

A checklist of terrestrial molluscs (Mollusca: Gastropoda) from Sierra Bibijagua, Isla de la Juventud, Cuba

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Abstract: Sierra Bibijagua are marmoreal elevations located on northern Isla de la Juventud (Island of Youth), southwestern Cuba. Isla de la Juventud is the largest island (2,200 km²) of the Canarreos Archipelago, Greater Antilles. A checklist of terrestrial molluscs recorded from Sierra Bibijagua is presented, including the following information: synonymy, type locality, updated distribution, endemism, and photographs of shells and living individuals whenever possible. The checklist comprises 12 families and 16 genera currently known from the area, including six new records: *Farcimen procer*, *Leidyula floridana*, *Liguus fasciatus*, *Subulina octona*, *Glandinella poeyana*, and *Bradybaena similaris*.

Key words: Canarreos Archipelago; land snails; Isle of Pines; Greater Antilles

INTRODUCTION

Cuba is considered the most diverse insular Caribbean region, with ca. 12,000 invertebrate species, with the most numerous group being insects, molluscs and arachnids (González et al. 2012). The Cuban Archipelago has a rich terrestrial molluscan fauna with over 1,390 living species, most of which are endemic (95%; Espinosa 2011). Cuban land snails are typically represented by three main groups: clade Neritimorpha (two families, 13 genera, 77 species), clade Caenogastropoda (four families, 39 genera, 399 species) and the informal group Pulmonata (clades Systellomorpha and Stylommatophora; 28 families, 106 genera, 914 species) (Espinosa 2011). Within the Cuban Archipelago, Isla de la Juventud is considered one of the most important areas of endemism: about 30% of the local terrestrial mollusc species are endemics to the island (Espinosa and Ortea 1999; Espinosa 2009). The purpose of this study is to survey the terrestrial gastropods from Sierra Bibijagua, Isla de la Juventud, because there are no previous records of research and/or scientific collecting of these invertebrates at this locality.

MATERIALS AND METHODS

Study site

Isla de la Juventud, formerly known as Isle of Pines, is a 2,204 km² Caribbean island separated from southwestern Cuba by about 94 km of water (CNAP 2013). The island's greatest width north to south (between Punta Lindero and Punta del Guanál) is 54 km. The greatest distance east to west (between Seboruco Alto and Caleta de Lugo) is 58 km (Acevedo 1983). In the northern part of the island there are five marmoreal sierras that are the habitats of the majority of the endemic terrestrial molluscs (Figure 1). The names of these sierras are: Sierra de Caballos (295 m above sea level [a.s.l.]), Sierra de las Casas (261 m a.s.l.), Sierra Chiquita (157 m a.s.l.), Sierra Colombo (130 m a.s.l.), and Sierra Bibijagua (93 m a.s.l.). Additionally, in southern Isla de la Juventud is Ciénaga de Lanier, the third most important Ramsar wetland site in Cuba (Iturralde-Vinent 1988).

Data collection

During 2014–2015, terrestrial molluscs from Sierra Bibijagua (21°89'27.1" N, 082°73'63.1" W) were collected, studied, and recorded. The number of individuals in 15 quadrants (7 × 7 m) were counted twice a day, checking rocks, fallen trunks, vegetation, and trees up to 2 m high. All specimens were collected by hand and preserved in 90% ethanol. Samples were deposited in the scientific malacological collection housed at the National Museum of Natural History of Cuba (MNHNC, Havana) under the registration numbers MNHNCu-08.00127 to MNHNCu-08.00129. Geographic coordinates were taken with a GPS receiver. Species identifications and endemism were assessed using the following bibliography: Pilsbry 1907; Henderson and Bartsch 1920; Torre and Bartsch 1941; Alcalde 1945; Aguayo and Jaume 1954; Jaume 1954a, 1954b; Clench and Jacobson 1970, 1971; Espinosa and Ortea 1999; Maceira 2003; Espinosa and Ortea 2009. Suprageneric classification follows Bouchet et al. (2005).

