

Rhytidoid land snails collected in 2007 at 21 sites in northern Madagascar, with descriptions of 13 new species and two new subspecies (Gastropoda, Rhytidoidea: Acavidae and Clavatoridae)

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ABSTRACT

Collections in 2007 of 634 stations at 21 sites in northern Madagascar yielded 35 species and subspecies of rhytidoid land snails: *Ampelita akoratsara akoratsara* Emberton, 1999, *A. akoratsara paulayi* subsp. nov., *A. analamerae* Emberton, 1999, *A. andavakoerae* spec. nov., *A. anjavaviensis* spec. nov., *A. atropos* (Deshayes, 1850), *A. capdambrae* spec. nov., *A. celestinae* spec. nov., *A. clotho* (Deshayes, 1850), *A. consanguinea* (Deshayes, 1850), *A. ela* spec. nov., *A. gaudens* (Mabille, 1884), *A. granulosa* (Deshayes, 1850), *A. kendrae* spec. nov., *A. kirae* spec. nov., *A. lachesis* (Deshayes, 1850), *A. lamarei lamarei* (L. Pfeiffer, 1846), *A. lamarei sakalava* (Angas, 1878), *A. lincolni* spec. nov., *A. masoalae* Emberton, 1999, *A. michellae* spec. nov., *A. miovaova* spec. nov., *A. niarae* spec. nov., *A. stilpna* (Mabille, 1884), *A. thompsoni* spec. nov., *Eurystyla ambatoensis* (Emberton & Griffiths, 2009), *E. julii julii* (Fischer-Piette & Garreau, 1965), *E. julii kely* subsp. nov., *E. julii soa* (Emberton & Griffiths, 2009), *Paraclavator moreleti* (Deshayes, 1851), *Embertoniphanta amphibulima* (L. Pfeiffer, 1847), *E. echinophora* (Deshayes, 1850), *E. oviformis* (Grateloup, 1840), *E. josephinae* spec. nov., and *E. socii* (Fischer-Piette, F. Blanc & Salvat, 1975).

Live adults of 17, and tissue samples of 22, of these 35 taxa were collected. The new species bring Madagascar's total described rhytidoid species to 135. More await discovery, both within Madagascar's forests and within extensive, unidentified collections from 1995-1996.

Discoveries include: (a) the hairy-shelled *Embertoniph-*

anta echinophora has a broad rainforest distribution and has an isolated, deciduous-forest, sister species, *E. josephinae* spec. nov.; (b) the gigantic (shell height 91.7 mm), micro-endemic *Embertoniphanta socii* is effectively absent from northern Ankarana; (c) the *Eurystyla* radiation is much more extensive than previously imagined; (d) southern Namoroka Reserve is not the home of its namesake *Ampelita namerokoensis* Fischer-Piette, 1952 (described from Bemaraha, far to the south!), but of *A. thompsoni* spec. nov.; (e) *A. miovaova* spec. nov., as proposed, is one of the most conchologically variable species of land snails; (f) *A. lincolni* spec. nov. is now the largest known *Ampelita* (73.5 mm diameter).

Key words: Mollusca, Gastropoda, Acavidae, Clavatoridae, biodiversity, tropical, Madagascar

INTRODUCTION

This paper is the sixth in a series on the Acavidae of Madagascar (Emberton 1990, 1994, 1995a, 1995b, 1999).

Madagascar's acavid radiation, as currently known, comprises 101 species in four genera (*Ampelita*, *Embertoniphanta*, *Eurystyla* and *Helicophanta*) (Fischer-Piette et al. 1994, Emberton 1999, Pearce 2003, Emberton & Griffiths 2009; Griffiths & Herbert, 2013). This radiation has potentially great biogeographic significance because of its species richness, monophyly, low vagility of species, availability of phylogenetically informative characters, and position within the pan-tropical Gondwanan rhytidoid radiation (Emberton & Rakotomalala 1996, Herbert et al. 2015). A phylogeny of Madagascan acavids also would provide important insights into the evolution of shell morphology, ecology, and estivation behavior in land snails (Emberton 1990, 1994, 1995c). Further, anything that can be learned about acavids may potentially be used to save them from

extinction; acavids are an ancient, relict, K-selected (laying very few, very large eggs), ecologically fragile lineage with special conservation needs (Emberton 1995d).

