 1822). ICCDRS 0073063. Santa Cruz Island, Puerto Ayora, Barrio El Edén. Santa Cruz Island.

- fig. 2; pl. 21, fig. 2; pl. 22, fig. 1; pl. 23, fig. 4; pl. 24, fig. 2; pl. 25, fig. 1; pl. 26, fig. 2; pl. 27, fig. 2; pl. 28; fig. 2; pl. 29, fig. 1–2; pl. 30, fig. 2; pl. 31, fig. 1–2; pl. 22, fig. 1–2; pl. 33, fig. 2; pl. 34, fig. 2; pl. 35, fig. 1; pl. 36, fig. 1–2; pl. 37, fig. 4; pl. 38, fig. 3.
- 1959 *Achatina (Lissachatina) fulica* BOWDICH, – ZILCH: 365, Abb.1338.
- 1979 *Achatina fulica* BOWDICH, – MEAD: 4, fig. 1; 18; 26; 36; 41; 75; 83; 96; 104.
- 2006 *Achatina fulica* BOWDICH, – SIMONE: 308, fig. 10.
- 2008 *Lissachatina fulica* BOWDICH, – BUDHA & NAGGS: 19.
- 2011 *Achatina fulica* BOWDICH, – GUTIÉRREZ GREGORICH et al.: 135.
- 2014 *Lissachatina fulica* BOWDICH, – CAUSTON et al.: 61.

Description (shell): Shell with 7 to 9 convex whorls, from very slender to moderately obese, a sharply conical spire, and broadly impressed sutures; aperture relatively short, the outer lip is usually sharp and thin, rarely somewhat thickened or even slightly expanded in very old specimens, it is very convex, evenly curved into a regular semi-ellipse, and inserted on the body-whorl at a sharp, open angle, the upper part of the body-whorl being scarcely or not flattened behind the lip; columella more or less concave, sometimes rather weakly so, in which case may be slightly or even much twisted; a umbilical slit completely closed and the columella truncate, both columella and parietal callus are white or bluish-white; 171 × 81 mm (BEQUAERT 1950).

Measurements of figured specimen: 77.0 × 41.0 mm (Agrocalidad s/n).

Type locality: Mauritius Island, Africa.

Natural distribution: Subsaharian oriental Africa.

Anthropogenic distribution: worldwide.

Remarks: This species has a high adaptability to different habitat conditions in natural or anthropogenic areas (WWW.SENASA.GOV.AR 2011). It is a polyphagous species, which causes important damages in tropical and subtropical crops. In Brazil, it preys on more than 100 species of plants, like for example cotton, banana, all kind of vegetables etc. (RODRÍGUEZ 2006). This species can be a host of the nematodes *Angyostrongylus (A.) cantonensis* (CHEN) and *A. costaricensis* (MORERA & CÉSPEDES), causing meningoencephalitis and human abdominal angiostrongylosis (WWW.SENASA.GOV.AR 2011).

Known distribution: Santa Cruz Island.

CDF material examined: **SCZ:** ICCDRS 0073063/54. Barrio El Edén, Puerto Ayora. ICCDRS 0040430/184. Barrio El Edén, Puerto Ayora; ICCDRS 0040429/2. Barrio Matazarno, Puerto Ayora (0°44'16.35" S90°18'45.40 W).

Ferussaciidae BOURGUIGNAT 1883

Cecilioides FÉRUSSAC 1814

Cecilioides (Cecilioides) acicula (O. F. MÜLLER 1774)

Fig. 34, map 10

- 1774 *Buccinum aciculum* O. F. MÜLLER: 150.
- 1900 *Cecilioides acicula* O. F. MÜLLER, – ADAMS: 297.
- 1909 *Cecilioides (Cecilioides) acicula* O. F. MÜLLER, – PILSBRY: 9, pl. 1, figs. 1, 2, 5–8.
- 1946 *Cecilioides acicula* O. F. MÜLLER, – PILSBRY: 185, fig. 89 (a).
- 1995 *Cecilioides acicula* O. F. MÜLLER, – MIQUEL et al.: 26.
- 1997 *Cecilioides acicula* O. F. MÜLLER, – MIQUEL & PARENT: 110, fig. 2.
- 1999 *Cecilioides (Cecilioides) acicula* O. F. MÜLLER, – BARKER: 59, figs. 36, 76, 117, 146, 172, 198, 226, C9, M13, M14, M56, M57, map 9.

Description (shell): Shell very narrowly lanceolate with regularly tapered spire, with 5 or 6 scarcely convex whorls, polished and smooth except for very weak spiral striae, thin, transparent, tinged yellow or golden brown in live specimens owing to colour of underlying digestive gland, imperforate; aperture pyriform, narrowed and acute above, rounded at base, with outer lip thin and flexuous, and parietal wall not calloused; columella slightly calloused, with a columellar fold in juveniles, and abruptly truncate at its union with basal margin of aperture lip in adults; protoconch blunt, rounded, smooth or with faint growth lines; 4.5 × 1.2 mm (BARKER 1999).

Type locality: Central and Western Europe.

Natural distribution: Palearctic region (BARKER 1999).

Anthropogenic distribution: Northern Europe, United States of America, Bermuda, Barbados, Hawaii, Azores, Canary Island, South Africa, Australia and New Zealand (BARKER 1999), Argentina and Uruguay (MIQUEL et al. 1995).