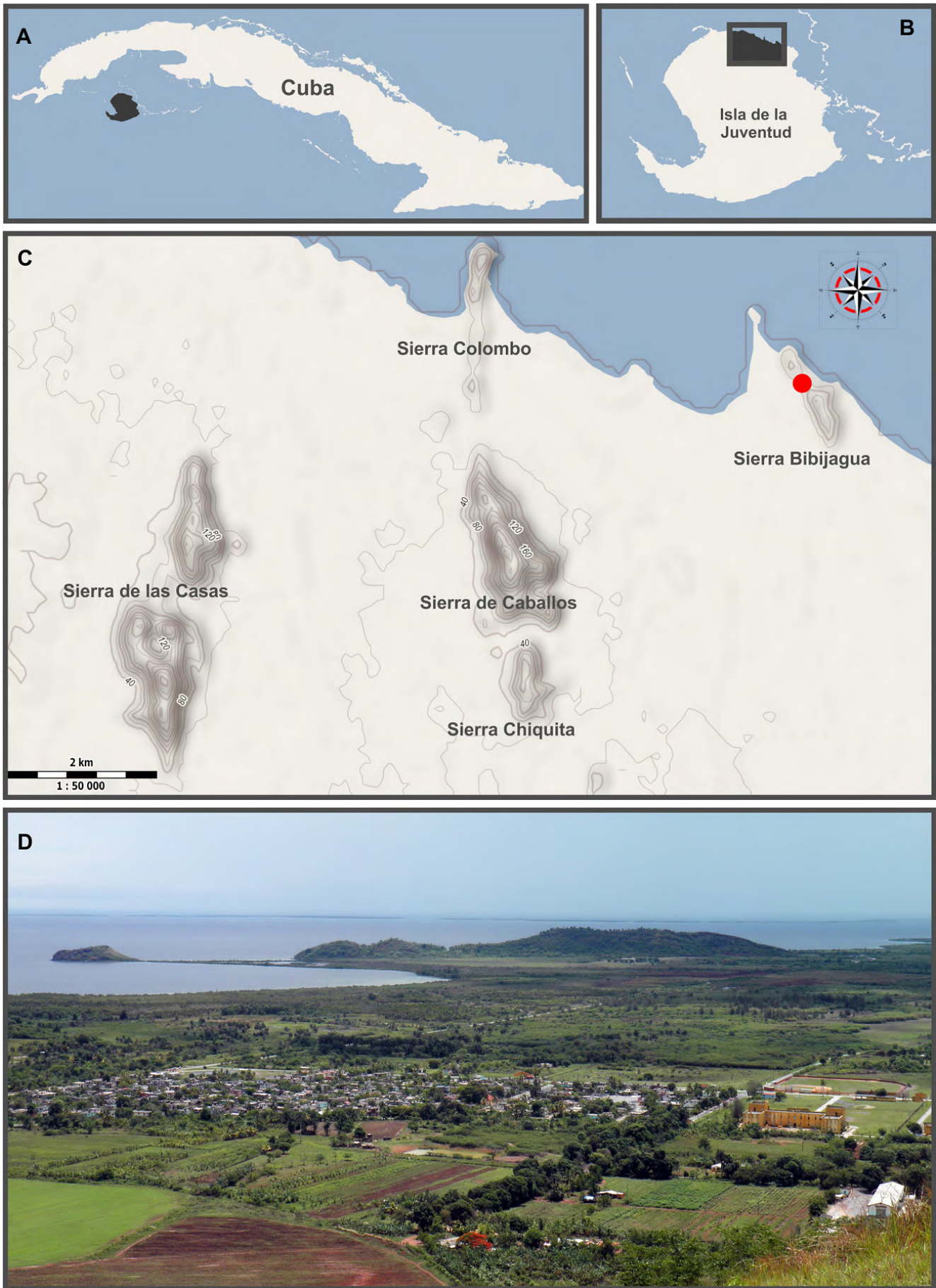


Figure 1. **A:** Map of Cuba. **B:** Map of Isla de la Juventud. **C:** Sierras on the north part of Isla de la Juventud. Sierra de Caballos (295 m above sea level [a.s.l.]), Sierra de las Casas (261 m a.s.l.), Sierra Chiquita (157 m a.s.l.), Sierra Colombo (130 m a.s.l.), and Sierra Bibijagua (93 m a.s.l.). **D:** View of Sierra Bibijagua from the east side of Sierra de Caballos.