Collections made in 2007 were intended to be used to initiate phylogenetic and biogeographic studies on Madagascan acavids, to be based primarily on DNA sequences and genital anatomies. The purpose of this paper is to lay the groundwork for those studies by conchologically identifying all acavid materials collected in 2007. In addition *Paraclavator* is listed (previously classified in Acavidae, but currently placed in Clavatoridae).

Six of the rhytidoid taxa collected in 2007 have already been included in a recent, separate account of land-molluscan taxa from three replicated, rainforest transects (Emberton & Griffiths, 2009). All six are also included, without redundancy, in this paper, which thus is complete for 2007 acavid collections.

METHODS AND MATERIALS

Collections were made following procedures recommended in Emberton et al. (1996). Collecting emphasis was on small-to-minute-sized land mollusks, but large mollusks such as acavids were incidentally collected into muslin bags whenever they were encountered in this process. Tissue samples were cut from the feet of live-collected adult and large-juvenile acavids. The tissue samples were placed immediately into numbered vials of 98% ethanol for DNA analysis. The sampled snails were then drowned overnight in water, then fixed and preserved in 90% ethanol for later, planned anatomical dissection. Very small live-collected juveniles and eggs were fixed and preserved in 98% ethanol for potential DNA analysis.

Collections were sorted to morphospecies and were identified, based on conchological characters, using Fischer-Piette et al. (1994), Emberton (1999), Verdcourt (2006), and Emberton & Griffiths (2009). Type materials are placed in the Florida Museum of Natural History, University of Florida, Gainesville (UF); the Australian Museum, Sydney (AMS); the Academy of Natural Sciences, Philadelphia (ANSP); and the Senckenberg Museum, Frankfurt am Main (SMF).

Abbreviations: ad = adult(s); juv = juvenile(s); h/d = height/diameter; W/lnD (or W/lnH) = whorl count (to nearest 0.1) divided by the natural logarithm of shell diameter (or height) – being an index of coiling tightness.

LOCALITIES

To shorten taxonomic descriptions, collecting sites are summarized below, followed by the rhytidoid species col-

lected there (species collected only at that site in 2007 are marked by an asterisk *; species known only from that site are marked with a second asterisk **). Station numbers (2001-2634) are in the senior author's "MBI" series, as archived at Florida Museum of Natural History.

2001-2009. Fôret Orangea (NE of Diego Suarez), 12°14-16'S, 49°22-24'E, 10-80 m, dry-deciduous forest-scrub on limestone-sand, 25-28 March 2007. *Ampelita consanguinea**, *A. lachesis*, *Embertoniphanta oviformis*.

2010-2068. N Ankarana NP, 12°49-52'S, 49°6-13'E, 120-390 m, dry-deciduous forest on limestone, 4-14 April 2007. *Ampelita stilpna*, *Embertoniphanta oviformis*, *E. socii**.

2069-2100. E Analamerana Reserve (SE of Irodo), 12°41-43'S, 49°33-35'E, 10-210 m, dry-deciduous forest on limestone, 23-27 April 2007. *Ampelita analamerana**, *A. stilpna*, *Embertoniphanta oviformis*, *E. josephinae***.

2101-2147. N-most Cap d'Ambre (E of Bemoko & Mt. Ambatojanahary), 11°58'-12°00'S, 49°16-18'E, 10-210 m, dry-deciduous forest-scrub on limestone-basalt, 4-10 May 2007. *Ampelita atropos*, *A. stilpna*, *Embertoniphanta oviformis*.