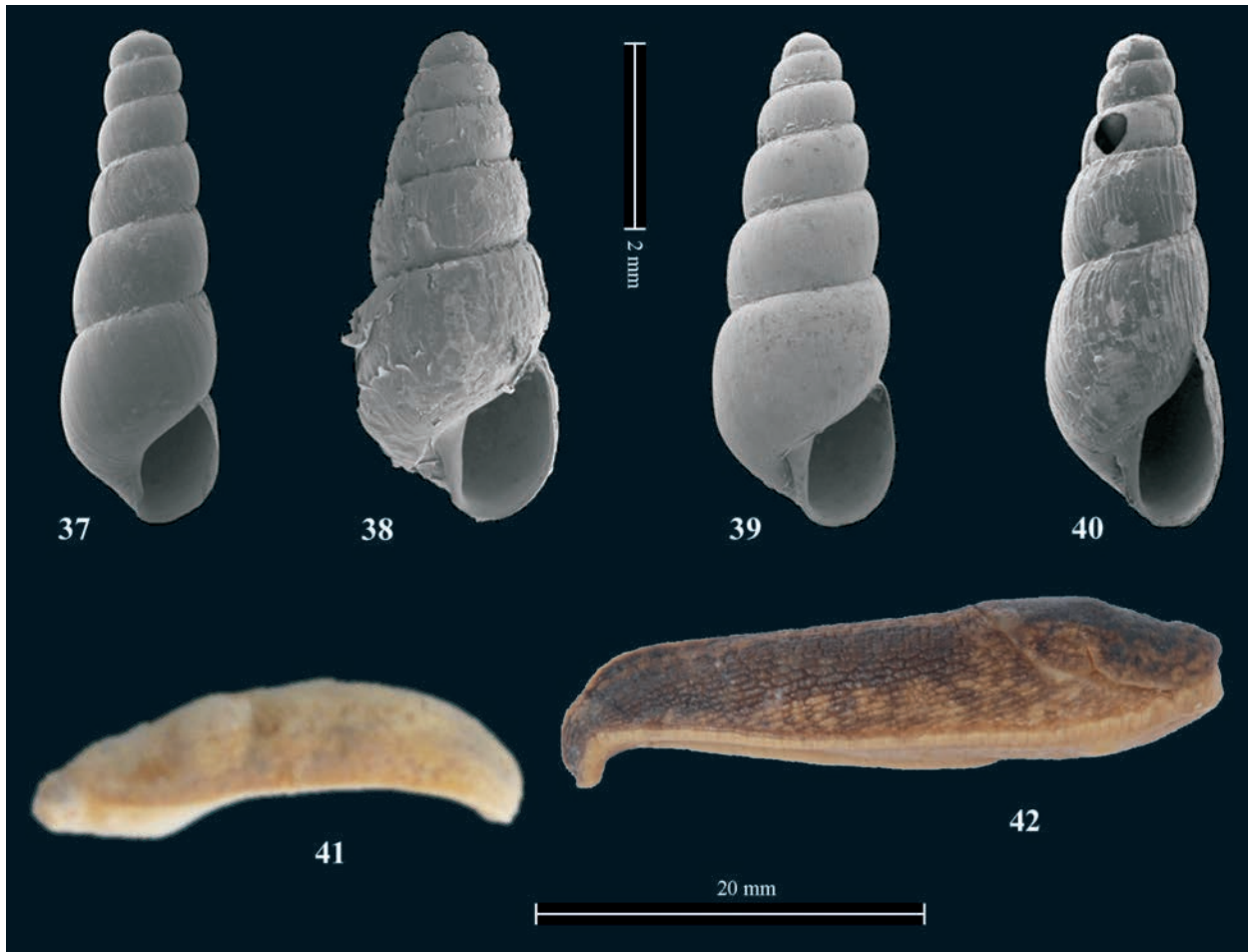


Fig. 37 *Subulina octona* (BRUGUIÈRE 1792). ICCDRS 0036584. Santa Cruz Island. — Fig. 38 *Lamellaxis micra* (ORBIGNY 1835). ICCDRS 0036641. Floreana Island, Cerro Pajas crater. *Scalesia* zone. — Fig. 39 *Lamellaxis gracilis* (HUTTON 1834). ICCDRS 0036600. Santa Cruz Island, Puerto Ayora. — Fig. 40 *Opeas (Opeas) pumilum* (PFEIFFER 1840). ICCDRS 0037005. Floreana Island, Arco de la Reina, (N). — Fig. 41 *Sarasinula plebeia* (FISCHER 1868). ICCDRS 0036713. Isabela Island, area of agriculture. — Fig. 42 *Deroceras (Deroceras) laeve* (O. F. MÜLLER 1774). ICCDRS 0036707. Isabela Island. C. Grande.

zone and Cerro Pajas), and Isabela Island (agricultural and urban zones).

CDF material examined: FLO: ICCDRS 0036587/1; ICCDRS 0036588/1. Cráter Cerro Pajas; ICCDRS 0036589/2 + 0036843/1. Cráter Cerro Pajas. 350 m.a.s.l.; ICCDRS 0036641/1. Cráter Cerro Pajas. Zona *Scalesia*; ICCDRS 0036692/1. AA. S01°30'38.64" W90°44'70.38"; ISA: ICCDRS 0036829/1. ZA; ICCDRS 0036694/1. AA. S00°85'03.56" W91°03'86.90"; ICCDRS 0036693/2. AA. S00°86'46.66" W09°01'51.1"; ICCDRS 0036695/2. ZA S00°84'61.45" W91°00'65.04"; SCZ: ICCDRS 0036852/13. Bellavista. Predio de la Universidad Central.

***Lamellaxis gracilis* (HUTTON 1834)**

Fig. 39, map 9

- 1834 *Bulimus gracilis* HUTTON: 93, 84.
 1906 *Opeas gracile* HUTTON, – PILSBRY: 125, pl. 18, figs. 3–6.
 1945 *Lamellaxis (Allopeas) gracilis* HUTTON, – BAKER: 88.
 1946 *Lamellaxis (Allopeas) gracilis* HUTTON, – PILSBRY: 177, fig. 85 (f–g).

1959 *Lamellaxis (Allopeas) gracilis* HUTTON, – ZILCH: 349, Abb. 1285.

1988 *Lamellaxis gracilis* HUTTON, – AUFFENBERG & STANGE: 1.

Description (shell): Shell elongate with 9 to 12 whorls moderately convex; minutely perforate, thin, slender, regularly tapering to the small, slightly obtuse apex; translucent, pale-coloured or rather colourless; sculpture of distinct arcuate striation; aperture oval, rather long; columella straight, reflected; 10.0 × 3.0 mm (PILSBRY 1906, 1946; AUFFENBERG & STANGE 1988).

Measurements of figured specimen CDF: 6.50 × 2.20 mm, 7 whorls (ICCDRS 0036600).

Type locality: ? Mirzapur, India. Its original distribution could be in tropical America (PILSBRY 1946).

Natural distribution: ?Tropical areas of America.

Anthropogenic distribution: Practically worldwide, in tropical and temperate areas.

Known distribution: In natural areas of San Cristóbal Island.

CDRS 0036704/1 juv. AA. S1°19'2815" W90°26'79.53"; ISA: ICCDRS 0036668/1 juv. + 0036669/1. S. Negra/Pampa; ICCDRS 0036706/1 juv. AA. S0°50'7749" W91°01.1898"; ICCDRS 0036705/4 juvs. AA. S0°50'66.66" W91°03'73.58; ICCDRS 0036707/3. C. Grande. J.C. S0°50'53.80" W91°00'7491"; Santa Cruz, Is.: ICCDRS 0036850/4. Bellavista; ICCDRS 0039123/2 + 0039125/2 + 0039127/2 + 0039131/2 + 0039134/2. Santa Rosa, 354 m; ICCDRS 0039124/3 + 0039126/2 + 0039128/2 + 0039130/2 + 0039133/2. Santa Rosa, 352 m; ICCDRS 0039129/2 + 0039132/2 + 0039135/2. Santa Rosa, 345 m.

Veronicellidae GRAY 1840

Sarasinula GRIMPE & HOFFMANN 1924

Sarasinula plebeia (FISCHER 1868)

Fig. 41, map 10

- 1868 *Vaginulus plebeius* FISCHER: 145.
 1871 *Vaginula plebeia* FISCHER, – FISCHER: 162, pl. 11, fig. 9–12.
 1925a *Sarasinula plebeja* FISCHER, – GRIMPE & HOFFMANN: 25, Fig. 10 (partim).
 1925b *Sarasinula plebeja* FISCHER, – GRIMPE & HOFFMANN: 377, Taf. 6, Figs. 1–3.
 1971 *Vaginulus plebeius* FISCHER, – THOMÉ: 34, Est. 3, f. 13–15; f. 10–12, 21.
 1993 *Sarasinula plebeia* FISCHER, – THOMÉ: 71.
 2001 *Sarasinula plebeia* FISCHER, – GOMES & THOMÉ: 140, fig. 2, 7.
 2002 *Sarasinula plebeia* FISCHER, – GOMES & THOMÉ: 38, figs. 1–7.
 2004 *Sarasinula plebeia* FISCHER, – GOMES & THOMÉ: 591, fig. 3.
 2007 *Sarasinula plebeia* FISCHER, – GOMES: 10, 22, 105, tabs. I, II.