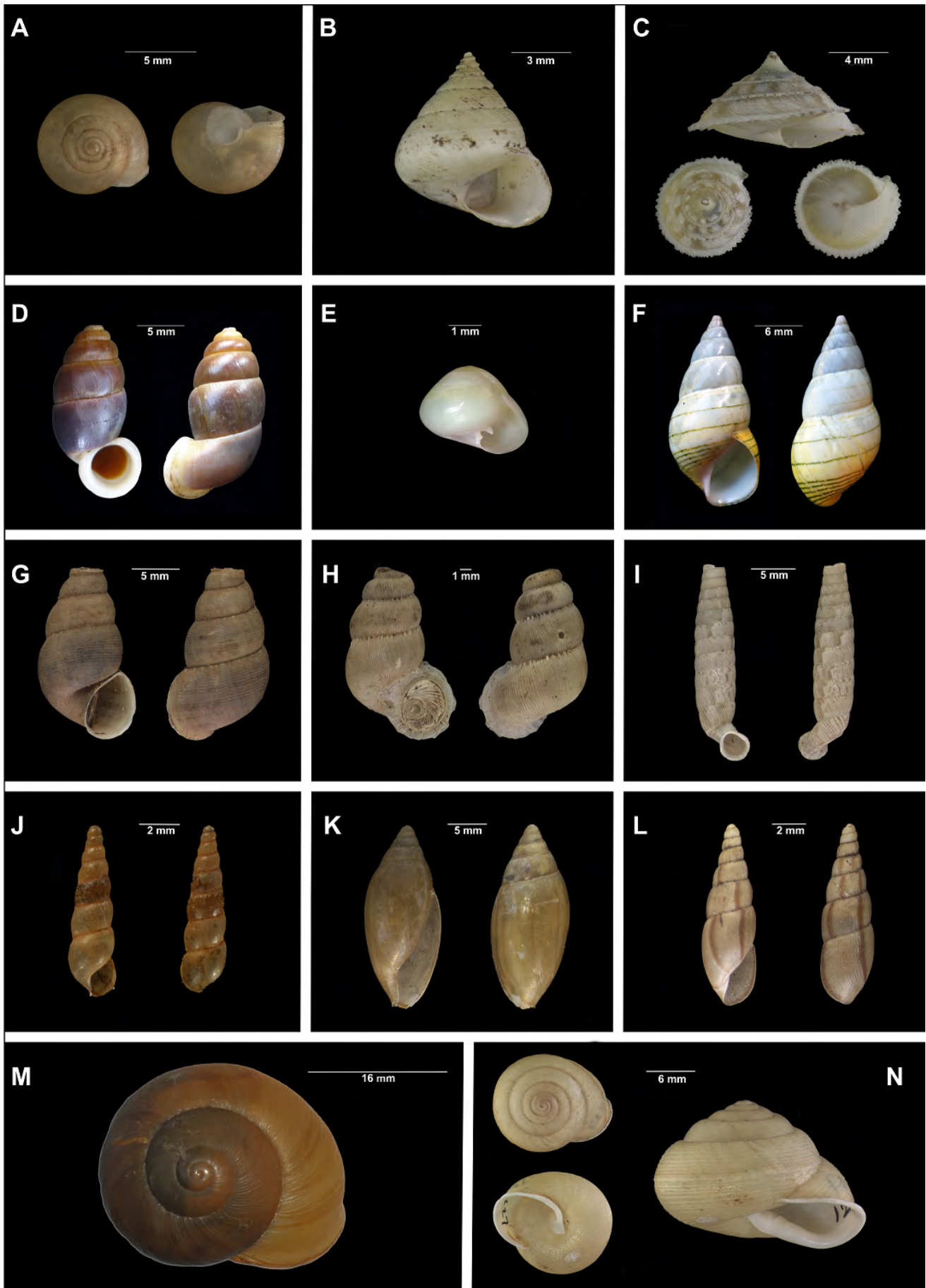


Figure 2. Terrestrial molluscs from Sierra Bibijagua, Isla de la Juventud, Cuba. **A:** *Alcacia hispida*. **B:** *Eutrochatella scopulorum*. **C:** *Priotrochatella stellata*. **D:** *Farcimen procer*. **E:** *Proserpina globulosa*. **F:** *Liguus fasciatus*. **G:** *Chondropoma vespertinum bibijaguaense*. **H:** *Opisthosiphon pupoides bibijaguaense*. **I:** *Nesocoptis pruinosa bibijaguaensis*. **J:** *Subulina octona*. **K:** *Oleacina subulata*. **L:** *Glandinella poeyana*. **M:** *Zachrysia auricoma*. **N:** *Jeanneretia bicincta pityonesica*.

RESULTS

In Sierra Bibijagua, I found 16 terrestrial molluscs species, including seven “prosobranch” snails (clades Neritimorpha and Caenogastropoda), one pulmonate slug (clade Systellomorpha), and eight pulmonate snails (clade Stylommophora). A total of 111 land snails were identified, belonging to 12 families and 16 genera. The most common species in terms of number of individuals was *Zachrysia auricoma* (39%) and *Liguus fasciatus* (23%). The photographs of shells are documented in Figure 2 and living individuals in Figures 3 and 4.

Terrestrial molluscs from Sierra Bibijagua, Isla de la Juventud, Cuba

Class Gastropoda
Clade Neritimorpha
Family Helicinidae Férrussac, 1822
Genus *Alcadia* Gray, 1840

Alcadia hispida (Pfeiffer, 1839) (Figures 2A, 3A)

Alcadia hispida Pfeiffer, 1839: 355.
Helicina dentigera d’Orbigny, 1853: 252.

Type locality: Cafetal “El Fundador”, Canimar, Matanzas, Cuba (Boss and Jacobson 1973).