2148-2168. E-central Cap d'Ambre (E of Anjiabe), 12°06-7'S, 49°19-20'E, 5-45 m, dry-deciduous forest on limestone, 15-16 May 2007. *Ampelits atropos*, *A. capdambrae***.

2169-2176. S Cap d'Ambre (Mt. "Windsor Castle"), 12°12'S, 49°10'E, 280-400 m, dry-deciduous forest on limestone, 17-18 May 2007. (No rhytidoids.)

2177-2218. SE Massif Mt. des Français, 12°23-24'S, 49°22-24'E, 125-370 m, dry-deciduous forest on limestone, 24-29 May 2007. *Ampelita clotho**, *A. granulosa**.

2219-2307. Mt. Ambato & vicinity, NE Masaola NP, 15°16-18'S, 50°20-22'E, 55-310 m, rainforest on lava-quartzite, 14-28 June 2007. *Ampelita celestinae***, *A. lamarei lamarei*, *A. lincolni***, *Eurystyla ambatoensis***, *E. julii julii*, *E. julii soa***, *Paraclavator moreleti*, *Embertoniphanta amphibulima*.

2308-2337. Cap Est coastal forest, NE Masaola NP, 15°16'S, 50°27-28'E, 0-20 m, littoral rainforest on sand, 6-8 July 2007. *Ampelita lamarei lamarei*, *Eurystyla julii julii*, *Paraclavator moreleti*.

2338-2348. Mt. Soratra (sw of Vohemar), 13°41-42'S, 49°26'E, 920-1550 m, rainforest on basalt, 13-15 July 2007. *Ampelita akoratsara akoratsara**, *A. gaudens*, *A. lamarei sakalava*, *A. masoalae**, *Paraclavator moreleti*, *Embertoniphanta amphibulima*.

2349-2357. Mt. Anjaniharibe (sw of Vohemar), 13°37-38'S, 49°36'E, 790-1040 m, rainforest on metamorphics, 18 July 2007. *Ampelita akoratsara paulayi***, *A. gaudens*, *A. lamarei sakalava*, *Paraclavator moreleti*, *Embertoniphanta amphibulima*.

2358-2380. Mt. Ananjina (sw of Vohemar), 13°30'S, 49°53'E, 80-610 m, rainforest on metamorphics, 20-23 July 2007. *Ampelita gaudens*, *A. lamarei sakalava*, *A. miovaova*,

Embertoniphanta echinophora, *E. oviformis*.

- 2381-2442. Mt. Anjiabe (NW of Antalaha), 14°41'S, 50°02'E, 225-545 m, rainforest on metamorphics, 28-30 July 2007. *Ampelita lamarei lamarei*, *Embertoniphanta amphibulima*.
- 2443-2492. Mt. Ambohivohitra (NW of Antalaha), 14°49'S, 49°58'E, 375-635 m, rainforest on metamorphics, 9-11 August 2007. *Embertoniphanta amphibulima*.
- 2493-2532. Sacred forest, Antsahanoro (NW of Antalaha), 14°51'S, 50°08'E, 80-130 m, rainforest on quartzite, 12-15 August 2007. *Ampelita lamarei lamarei*, *Eurystyla julii kely****, *Embertoniphanta amphibulima*.
- 2533-2544. S of Voehemar, forest w of main coast road, 13°35'-38'S, 49°59'-50°01'E, 25-240 m, rainforest on basalt, 23-24 August 2007. *Ampelita gaudens*, *A. lamarei sakalava*, *A. miovaova*.
- 2545-2552. Mt. Bobankora (circa 40 km w of Voehemar), 13°13'S, 49°45'-46'E, 220-525 m, rainforest on basalt, 26 August 2007. *Ampelita gaudens*, *A. lamarei sakalava*, *A. miovaova*, *A. niarae***, *Embertoniphanta echinophora*, *E. oviformis*.
- 2553-2560. Andavakoera Massif, 13°05'-07'S, 49°15'E, 230-480 m, dry-deciduous forest on sandstone, 28-29 August 2007. *Ampelita andavakoerae***, *A. gaudens*, *Embertoniphanta oviformis*.
- 2561-2580. S Namoroka Reserve & vicinity, 16°27'-31'S, 45°20'-28'E, 105-160 m, dry-deciduous forest on limestone, 23-29 September 2007. *Ampelita ela***, *A. thompsoni***, *Embertoniphanta oviformis*.
- 2581-2597. Anjajavy & vicinity (N of Mahajanga), 15°01'-04'S, 45°14'-16'E, 10-60 m, dry-deciduous forest on limestone-sand, 7-12 October 2007. *Ampelita anjajaviensis***, *Embertoniphanta oviformis*.
- 2598-2634. Manongarivo Reserve, 13°59'-14°02'S, 48°17'-18'E, 160-1170 m, rainforest-cloudforest-pandanus scrub on metamorphics-sand, 16-22 October 2007. *Ampelita gaudens*, *A. kendrae***, *A. kirae***, *A. lamarei sakalava*, *A. michellae***, *Paraclavator moreleti*, *Embertoniphanta oviformis*.