Description of the soft parts: Body small, grey-brown with small black dots; the foot is narrower than the hyponotum; pedal gland well delimited; rectum penetrates in the body wall, near the female genital pore; posterior located anus which opens almost central and behind the foot; female genital pore opens away from the foot, in the middle of the right hyponotum; an accessory bursa is lacking; prostate compact; penis short with smooth surface (without spines or granular texture), retractor muscle inserts in its base; deferent duct opens in the distal part of the penis, spate absent, penial gland present, with undifferentiated tubules; 40 × 15 mm (THOMÉ 1971, 1993; GOMES 2007).

Measurements of figured specimen CDF: 30.50 mm (ICCDRS 0036713).

Type locality: New Caledonia.

Known distribution: Distributed in Asia, Australia and America Cited for Galápagos in the website of FCD (PARENT et al. 2012).

Records in CDF collection: area of agriculture of Floreana, Isabela and San Cristóbal Islands, and urban area of Santa Cruz Island.

CDF material examined: FLO: ICCDRS 0036671/1 juv. Finca. 350 m; ISA: ICCDRS 0036714/1. AA. S0°80'9442" W91°04'39.21"; ICCDRS 0036712/1. AA. S0°52'39.80" W91°00'87.92"; ICCDRS 0036713/2. AA. S0°49'21.70" W91°01'69.35"; ICCDRS 0036715/1. AA. S0°82'18.50" W91°04'2488"; ICCDRS 0036711/1. AA. S0°51' 00.53" W91°02'31.69"; ICCDRS 0036709/1. AA. S0°51' 00.53" W91°02'31.69"; ICCDRS 0036710/1. AA. S0°50'53.80" W91°00'7491"; SCB: ICCDRS 0036678/1. El Chino. S0°54'28.6"/W 89°27'5.1". 222 m.a.s.l.; ICCDRS 0036708/1 juv. AA. S0°52'5895" W89°32'4905"; SCZ: ICCDRS 0036670/1 juv. Bellavista.

Discussion

Most of the studied specimens were obtained serendipitously as part of broader studies looking for other invertebrates and/or vegetation. Little or no information exists about the collection efforts, the selection of habitat to prospect, or specific collection techniques according to habitat carried out in the archipelago, though a few data are mentioned in DALL & OCHSNER (1928).

Leaving Bulimulidae and Succineidae apart, which make up the most numerous and conspicuous part of terrestrial molluscs of this area (PARENT et al. 2012), the presence of 27 species of terrestrial gastropods is now recognized; two of them belonging to the Neritimorpha, 24 taxa to Pulmonata Stylommatophora and one species to Pulmonata Systellommatophora. Endemic, native and exotic taxa are recorded, although the exact biogeographic affiliation of some species is not certainly known.

Half of them are endemic species belonging to the Helicinidae families (two species of genus *Helicina*)

Achatinellidae (one species each of genus *Tornatellides* and *Ambrosiella*), Vertiginidae (three species of *Gastrocopta* and one of *Nesopupa*) Strobilopsidae (one species of genus *Strobilops*) Pristilomatidae (two taxa; *Retinella*?) and Euconulidae (probably two species of *Habroconus* and one of *Guppya*). None of these genera is exclusive of the archipelago; only the subgenus *Strobilops* (*Nesostrobilops*), represented by a single species (*S. (N.) helleri*), is endemic to Fernandina, Isabela, San Cristóbal, Santa Cruz and Santiago Islands (Table 2).

Moreover, the only genus represented in most of the archipelago is *Gastrocopta* (Table 2). *G. munita* is living on at least 12 islands, being the species with the largest spatial range among the continental molluscs found in Galápagos and appearing on very distant islands and in different habitats. This species was found on the coast of Isabela, in forests of *Psidium* sp. (“guayabillos”) and *Pisonia* sp. (“pega-pega”) trees, as well as in the high arid zone (200 m.a.s.l.) and inside the crater of the Al-

cedo volcano. On Floreana, *G. munita* is registered in the Sierra Negra/Pampa, *Scalesia* area, in the Cerro Pajas crater and in the “guayabillos” area of Santiago. Other species of important geographic expansion are *T. chathamensis*, *G. clausa* and *H.? galapaganus*, whereas *G. duncana* (Pinzón) and *N. (I.) galapagensis* (Santiago) are forms with a very restricted dispersion (Table 2).

In the human inhabited islands, a group of species of several exotic families of unnoticed introduction was recorded: (*Z. (Z.) arboreus*, Gastrodontiidae), (*D. (D.) laeve*, Agriolimacidae), (*C. (C.) acicula* and *C. (G.) aperta*, Ferussaciidae), (*S. octona*, *L. gracilis* and *O. (O.) pumilum*, Subulinidae) and (*S. plebeia*, Veronicellidae) along with one species whose introduction was clearly intentional (*L. fulica*, Achatinidae). In these cases, their distributions are related to intensive human activities, since they were recorded in agricultural areas of Floreana, Isabela, and San Cristóbal and in urban areas of Santa Cruz and San Cristóbal. The fact that Santa Cruz has the largest number of alien species could be explained because of the significant presence of humans but also could be due to a more thorough survey effort. *L. fulica* is the most dangerous of the exotic terrestrial molluscs given its high reproductive capacity and its avidity.

Families including Chondrinidae, Ferussaciidae, and Subulinidae have species whose native or exotic origins are uncertain, as *C. (K.) consobrina* and *L. micra* that occur in large areas of the American continent. In the case of *P. (P.) dioscoricola*, there is evidence that its original range has been expanded due to human activities (HAUSDORF 2007). In Galápagos, all of these species are located in areas disturbed by human activity (Santa Cruz and Floreana), thus anthropogenic dispersion could be shared by other species as well.

With regard to, *H. ochsneri*, *T. chathamensis*, *G. munita*, *P. (P.) dioscoricola*, *H. (P.)* aff. *pacificus*, *H.? galapaganus*, *C. (K.) consobrina* and *L. micra*, these can be found in natural areas such as the Alcedo volcano (Isabela), Cerro Pajas, Sierra Negra/Pampa (Floreana) and Los Gemelos (Santa Cruz), but also in disturbed, agricultural, or urban areas. Commonly, agricultural and livestock activities are located in the upper parts of the islands, due to the greater rainfall abundance at higher altitudes. Several native species were described from specimens collected in these areas, profoundly altered nowadays.