Distribution: Western and central part of Cuban Archipelago.

Genus *Eutrochatella* Fischer, 1885

Eutrochatella scopulorum (Morelet, 1849) (Figures 2B, 3B)

Eutrochatella scopulorum Morelet, 1849: 20.
Helicina luteopunctata Poey, 1851: 115.

Type locality: Isla de Pinos, Cuba (Clench and Jacobson 1971).

Distribution: Endemic species to Isla de la Juventud, Cuba.

Genus *Priotrochatella* Fischer, 1883

Priotrochatella stellata (Velazquez in Poey, 1851) (Figures 2C, 3C, 3D)

Priotrochatella stellata Velazquez in Poey, 1851: 117.

Type locality: Sierra de Caballos, Isla de la Juventud, Cuba (Clench and Jacobson 1970).

Distribution: Endemic to Isla de la Juventud, Cuba (Sierra de Caballos and Sierra Bibijagua).

Family Proserpinidae Gray, 1847
Genus *Proserpina* G.B. Sowerby II, 1839

Proserpina globulosa (d’Orbigny, 1842) (Figure 2E)

Proserpina globulosa d’Orbigny, 1842: 239.
Odontostoma globulosum Pfeiffer, 1848: 11.

Type locality: Interior of Cuban Archipelago (d’Orbigny 1842).

Distribution: Pinar del Río, Isla de la Juventud, Santiago de Cuba and Guantánamo, Cuba.

Clade Caenogastropoda
Family Megalomastomatidae Blandford, 1864
Genus *Farcimen* Troschel, 1847

Farcimen procer (Poey, 1854) (Figures 2D, 3E, 3F)

Farcimen procer Poey, 1854: 404.

Cyclostoma tortum Poey, 1852: 105.

Magalomastoma complanatum Pfeiffer, 1856: 120.

Type locality: Isla de la Juventud, Cuba (Poey 1851).

Distribution: Endemic to Isla de la Juventud, Cuba (Sierra de las Casas, Sierra de Caballos, Sierra Colombo, and Sierra Bibijagua).