SYSTEMATICS

Higher classification follows Bouchet et al. (2017), whereas at the genus level Groh & Poppe (2002) is followed.

Class Gastropoda Cuvier, 1795

Subclass Heterobranchia Burmeister, 1837

Infraclass Euthyneura Spengel, 1881

Superorder Eupulmonata Haszprunar & Huber, 1990

Order Stylommatophora A. Schmidt, 1855

Suborder Helicina Minichev & Starobogatov, 1975

Infraorder Rhytidoidei Pilsbry, 1893

Superfamily Rhytidoidea Pilsbry, 1893

Family Acavidae Pilsbry, 1895

Genus *Ampelita* Beck, 1837

Ampelita Beck, 1837: 30. Type species (designated by Herrmannsen, 1846: 38): *Helix madagascariensis* Lamarck, 1816.

Ampelita akoratsara akoratsara Emberton, 1999

Figs 162-165

Ampelita akoratsara Emberton, 1999: 89, fig. 8. Type locality: "14°32'S, 49°42'E: Madagascar: near Marojejy Reserve, Ambatosorotra Mountain, 800 m: rainforest".

Material examined. — Illustrated voucher specimens: Stations 2344 (UF 419019, 1 adult, Figs 162-164), 2339 (UF 419020, 1 adult, Fig. 165). Other vouchers: Stations 2339 (UF 418604, 1 juv), 2344 (UF 418605, 3 juv).

Description of illustrated voucher from station 2344 (adult, Figs 163-165). — Shell shape broadly lenticular. Height 14.0 mm, diameter 27.8 mm (h/d 0.50). Whorls 4.1, coiling tightness (W/lnD) 1.23. Body-whorl periphery keeled, sutures shallowly impressed, whorls unshouldered. Spire low domed-conic; apex flattish. Umbilicus 3.48 mm (0.13 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.03 whorl. Aperture flattened oval; aperture internal height (in apertural view, parallel to axis of rotation 6.49 mm (0.46 shell height); aperture greatest internal width (perpendicular to same) 12.67 mm (0.46 shell diameter). Apertural basal gape 9.18 mm (1.41 apertural height). Distance between upper and lower peristome insertions 2.38 mm (0.09 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 7.92 mm (1.22 apertural internal height); peristome width (perpendicular to axis of rotation) 14.73 mm (1.16 apertural internal width). Peristome thin, narrowly reflected palatally, slightly wider baso-palatally and at columellar insertion. First-whorl diameter 1.92 mm, first-two-whorls diameter 5.11 mm, embryonic whorl-count 2.1. Embryonic sculpture unknown. Body-whorl sculpture of dense, moderately strong, evenly spaced, spiral lines, made wavy by uneven radial growth lines; sculpture continues undiminished onto base of shell. Shell color light brown, with both a sutural and a peripheral white color band, each thinly lined on both sides with thin dark-purple-brown color bands; umbilicus dark purple-brown within, bordered by a broadish white band.