Introduced species can also be found in natural areas of Floreana and San Cristóbal (*L. gracilis*) and in areas of *Scalesia* in anthropogenic habitat of Santa Cruz (*S. octona* and *D. (D.) laeve*). They appear not only in disturbed areas, but also in natural areas of Isabela (S. Negra/Pampa).

Native and endemic forests of *Scalesia* and other vegetation, such as “guayabillos” in Isabela and Santiago, have species of both native and exotic gastropods, such as *H. ochsneri*, *T. chathamensis*, *G. munita*, *P. (P.)*

dioscoricola, *H. (P.)* aff. *pacificus*, *C. (K.) consobrina*, *S. octona*, *L. micra* and *L. gracilis*. Meanwhile, *H. ochsneri*, *T. chathamensis*, *G. munita*, *L. micra* and *L. gracilis* live in forests and areas with *Scalesia* on Floreana. On Santa Cruz, *D. (D.) laeve*, *H.? galapaganus* and *S. octona* have been recorded in forests and areas of *Scalesia*, while *T. chathamensis*, *S. (N.) helleri*, *R.? chathamensis*, *H.? galapaganus* and *G. bauri* appear in areas of *Miconia*.

Regarding the outlook for continental gastropod invasions in the Pacific Ocean islands noted by COWIE (2001), Galápagos seems to remain free from many of the potential forms that inhabit the region like species of *Lamellidea* PILSBRY 1910, *Bradybaena* BECK 1837, *Liaradetia* GUDE 1913, and others of high presence in many Pacific islands. Now, in this paper we include *Zonitoides*, *Opeas*, *Achatina* and *Sarasinula* in the “Eastern Pacific outliers” (Epac) area that includes, Revillagigedo, Clipperton, Cocos, Malpelo and the Galápagos Islands, according to COWIE (2001).

Another South American region well known in connection with the invasion of gastropod exotic species is Argentina, whose inventory has been recently updated (VIRGILLITO et al. 2010, 2011; VIRGILLITO 2012; GUTIÉRREZ GREGORIC et al. in press). Both, Galápagos and Argentina, share the presence of non-indigenous molluscs of medium to small size, mostly pulmonates (at least, *C. (C.) acicula*, *L. (A.) gracilis* and *Opeas (O.) pumilum*), however, Argentina (and much of South America) differs in having presence of European Helicoidea (*Theba* RISSO 1826, *Otala* SCHUMACHER 1817, *Cryptomphalus* CHARPENTIER 1837 and *Bradybaena* BECK 1837) and slugs (*Limax* LINNAEUS 1758, *Limacus* LEHMANN 1864, *Lehmania* HEYNEMANN 1863, *Milax* GRAY 1855, and *Arion* FÉRUSSAC 1819).

The presence of *O. (O.) pumilum* has recently been detected in the tropical northern region of Argentina (Tucumán), and Oxychilidae *Oxychilus draparnaudi* (BECK 1837), has been found in a warm climate area (Ecological Reserve, Vicente López, Buenos Aires) (VIRGILLITO 2012). The latter species is still absent from the Galápagos malacological records.

Many of the introduced species in Galápagos are intermediate hosts of parasitic Strongylidae nematodes as *Z. (Z.) arboreus*, *D. (D.) laeve*, *S. octona*, *L. fulica* and *S. plebeia* (GREWAL et al. 2003); posing a risk of potentially dangerous infestations to vertebrates (humans included) or to other gastropods, either acting as definitive or intermediate hosts respectively.

The Galápagos native malacofauna is traditionally defined as akin to the faunas of Hawaii, Polynesia and the Americas. *Helicina*, *Gastrocopta*, *Guppya* and *Habroconus* are genera represented by numerous species in South and Central America. The recent Strobilopsidae are distributed in areas of North and Central America (SOLEM 1981); for its part, *Nesopupa* is widely spread in Polynesia and the Cocos Islands (VAGVOLGYI 1974).

Table 2: Presence of genera discriminated for each island. L: living; F: fossil. ■: specimens housed at ANSP, □: specimens housed at CAS (in both cases, with the generic or doubtful arrangement).

Taxa/Island	Balra	Daphne Mayor	Española	Fernandina	Floreana	Genovesa	Isabela	Marchena	Pinta	Pinzón	San Cristóbal	Santa Cruz	Santa Fe	Santiago	Seymour Norte
<i>Helicina</i>					L F		L		L	■	L	L F		L	
<i>Tornatellides</i>			□		L		L		L	■	L	L F			
<i>Ambrosiella</i>					L										
<i>Gastrocopta</i>	L	L	L		L F	L	L	L	L	L	?L	L F	L	L	L
<i>Nesopupa</i>														L	
<i>Pupisoma</i> (<i>Pupisoma?</i>)					L		L				L	L			
<i>Pupisoma</i> (<i>Ptychopatulula</i>)			□		L		L				L	L			
<i>Strobilops</i>			L				L				L	□		L	
<i>Zonitoides</i>											L				
<i>Retinella?</i>							L		L		L	L F		L	
<i>Habroconus</i>							L		L		L	L		L	
<i>Habroconus?</i>					L		L		L	L	L	L F		L	
<i>Guppya</i>			L			L	L		L	L		L F			
<i>Lissachatina</i>												L			
<i>Cecilioides</i> (<i>Cecilioides</i>)												□			
<i>Cecilioides</i> (<i>Karolus</i>)							L					L			
<i>Subulina</i>							L				L	L			
<i>Lamellaxis</i>			L		L		L				L	L			
<i>Opeas</i>					L		■					L			
<i>Deroceras</i>					L		L					L			
<i>Sarasinula</i>					L		L				L	L			

This author argues that the presence of the subgenus *Nesopupa* (*Infranesopupa*) in Hawaii and the Galápagos is due to petrel transportation (VAGVOLGYI 1975). Different growth stages (eggs, juveniles, or adults) could be transported in this way. This dispersal mode may be common for gastropods, as the final size of the species is not a limiting factor. In Argentina, populations of terrestrial micromollusk species have been found living in

avian nests, a circumstance facilitating the opportunity of its transportation (TURIENZO et al. 2012).

The Achatinellidae are abundant in Hawaii, Rapa Nui (Easter Island), and Juan Fernández (Solem, 1981) and are present in Revillagigedo Islands (México) (ZILCH 1959), Desventuradas Islands (Chile) (ODHNER 1963), and Galápagos, with at least one genus (*Ambrosiella* or *Tornatellides*). The description of *Ambrosiella floreanae*

n. sp. in one of the southernmost islands of Galápagos allows us to consider the existence of a close relationship between the malacofauna of Galápagos and San Ambrosio Island (Desventuradas Islands, Province of Valparaíso, Chile), located about 917 km from the South American coast, (26.32 S/80.00 W). Both insular areas share *Ambrosiella*, a genus described as monotypic to the islands of the Pacific Ocean (ODHNER 1963). Most likely, the species *Tornatellides mexicana* DALL 1926, described for the Socorro Island (México), belongs to this genus (DALL 1926).