Family Pomatiidae Newton, 1891 (1828)
Genus *Chondropoma* Pfeiffer, 1847

Chondropoma vespertinum bibijaguense Torre & Bartsch, 1938 (Figure 2G)

Chondropoma vespertinum bibijaguense Torre & Bartsch, 1938: 344.



Figure 3. Terrestrial molluscs from Sierra Bibijagua, Isla de la Juventud, Cuba. **A:** *Alcadia hispida*. **B:** *Eutrochatella scopulorum*. **C–D:** *Priotrochatella stellata*. **E:** *Farcimen procer*. **F:** *Farcimen procer*, juvenile. **G–H:** *Opisthosi-phon pupoides bibijaguense*.

Type locality: West side of the central Sierra Bibijagua, Isla de la Juventud, Cuba (Torre and Bartsch 1938).

Distribution: Endemic to Sierra Bibijagua, Isla de la Juventud, Cuba.

Genus *Opisthosiphon* Dall, 1905

Opisthosiphon pupoides bibijaguaense Torre & Bartsch, 1941 (Figures 2H, 3G, 3H)

Opisthosiphon pupoides bibijaguaense Torre & Bartsch, 1941: 195.

Type locality: West side of the central Sierra Bibijagua, Isla de la Juventud, Cuba (Torre and Bartsch 1941).

Distribution: Endemic to Sierra Bibijagua, Isla de la Juventud, Cuba.

Informal Group Pulmonata

Clade Systellommatophora

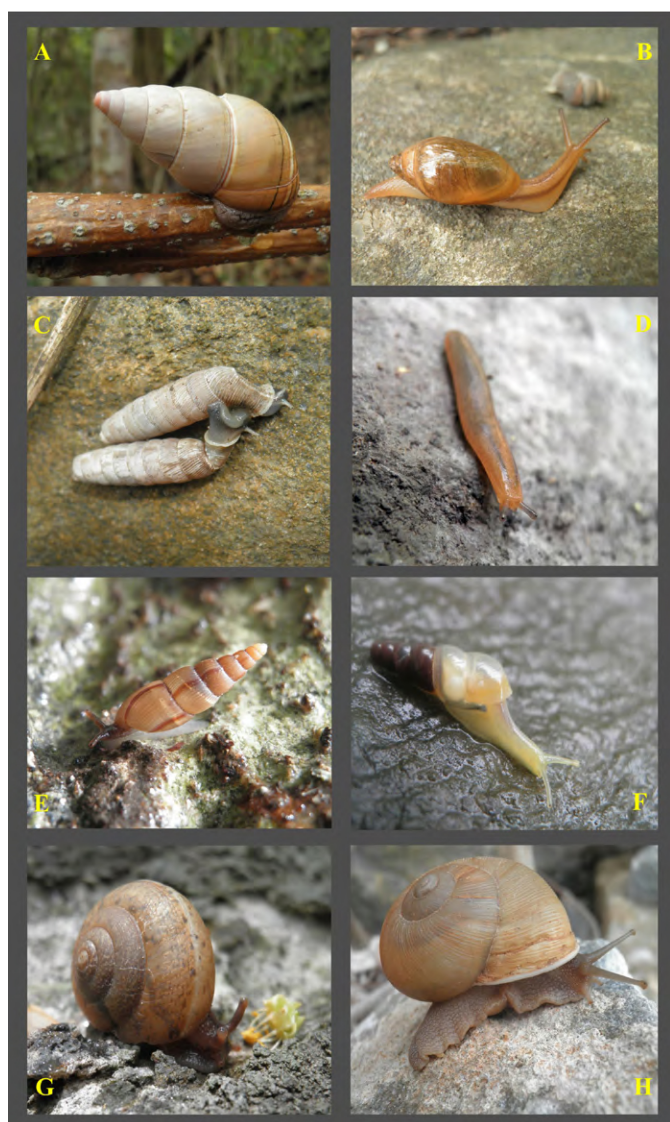


Figure 4. Terrestrial molluscs from Sierra Bibijagua, Isla de la Juventud, Cuba. **A:** *Liguus fasciatus*. **B:** *Oleacina subulata*. **C:** *Nesocoptis pruinosa bibijaguaensis*. **D:** *Leidyula floridana*, juvenile. **E:** *Glandinella poeyana*. **F:** *Subulina octona*. **G:** *Jeanneretia bicincta pityonesica*. **H:** *Zachrysia auricoma*.