The outlook displayed by native and endemic gastropods from the Galápagos shows that the species distribution is quite widespread and similar among them. Exceptionally, a few have “absolute” endemism, i.e. they are restricted to a single island, namely *A. floreanae* n. sp. and *N. (I.) galapagensis*: in both cases, they also display “absolute” generic or subgeneric endemism. In the case of *C. (K.) consobrina*, its character of native or exotic species is not clear, as earlier stated.

Particularly interesting are the cases of *Ambrosiella* and *Nesopupa*, two genera biogeographically linked with two geographically distinct islands (San Ambrosio Island, Chile, approximately 25 ° S, and Hawaii, USA, 20 ° N, respectively) which are both very distant from Galápagos. In both cases, speciation processes resulted in the existence of a single species within each genus.

To *Ambrosiella* and *Nesopupa*, as to some of the other groups, soil, plant species, and topography diversity among the islands does not seem to account for greater species diversity. This is in contrast to the diversity of the genus *Bulimulus* (*Naesiotus*) ALBERS 1850 in the Galapagos Archipelago, where the number of described species exceeds seventy (LOSOS & SCHLUTER 2000; PARENT & CRESPI 2006), even though there is no evidence that *B. (Naesiotus)* has been presented on the islands for longer than *Ambrosiella* or *Nesopupa*.

Holocene specimens of *H. nesiotica* and *G. clausa* were recorded on Floreana and Santa Cruz, while holocene records of *T. chathamensis*, *G. duncana*, *R.?* *chathamensis*, *H.?* *galapaganus* and *G. bauri* are restricted to Santa Cruz (CHAMBERS & STEADMAN 1986). *G. duncana* lives on Pinzón only, but has holocene records on Santa Cruz.

More thorough palaeontological studies are needed to shed light on some problematic species, especially to determine whether they were already present on the islands prior to human colonization.

Conclusions

Except Bulimulidae and Succineidae, 27 species of land shells were identified (two of Neritimorpha, 24, Pulmonata Stylommatophora and one, Pulmonata Systellommatophora). Endemic, native and exotic taxa are recorded, but the origin (native or exotic) of some species could not be determined. Half of the species are endemic, belonging

to Helicinidae, Achatinellidae, Pupillidae, Strobilopsidae, Pristilomatidae and Euconulidae. Currently, terrestrial mollusks have been recorded in 14 islands of the Galápagos Archipelago (Ecuador). The most abundant records are found in the human inhabited islands: Santa Cruz, San Cristóbal, Isabela and Floreana. Some generic arrangements are tentative or doubtful and must be confirmed through the study of the soft parts. None of the families or genera is exclusive to the archipelago; the only endemic subgenus is *Strobilops* (*Nesostrobilops*). The most widespread species is *Gastrocopta munita*, recorded in 12 of the 14 analysed islands. Only a few species are recorded as unique to a single island (e.g., *Nesopupa* (*Infranesopupa*) *galapagensis*). A new species of Tornatellidae from Floreana, *Ambrosiella floreanae*, is described: characterized by a parietal lamella in the aperture, it is related to the Chilean insular fauna. Human inhabited islands host several exotic species of inadvertently introduced micromolluscs (e.g., *Zonitoides* (*Z.*) *arboreus*) and slugs (e.g., *Sarasinula plebeia*), and one intentional introduction (*Lissachatina fulica*). Although the introduced species are dominant in anthropogenic altered sectors of the islands, they have also invaded natural areas. New records extend the distribution of almost all terrestrial gastropod species in the archipelago.

Acknowledgements

We thank the Galápagos National Park Service (GNPS) for providing export authorizations. Thanks go to the collectors listed in this study that contributed specimens and allowed us to use unpublished material. Thanks to Christine Parent (Biological Sciences, University of Idaho, USA), for allowing one of the authors (SEM) be part of her research project in 2010 and, thus, to begin his studies in Galápagos. Frank Bungartz, CDF, for his support in such work. We are grateful to P. Callomon (ANSP), Y. Finet (Muséum d'Histoire Naturelle, Genève), R. Hershler (NMNH), F. Naggs (NHM), C. Piotrowski (CAS) and S. Wu (UCM), for the photographs, bibliography, and information on materials from Galapagos preserved in their institutions, and to S. R. Gomes, for confirmation of the identity of *S. plebeia*. A.H. Breure (Netherlands Centre for Biodiversity Naturalis, Leiden, The Netherlands), for sending literature. X. Pilataxi, helped to separate specimens in 2010, M. Virgillito, assisted in collecting samples from Santa Cruz in 2011, A. Gonzalez (MACN) prepared maps, and A. Tablado (MACN) provided continued support. D. Freud (Wisconsin University), N. Boelling (Charles Darwin Research Station) and J. F. Araya (Universidad de Chile) helped with the translation of the manuscript from Spanish. This contribution was partially financially supported by PICT 2006-00468 (Agencia Nacional de Promoción Científica y Tecnológica, Argentina) and PIP 2010-0080 (Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina). SEM is member of Scientific Research Career of CONICET. This publication is contribution number 2.100 of the Charles Darwin Foundation for the Galapagos Islands. We like to thank the Galápagos National park Service who has kindly granted us to carry out this investigation.