Family Veronicellidae Gray, 1840

Genus *Leidyula* H.B. Baker, 1925

Leidyula floridana (Leidy & Binney in Binney, 1851) (Figure 4D)

Leidyula floridana Leidy & Binney in Binney, 1851: 198.

Vaginulus floridanus Leidy & Binney in Binney, 1851: 198, 251.

Type locality: Charlotte Harburg, Florida, United States of America (Maceira 2003).

Distribution: Cuban Archipelago, United States of America, Jamaica, and Haiti.

Clade Stylommatophora

Family Orthalicidae Albers, 1860

Genus *Liguus* Montfort, 1810

Liguus fasciatus (Müller, 1774) (Figures 2F, 4A)

Type locality: Ciudad de Matanzas, Matanzas, Cuba (Espinosa and Ortea 2009).

Distribution: Cuban Archipelago and Florida, United States of America.

Family Urocoptidae Pilsbry, 1898

Genus *Nesocoptis* Pilsbry, 1941

Nesocoptis pruinosa bibijaguaensis Jaume & Torre, 1976 (Figures 2I, 4C)

Nesocoptis pruinosa bibijaguaensis Jaume & Torre, 1976: 76.

Type locality: West side of the central Sierra Bibijagua, Isla de la Juventud, Cuba (Torre and Bartsch 2008).

Distribution: Endemic to Sierra Bibijagua, Isla de la Juventud, Cuba.

Family Subulinidae P. Fischer & Crosse, 1877

Genus *Subulina* Beck, 1837

Subulina octona (Bruguière, 1792) (Figures 2J, 4F)

Type locality: Antilles (Guadeloupe and Saint-Dominique).

Distribution: Worldwide tropics.

Family Oleacinidae H. Adams & A. Adams, 1855

Genus *Oleacina* Röding, 1798

Oleacina subulata (Pfeiffer, 1839) (Figures 2K, 4B)

Oleacina subulata Pfeiffer, 1839: 352.

Type locality: Cafetal “El Fundador”, Canimar, Matanzas, Cuba (Pfeiffer 1854).

Distribution: Cuban Archipelago, except in the extreme west.

Genus *Glandinella* Pfeiffer, 1879

Glandinella poeyana (Pfeiffer, 1854) (Figures 2L, 4E)

Glandinella poeyana Pfeiffer, 1854: 157.

Type locality: Isla de la Juventud, Cuba (Pfeiffer 1854).

Distribution: Endemic to Isla de la Juventud, Cuba

(Sierra de las Casas, Sierra de Caballos, Sierra Colombo and Sierra Bibijagua).

Family Bradybaenidae Pilsbry, 1934
Genus *Bradybaena* Beck, 1837

Bradybaena similaris (Férussac, 1821)

Distribution: Worldwide tropics, introduced. Native to southeast Asia.

Family Camaenidae Pilsbry, 1895
Genus *Zachrysia* Pilsbry, 1894

Zachrysia auricoma (Férussac, 1822) (Figures 2M, 4H)

Type locality: Puentes Grandes, near Havana, Cuba (Pilsbry 1928).

Distribution: Western and central parts of the Cuban Archipelago.

Family Cepolidae Ihering, 1909
Genus *Jeanneretia* Pfeiffer, 1877

Jeanneretia bicincta pityonesica (Pfeiffer, 1854) (Figures 2N, 4G)

Jeanneretia bicincta pityonesica Pfeiffer, 1854: 156.

Type locality: Isla de Pinos, Cuba (Pfeiffer 1854).

Distribution: Subspecies endemic to Isla de la Juventud, Cuba (Sierra de San Juan de la Mar, Nueva Gerona, Sierra de las Casas and Sierra Bibijagua).