References

- ADAMS, C.B. (1845): Specierum novarum conchyliorum, in Jamaica repertorium, synopsis. — Proceedings of the Boston Society of Natural History, **2**: 1–17.
- ADAMS, L.E. (1900): Observations on some British land and freshwater shells. — Journal of Conchology, **9**: 297–302.
- AUFFENBERG, K. & STANGE, L.A. (1988): The Subulinidae of Florida. — Entomology Circular, **305**: 1–4.
- BAKER, H.B. (1928): Minute Mexican land snails. — Proceedings of the Academy of Natural Sciences of Philadelphia, **79**: 223–246, pls. 15–20.
- BAKER, H.B. (1930): Mexican mollusks collected for Dr. Bryant Walker in 1926. Part II. Auriculidae, Orthurethra, Heterurethra, and Aulacopoda. — Occasional Papers of the Museum of Zoology, University of Michigan, **220**: 1–45, pls. 7–11.
- BAKER, H.B. (1941): Zonitid snails from Pacific Islands. Partes 3 and 4. — Bernice P. Bishop Museum Bulletin, **166**: 205–370.
- BAKER, H.B. (1945): Some American Achatinidae. — Nautilus, **58** (3): 84–92.
- BAKER, H.B. (1963): Type land snails in the Academy of Natural Sciences of Philadelphia. Part 2. Land Pulmonata, exclusive of North America, north of Mexico. — Proceedings of the Academy of Natural Sciences of Philadelphia, **115**: 191–259.
- BARKER, G.M. (1999): Naturalised terrestrial Stylommatophora (Mollusca: Gastropoda). — Fauna of New Zealand, **38**: 1–247.
- BARKER, G.M. & POTTINGER, R.P. (1983): Three Slugs of the Altiplano, Peru (Mollusca, Stylommatophora). — Revista peruana de Entomología, **26** (1): 67–73.
- BEQUAERT, J.C. (1950): Studies in the Achatinidae, a group of African land snails. — Bulletin of the Museum of Comparative Zoölogy, **105** (1): 1–216.
- BOWDICH, E. (1822): Elements of Conchology including the fossil genera and the animals. Part 1, Univalves. 83 pp. London.
- BRUGUIÈRE, M. (1789–1792): Encyclopédie méthodique. Histoire naturelle des Vers, **VI**: 1–757. Paris.
- BUDHA, P.B. & NAGGS, F. (2008): The Giant African Land Snail *Lissachatina fulica* (Bowdich) in Nepal. — The Malacologist, **50**: 19–21.
- CAUSTON, C., HERRERA, H. W. & LINCANGO, M. P. (2014): CDF Checklist of Galapagos Introduced Invertebrates - FCD Lista de especies de Invertebrados introducidos de Galápagos. — In: BUNGARTZ, F., HERRERA, H., JARAMILLO, P., TIRADO, N., JIMÉNEZ-UZCÁTEGUI, G., RUIZ, D., GUÉZOU, A. & ZIEMMECK, F. (eds.). Charles Darwin Foundation Galapagos Species Checklist - Lista de Especies de Galápagos de la Fundación Charles Darwin. Charles Darwin Foundation / Fundación Charles Darwin, Puerto Ayora, Galapagos: <http://www.darwinfoundation.org/datazone/checklists/introduced-species/introduced-invertebrates/> Last updated 21 May 2014.
- CHAMBERS, S. M. (1991): Biogeography of Galápagos Land Snails. — In: JAMES, M. J. (Ed.): Galápagos Marine Invertebrates. Taxonomy, Biogeography, and Evolution in Darwin's Is. — Topics in Geobiology, **8**: 307–325. New York.
- CHAMBERS, S. M. & STEADMAN, D. W. (1986): Holocene terrestrial gastropod faunas from Isla Santa Cruz and Isla Floreana, Galápagos: evidence for late Holocene declines. — Transactions of the San Diego Society of Natural History, **21** (6): 89–110.
- CLAPP, G.H. (1915): Notes. — Nautilus, **28** (11): 131.
- COWIE, R.H. (1997): Catalogue and bibliography of the non indigenous non-marine snails and slugs of the Hawaiian Islands. — Bishop Museum Occasional Papers, **50**: 1–66.
- COWIE, R.H. (2001): Invertebrate invasions on Pacific Islands and the replacement of unique native faunas: a synthesis of the land and freshwater snails. — Biological Invasions, **3**: 119–136.
- CROSSE, H. (1867): Description d'un genre nouveau et de plusieurs espèces inédites provenant de la Nouvelle-Calédonie. — Journal de Conchyliologie, **15**: 177–194.
- CROSSE, H. (1873): Diagnoses Molluscorum novorum, ex insula Haiti dicta oriundorum. — Journal de Conchyliologie, **21**: 352–356.
- DALL, W. H. (1892): On some types new to the fauna of the Galápagos Is. — Nautilus, **5** (9): 97–99.
- DALL, W. H. (1893): Preliminary notice of new species of landshells from the Galápagos Is., collected by Dr. G. Baur. — Nautilus, **7** (5): 52–56.
- DALL, W. H. (1896): Insular landshell faunas, especially as illustrated by the data obtained by Dr. G. Baur in the Galápagos Is. — Proceedings of the Academy of the Natural Sciences of Philadelphia, **1896**: 395–460, pls. XV–XVII.
- DALL, W. H. (1900): Additions to the insular land-shell faunas of the Pacific coast, especially of the Galápagos and Cocos Is. — Proceedings of the Academy of the Natural Sciences of Philadelphia, **1900**: 88–99, pl. VIII.
- DALL, W. H. (1917a): New *Bulimulus* from the Galápagos Is. and Perú. — Proceedings of the Biological Society of Washington, **30**: 9–12.
- DALL, W. H. (1917b): Preliminary descriptions of new species of Pulmonata of the Galapagos Is. — Proceedings of the California Academy of Sciences, 4th Series, **2**: 375–382.
- DALL, W.H. (1926): XV. Expedition to the Revillagigedo Is., Mexico, in 1925. Land shells of the Revillagigedo

- and Tres Marias Is., Mexico. — Proceedings of the California Academy of Sciences, 4^oSeries, **15** (15): 467–491, pls. 35–36.
- DALL, W. H. & OCHSNER, W. H. (1928): Landshells of the Galápagos Is. — Proceedings of the California Academy of Sciences, 4^oSeries, **17** (5): 141–185, pls. 8–9.
- FÉRUSAC, A.E.J., d'A. (1821): Tableaux systématiques des animaux mollusques: 1–94. Paris.
- FISCHER, P. (1868): Diagnoses de deux Limaciens de la Nouvelle Calédonie. — Journal de Conchilologie, **16**: 145–146.
- FISCHER, P. (1871): Révision des espèces du Genre *Vaginula* Férussac. — Archives du Muséum national d'histoire naturelle (Paris), **7**: 147–175.
- GOMES, S.R. (2007): Filogenia morfológica de Veronicellidae, filogenia molecular de *Phyllocaulis* Colosi e descrição de uma nova espécie para a família (Mollusca, Gastropoda, Pulmonata). Tese de Doutorado. Universidade Federal do Rio Grande do Sul. 165 pp. Porto Alegre.
- GOMES, S.R. & THOMÉ, J. W. (2001): Anatomia comparada de cinco espécies da família Veronicellidae (Gastropoda, Soleolifera) ocorrentes nas regiões australiana e oriental. — Biociências, **9** (2): 137–151.
- GOMES, S.R. & THOMÉ, J. W. (2002): Variabilidade morfológica de *Sarasinula plebeia* (Fischer, 1868) (Gastropoda, Veronicellidae) na região biogeográfica australiana. — Acta Biologica Leopoldensia, **24** (1): 37–46.
- GOMES, S.R. & THOMÉ, J.W. (2004): Diversity and distribution of the Veronicellidae (Gastropoda: Soleolifera) in the Oriental and Australian biogeographical regions. — Memoirs of the Queensland Museum, **49** (2): 589–601.
- GREWAL, P.S., GREWAL, S.K., TAN, L. & ADAMS, B.J. (2003): Parasitism of Molluscs by Nematodes: Types of Associations and Evolutionary Trends. — Journal of Nematology, **35** (2): 146–156.
- GRIMPE, G. & HOFFMANN, H. (1925a): Versuch einer Revision der indischen, indo-und polynesischen Vaginuliden (Gastrop. Pulm.). — Zeitschrift für wissenschaftliche Zoologie, **124** (1): 1–50.
- GRIMPE, G. & HOFFMANN, H. (1925b): Die Nackschnecken von Neu-Caledonien, den Loyalty Inseln und den Neuen-Hebriden. In: Sarasin, F. & Roux, J. — Nova Caledonia, Zoologie, **3** (3): 339–476, Taf. 5–6.
- GUTIÉRREZ GREGORIC, D.E., NÚÑEZ, V., VOGLER, R. & RUMI, A. (2011): Invasion of the Argentinean Paranense rainforest by the giant African snail *Achatina fulica*. — American Malacological Bulletin, **29**: 135–137.
- GUTIÉRREZ GREGORIC, D.E., BELTRAMINO, A., VOGLER, R., NÚÑEZ, V., CUEZZO, M.G., GOMES, S.R., VIRGILLITO, M. & MIQUEL, S.E. Primeros registros de babosas terrestres exóticas de las familias Phylomicidae, Arionidae, Agriolimacidae y Limacidae (Gastropoda, Pulmonata) en la Argentina. In press.
- HANNA, G.D. & HERTLEIN, L.G. (1938): Land and brackish water Mollusca of Cocos Is. — Allan Hancock Pacific Expeditions, **2** (8): 123–135.
- HAUSDORF, B. (2007): Revision of the American *Pupisoma* species (Gastropoda: Pupilloidea). — Journal of Natural History, **41** (21–24): 1481–1551.
- HENDERSON, J. (1924): Mollusca of Colorado, Utah, Montana, Idaho and Wyoming. — University of Colorado Studies, **13** (2): 65–223.
- HERTLEIN, L.G. (1932): *Gastrocopta munita* on South Seymour Is., Galápagos Group. — Nautilus, **46** (2): 69–70.
- HERTLEIN, L.G. (1963): Contribution to the biogeography of Cocos Is., including a bibliography. — Proceedings of the California Academy of Sciences, 4^oSeries, **32** (8): 219–289.
- HERTLEIN, L.G. (1972): Pliocene fossils from Baltra (South Seymour) Is., Galápagos Is. — Proceedings of the California Academy of Sciences, 4^oSeries, **39** (2): 25–46.
- HUTTON, T. (1834): On the land shells of India. — Journal of the Asiatic Society of Bengal, **3**: 81–93.
- HYLTON SCOTT, M.I. (1948): Moluscos del noroeste argentino. — Acta Zoológica Lilloana, **6**: 241–274.
- KRAMER, P. (2009): La Fundación Charles Darwin: Historia de una visión de ciencia y conservación. 24–27 pp. — In: DE ROY, T. (Ed.): Galápagos, cincuenta años de ciencia y conservación. 239 pp; Quito.
- LOSOS, J.B. & SCHLUTER, D. (2000): Analysis of an evolutionary species-area relationship. — Nature, **408**: 847–850.
- MEAD, A.R. (1979): Economic malacology. — In: FRETTER, V. & PEAKE, J. (Eds.): Pulmonates, 2B: 150 pp; London.
- MILLER, J. S. (1822): A list of the freshwater and landshells occurring in the environment of Bristol, with observations. — Annals of Philosophy (New Series), **3** (17): 376–381.
- MILLER, K. (1879): Die Binnenmollusken von Ecuador. — Malakozoologische Blätter (Neue Folge), **1**: 117–199, Taf. IV–XV.
- MIQUEL, S.E. & AGUIRRE, M.L. (2011): Taxonomía de los gasterópodos terrestres del Cuaternario de Argentina. — Revista Española de Paleontología, **26** (2): 101–133.
- MIQUEL, S.E. & PARENT, H. (1997): Moluscos gasterópodos de la provincia de Santa Fe, Argentina. — Malacological Review, **29**: 107–112.
- MIQUEL, S.E., PARENT, H. & SCARABINO, F. (1995): Achatinoidea introducidos en la Argentina y el Uruguay (Mollusca: Gastropoda: Stylommatophorida). — Neotrópica, **41** (105–106): 26.
- MÜLLER, O.F. (1774): Vermium terrestrium et fluviatilium, seu animalium...2. 214 pp. Havniae et Lipsiae.
- ODHNER, N. H. (1951): Studies on Galápagos bulimulids. — Journal de Conchyliologie, **90** (4): 253–268.