DISCUSSION

Of 16 species found in this study, eight (50%) are endemic and eight (50%) are introduced to the Isla de la Juventud. Six species reported herein were new records from Sierra Bibijagua: *Farcimen procer*, *Leidyula floridana*, *Liguus fasciatus*, *Subulina octona*, *Glandinella poeyana*, and *Bradybaena similaris*. The slug *Leidyula floridana*, is also a new record from Isla de la Juventud. On this island, the Veronicellidae was represented by a single species, *Veronicella cubense* (Maceira 2003; Pfeiffer 1840). Sierra Bibijagua has an enormous importance for the conservation of the terrestrial malacofauna of Isla de la Juventud because it is the habitat of three local endemic molluscs (19%): *Chondropoma vespertinum bibijaguense*, *Opisthosiphon pupoides bibijaguaense*, and *Nesocoptis pruinosa bibijaguaensis*. The most common substrate where land snails were found was rocks, with the exception of *Leidyula floridana*, *Subulina octona*, and *Zachrysia auricoma*, which live in open areas, and *Liguus fasciatus*, which lives on trees.

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LITERATURE CITED

- Acevedo, M.G. 1983. Geografía física de Cuba. Tomo 2. Ciudad de la Habana: Editorial Pueblo y Educación. 386 pp.
- Aguayo, C.G. and M.L. Jaume. 1954. Descripción de nuevas especies de Moluscos terrestres Cubanos. Revista de la Sociedad Malacológica "Carlos de la Torre" 9(2): 47–67.
- Alcalde, O. 1945. Estudio y revisión de los moluscos cubanos del género *Farcimen* II. Revista de la Sociedad Malacológica "Carlos de la Torre" 3(2): 39–50.
- Binney, A. 1851. The terrestrial air-breathing mollusks of the United States and the adjacent territories of North America. Vol. I. Boston: C. C. Little and J. Brown. 366 pp. <http://biodiversitylibrary.org/page/5219376>
- Boss, K.J. and M.K. Jacobson. 1973. Monograph of the genus *Alcacia* in Cuba. Bulletin of the Museum of Comparative Zoology 145(7): 311–358. <http://biodiversitylibrary.org/page/4336305>
- Bouchet, P., J. Frýda, B. Hausdorf, W. Ponder, Á. Valdés and A. Warén. 2005. Working classification of the Gastropoda; pp. 240–284, in: Bouchet, P. and J.-P. Rocroi (eds.). Classification and nomenclator of gastropod families. Malacologia 47(1). <http://biodiversitylibrary.org/page/2512740>
- Centro Nacional de Áreas Protegidas. 2013. Plan del Sistema Nacional de Áreas Protegidas 2014–2020. La Habana: Ministerio de Ciencias Tecnología y Medio Ambiente. 366 pp.
- Clench, W.J. and M.K. Jacobson. 1970. The genus *Prietrochatella* of the Isle de Pinos and Jamaica, West Indies. Occasional Papers on Mollusks 3(39): 61–80.
- Clench, W.J. and M.K. Jacobson. 1971. Monograph of the genera *Calidviana*, *Ustronia*, *Troschelviana* and *Semitrochatella* (Mollusca: Archaeogastropoda: Helicinidae) in Cuba. Bulletin of the Museum of Comparative Zoology 141(7): 403–463. <http://biodiversitylibrary.org/page/4753589>
- d'Orbigny, A. 1841–1853. Mollusques; in: Histoire physique, politique et naturelle de l'Île de Cuba par Ramón de la Sagra. Paris: Arthus Bertrand. Vol. 1: 264 pp.
- Espinosa, J. 2011. Moluscos terrestres; pp. 92–119, in: J.L. Larramendi and N. Viña Dávila (eds.). Rostros en Peligro. Especies cubanas amenazadas. Ciudad de Guatemala: Ediciones Polymita.
- Espinosa, J. and J. Ortea. 1999. Moluscos terrestres del archipiélago cubano. Avicennia 2: 1–137.
- Espinosa, J. and J. Ortea. 2009. Moluscos terrestres de Cuba. Vaasa, Finland: UPC Print, Vasa. 191 pp.
- González, A.H., L. Rodríguez Schettino, A. Rodríguez, C.A. Mancina and L. Ramos García. 2012. Libro rojo de los vertebrados de Cuba. La Habana: Editorial Academia. 304 pp.
- Henderson, J.B. and P. Bartsch. 1920. A classification of the American operculate land mollusks of the family Annulariidae. Proceedings of the United States National Museum 58(2327): 49–82. <http://biodiversitylibrary.org/page/7290135>
- Iturralde-Vinent, M.A. 1988. Naturaleza geológica de Cuba. Ciudad de La Habana: Editorial Científico Técnica. 146 pp.
- Jaume, M.L. 1954a. Novedades en *Liguus* de Cuba e Isla de Pinos. Circulares del Museo y Biblioteca de Zoología de La Habana 1375–1388.
- Jaume, M.L. 1954b. Catálogo del género *Liguus* en Cuba (Mollusca–Gastropoda). Circulares del Museo y Biblioteca de Zoología de La Habana 1423–1452.
- Jaume, M.L. and de la A. Torre. 1976. Los Urocoptidae de Cuba (Mollusca: Pulmonata). Ciencias Biológicas 4(53): 1–122.

- Maceira, D. 2003. Las especies de la familia Veronicellidae (Mollusca: Soleolifera) en Cuba. *Revista de Biología Tropical* 51(suppl. 3): 453–461.
- Morelet, A. 1849. Testacea novissima Insulae Cubae et Americae Centralis 1: 1–92. Paris: J.B. Ballière. doi: [10.5962/bhl.title.11067](https://doi.org/10.5962/bhl.title.11067)
- Pfeiffer, L. 1839. Bericht über die Ergebnisse meiner Reisen nach Cuba im Winter 1838–1839. *Archiv für Naturgeschichte* 5(1): 346–358. <http://biodiversitylibrary.org/page/24904257>
- Pfeiffer, L. 1840. Übersicht der im Januar, Februar und März 1839 auf Cuba gesammelten Mollusken. *Archiv für Naturgeschichte* 6(1): 250–261. <http://biodiversitylibrary.org/page/7203058>
- Pfeiffer, L. 1848. Monographia heliceorum viventium: sistens descriptiones systematicas et criticas omnium huius familiae generum et specierum hodie cognitarum. Lipsiae: F. A. Brockhaus. Vol. I: 484 pp.
- Pfeiffer, L. 1854. Beschreibung neuer Landschnecken von Cuba. *Malakozoologische Blätter* 1: 156–159. <http://www.biodiversitylibrary.org/item/53876>
- Pfeiffer, L. 1856. Verzeichniss der bisher bekannt gewordenen gedeckelten Landschnecken von Cuba. *Malakozoologische Blätter* 3: 118–150. <http://www.biodiversitylibrary.org/item/53877>
- Pilsbry, H.A. 1907. Manual of conchology. Second series (Pulmonata). Philadelphia: Academy of Natural Sciences of Philadelphia. Vol. 19: 350 pp. doi: [10.5962/bhl.title.6534](https://doi.org/10.5962/bhl.title.6534)
- Pilsbry, H.A. 1928. Studies on West Indian mollusks: genus *Zachrysia*. *Proceedings of the Academy of Natural Sciences Philadelphia* 80: 581–606. <http://www.jstor.org/stable/4064007>
- Poey, F. 1851–1854. Memorias sobre la historia natural de la Isla de Cuba. Habana: Barcina. Vol. 1: 463 pp. doi: [10.5962/bhl.title.2485](https://doi.org/10.5962/bhl.title.2485)
- Torre, C. de la and P. Bartsch, 1938. The Cuban operculate land shells of the subfamily Chondropominae. *Proceedings of the United States National Museum* 85(3039): 193–423. <http://www.biodiversitylibrary.org/page/7721279>
- Torre, C. de la and P. Bartsch. 1941. The Cuban operculate land mollusks of the family Annulariidae, exclusive of the subfamily Chondropominae. *Proceedings of the United States National Museum* 89(3096): 131–385. <http://www.biodiversitylibrary.org/page/7611794>
- Torre, C. de la and P. Bartsch. 2008. Los moluscos terrestres cubanos de la familia Urocoptidae. La Habana: Editorial Científico-Técnica. 728 pp.

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