- ODHNER, N.H. (1963): *Ambrosiella kuscheli* n. gen., n. sp., a Tornatellinid land shell from San Ambrosio Is. — Proceeding of the Malacological Society of London, **35**: 207–209.
- ORBIGNY, A. d' (1834–1847): Voyage dans l'Amérique méridionale... 5 (3). Mollusques: 1–758; 9. Atlas, 85 pls. Paris et Strasbourg.
- ORBIGNY, A. d' (1835): Synopsis terrestrium et fluviatilium molluscorum, in suo per Americam meridionalem itinere. — Magasin de Zoologie, **5** (61): 1–44.
- ORBIGNY, A. d' (1841–1853): Mollusques. Vol. 1, 264 pp.; 1842, Atlas, Vol. 8, 28 pls. — In: DE LA SAGRA, R. (Ed.): Histoire physique, politique et naturelle de l'île de Cuba; Paris.
- PARENT, C.E. & ^{Crespi} B.J. (2006): Sequential colonization and diversification of Galápagos endemic land snail genus *Bulimulus* (Gastropoda, Stylommatophora). — Evolution, **60** (11): 2311–2328.
- PARENT, C.E., MIQUEL, S.E. & COPPOIS, G. (2012): CDF Checklist of Galapagos Terrestrial & brackish water snails - FCD Lista de especies de Caracoles terrestres de Galápagos. In: BUNGARTZ, F., HERRERA, H., JARAMILLO, P., TIRADO, N., JIMENEZ-UZCATEGUI, G., RUIZ, D., GUÉZOU, A. & ZIEMMECK, F. (Eds.). Charles Darwin Foundation Galapagos Species Checklist: <http://www.darwinfoundation.org/datazone/checklists/terrestrial-invertebrates/gastropoda/> Last updated 06 Jun 2012.
- PFEIFFER, L. (1840): Uebersicht der im Januar, Februar und März 1839 auf Cuba gesammelten Mollusken. — Archiv für Naturgeschichte, **6** (1): 250–261.
- PFEIFFER, L. (1841–1846): Symbolae ad Historiam Heliceorum, **3**. 100 pp: Casellis.
- PFEIFFER, L. (1848): Monographia heliceorum viventium, **1**. 484 pp; Lipsiae.
- PFEIFFER, L. (1851): Beschreibungen neuer Landschnecken. — Zeitschrift für Malakologie, 1850 (5): 65–80.
- PFEIFFER, L. (1853): Monographia heliceorum viventium, **3**. 711 pp; Lipsiae.
- PILSBRY, H.A. (1904–1905): African Achatinidae. Manual of Conchology, (2) **17**: 1–232, 65 pls; Philadelphia.
- PILSBRY, H.A. (1906): Achatinidae: Stenogyrinae and Coeliarinae. Manual of Conchology, (2) **18**: 1–357, 51 pls; Philadelphia.
- PILSBRY, H.A. (1909–1910): *Cecilioides*, *Glessula* and Partulidae. Manual of Conchology, (2) **20**: 1–336, 43 pls; Philadelphia.
- PILSBRY, H.A. (1910): On *Opeas goodalli* Miller. — Nautilus, **24** (3): 31–32.
- PILSBRY, H.A. (1916–1918): Pupillidae (Gastrocoptinae). Manual of Conchology, (2) **24**: 1–380, 49 pls; Philadelphia.
- PILSBRY, H.A. (1920–1921): Pupillidae (Vertiginidae, Pupillinae). Manual of Conchology, (2) **26** (101): 1–64, pls. 1–8; Philadelphia.
- PILSBRY, H.A. (1927): Family Strobilopsidae. Manual of Conchology, (2) **28** (109): 1–48, pls. 1–8; Philadelphia.
- PILSBRY, H.A. (1931): Appendix to Pupillidae. Manual of Conchology, (2) **28** (110): 49–96, pls. 9–15; Philadelphia.
- PILSBRY, H.A. (1934): Appendix to Pupillidae. Manual of Conchology, (2) **28** (114): 97–160, pls. 16–23; Philadelphia.
- PILSBRY, H.A. (1946): Land Mollusca of North America (North of Mexico), **2** (1): 1–520 pp. Monographs. The Academy of Natural Sciences of Philadelphia.
- PILSBRY, H.A. (1948): Land Mollusca of North America (North of Mexico), **2** (2): 521–1113. Monographs. The Academy of Natural Sciences of Philadelphia.
- PILSBRY, H.A. & COOKE, C. M. (1915–1916): Appendix to Amastridae. Tornatellinidae. Index, Vols. Xxi–XXI-II. Manual of Conchology, (2) **23**: iii–xi + 1–302, 55 pls; Philadelphia.
- RAMÍREZ, R., PAREDES, C. & ARENAS, J. (2003): Moluscos del Perú. — Revista de Biología Tropical, Suppl. 3: 225–284.
- REIBISCH, P. (1893): Die conchyliologische Fauna der Galápagos-Inseln. — Sitzungsberichte und Abhandlungen der Naturwissenschaftlichen Gesellschaft Isis, **1893**: 13–32, Taf. I–II.
- RODRÍGUEZ, M.C. (2006): Estrategia preliminar para evaluar y erradicar *Achatina fulica* (Gastropoda: Achatinaceae) en Ecuador. — Boletín Técnico, Serie Zoológica, **2**: 45–52.
- SAY, T. (1816): Conchology. — In: NICHOLSON's British encyclopedia of arts and science. First American edition, 4. New York. [no pagination]
- SIMONE, L.R.L. (2006): Land and freshwater molluscs of Brazil. (Ed.): EGB, Fapesp. 390 pp; São Paulo.
- SMITH, E.A. (1895): Report on the land and fresh-water shells collected by Mr. Herbert H. Smith at St. Vincent, Grenada, and other neighbouring Is. — Proceedings of the Malacological Society of London, **1**: 300–322.
- SMITH, A.G. (1966): Land Snails of the Galápagos. — In: The Galápagos. BOWMAN, R. I. (Ed.): Proceedings of the Symposia of the Galápagos International Scientific Project: 240–251; Brussels.
- SMITH, A. G. (1971): New record for a rare Galápagos land snail. — Nautilus, **85** (1): 5–8.
- SNELL, H.M., SNELL, H.L., DAVIS-MERLEN, G., SIMKIN, T. & SILBERGLIED, R.E. (1996): Bibliografía de Galápagos 1535–1995. Fundación Charles Darwin para las islas Galápagos. Contribución FCD 575. Quito.
- SOLEM, A. (1981): Land-Snail Biogeography: A true Snail's Pace of Change. — In: Vicariance Biogeography: A Critique. G. NELSON & ROSEN, D.E. (Eds); New York.
- STEARNS, R.E.C. (1894): Scientific results of explorations by the U.S. Fish Commission Steamer Albatross. — Proceedings of the United States of Natural Museum, **16**: 353–450, pls. 51–52.

- SWAINSON, W. (1840): A treatise on Malacology; or the natural classification of shells and shell fish. 419 pp; London.
- THOMÉ, J.W. (1971): Redescrção dos tipos de Veronicellidae (Mollusca, Gastropoda) Neotropicais. VII. Espécies depositadas no "Muséum National d'Histoire Naturelle", Paris, França. — *Iheringia, Zoología*, **40**: 27–52.
- THOMÉ, J.W. (1993): Estado atual da sistemática dos Veronicellidae (Mollusca; Gastropoda) americanos, com comentários sobre sua importância econômica, ambiental e na saúde. — *Biociências*, **1** (1): 61–75.
- TRYON, G.W. (1886): Zonitidae. *Manual of Conchology*, (2) **2**: 3–265, pls. 64; Philadelphia.
- TRYON, G.W. (1887): Helicidae. *Manual of Conchology*, (2) **3**: 3–313, pls. 63; Philadelphia.
- TURIENZO, P. & MIQUEL, S.E. (2012): Gastropoda en nidos de aves de la Argentina: primeros registros. 25° Reunión Argentina de Ecología. Resúmenes: 277. Luján.
- VAGVOLGYI, J. (1974): *Nesopupa galapagensis*, a new Indo-pacific element in the land snail fauna of the Galápagos Is. (Pulmonata: Vertiginidae). — *Nautilus*, **88** (3): 86–89.
- VAGVOLGYI, J. (1975): Body size, aerial dispersal, and origin of the Pacific land snail Fauna. — *Systematic Zoology*, **24**: 465–488.
- VAGVOLGYI, J. (1979): Systematics and Evolution of Galapagos *Gastrocopta*. — *Bulletin of the American Malacological Union*, **1979**: 63.
- VIRGILLITO, M. (2012): Moluscos gasterópodos terrestres introducidos en la República Argentina. Tesina de Grado. Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. 99 pp. Buenos Aires.
- VIRGILLITO, M., MIQUEL, S.E. & SANTIN, R. (2010): Moluscos Gasterópodos exóticos en ambientes terrestres de Argentina. 1° Congreso Latinoamericano (4° Argentino) de Conservación de la Biodiversidad. Resúmenes B7P–0086. San Miguel de Tucumán.
- VIRGILLITO, M., SANTIN, R. & MIQUEL, S.E. (2011): "Babosas" terrestres en la República Argentina (Mollusca Pulmonata Veronicelloidea y Limacoidea). 8° Congreso Latinoamericano de Malacología. Resúmenes: 293. Puerto Madryn.
- WAGNER, A. (1905–1911): Die Familie der Helicinidae. Neue Folge. — In: MARTINI, F. H. W. & CHEMNITZ, J. H. (Eds): *Systematisches Conchylien-Cabinet*, 1 (18) **2**: 1–391, pls. 1–70. Nürnberg.
- WU, S.-K. & ITOW, S. (1988): Distributions of land shells and plants on Santa Cruz and Santa Maria Is., Galapagos. — *Annual Report of The Western Society of Malacologists*, **21**: 12–14.
- ZILCH, A. (1959-1960): Gastropoda Euthyneura. — In: O.H. SCHINDEWOLF (Ed.): *Handbuch der Paläozoologie*, **6** (2), 834 pp. Berlin-Nikolassee.
- WWW.SENASA.GOV.AR (2011): Dirección de Vigilancia y Monitoreo. Estado de situación de *Achatina fulica* en Argentina.

Manuscript submitted: 15.07.2013
 Revised manuscript accepted: 16.06.2014