Partial description of juvenile voucher from station 2339. — Embryonic sculpture of lightly impressed, dense, uneven, spiral lines.

Variation. — The juvenile illustrated voucher (3.95 whorls, diameter 23.3 mm) has a relatively broader umbili-

cus (U/D 0.17), a lesser first-two-whorls diameter (5.02 mm), and slightly lower embryonic whorl count (2.0).

Ampelita akoratsara paulayi subspec. nov.

Figs 159-161

Material examined. — Holotype: UF 419021 (adult), station 2354, Madagascar, sw of Vohemar, Mt. Anjaniharibe, S slope, 890-970 m elevation, 13°37.5'S, 49°36.1'E, rainforest, basalt bedrock, 18 Jul 07. Measured Paratype: Station 2356 (UF 419022, 1 adult). Other paratypes: Stations 2354 (UF 418606, 1 ad), 2355 (UF 418607, 2 juv), 2357 (UF 418608, 2 juv).

Diagnosis. — Differs from the parent species by its white, double-dark-banded shell base; its larger first-whorl and first-two-whorls diameters (1.98-2.11 mm and 5.45-5.79 mm, vs. 1.92 mm and 5.02-5.11 mm); its slightly looser coiling (W/lnD 1.12-1.22 vs. 1.23-1.25); and its slightly more elevated shell (h/d 0.47-0.49 vs. 0.50-0.57). Known only from below a summit-cliff of Mt. Anjanaharibe (southwest of Vohemar), far isolated from Mt. Soratra, site of the closest collected population of the parent species.

Description of holotype (adult). — Shell shape thickly lenticular. Height 14.4 mm, diameter 29.1 mm (h/d 0.49). Whorls 4.1, coiling tightness (W/lnD) 1.22. Body-whorl periphery keeled, sutures rather shallowly impressed, whorls slightly shouldered. Spire low, domed-conic; apex somewhat elevated. Umbilicus 3.96 mm (0.14 shell diameter). Pre-apertural body-whorl deflection slightly downward, about 0.01 whorl. Aperture keeled-oval, flattened above; aperture internal height (in apertural view, parallel to axis of rotation 6.81 mm (0.47 shell height); aperture greatest internal width (perpendicular to same) 13.93 mm (0.48 shell diameter). Apertural basal gape 10.29 mm (1.51 apertural height). Distance between upper and lower peristome insertions 2.38 mm (0.08 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 8.71 mm (1.28 apertural internal height); peristome width (perpendicular to axis of rotation) 15.52 mm (1.11 apertural internal width). Peristome thin, narrowly reflected palatally, slightly wider baso-palatally and at columellar insertion. First-whorl diameter 2.11 mm, first-two-whorls diameter 5.45 mm, embryonic whorl-count 2.0. Embryonic sculpture unknown. Body-whorl sculpture of strong, dense, evenly spaced, spiral lines, made wavy by irregular, weak, radial lines of growth; sculpture continues undiminished onto base of shell. Shell upper color light brown with both a sutural and a peripheral white color band, each thinly lined with thin dark-purple-brown color bands; shell base color white, with two moderately wide spiral bands of dark purple-brown; umbilicus brown within.

Variation. — The measured paratype has looser coiling (W/lnD 1.12), a lesser first-whorl diameter (1.98 mm), a greater first-two-whorls diameter (5.79 mm), and a lesser

embryonic whorl count (1.8).

Etymology. — For Dr. Gustav Paulay, Curator of Invertebrates, Florida Museum of Natural History, who helped greatly in the planning stages of this project.

Ampelita analamerae Emberton, 1999

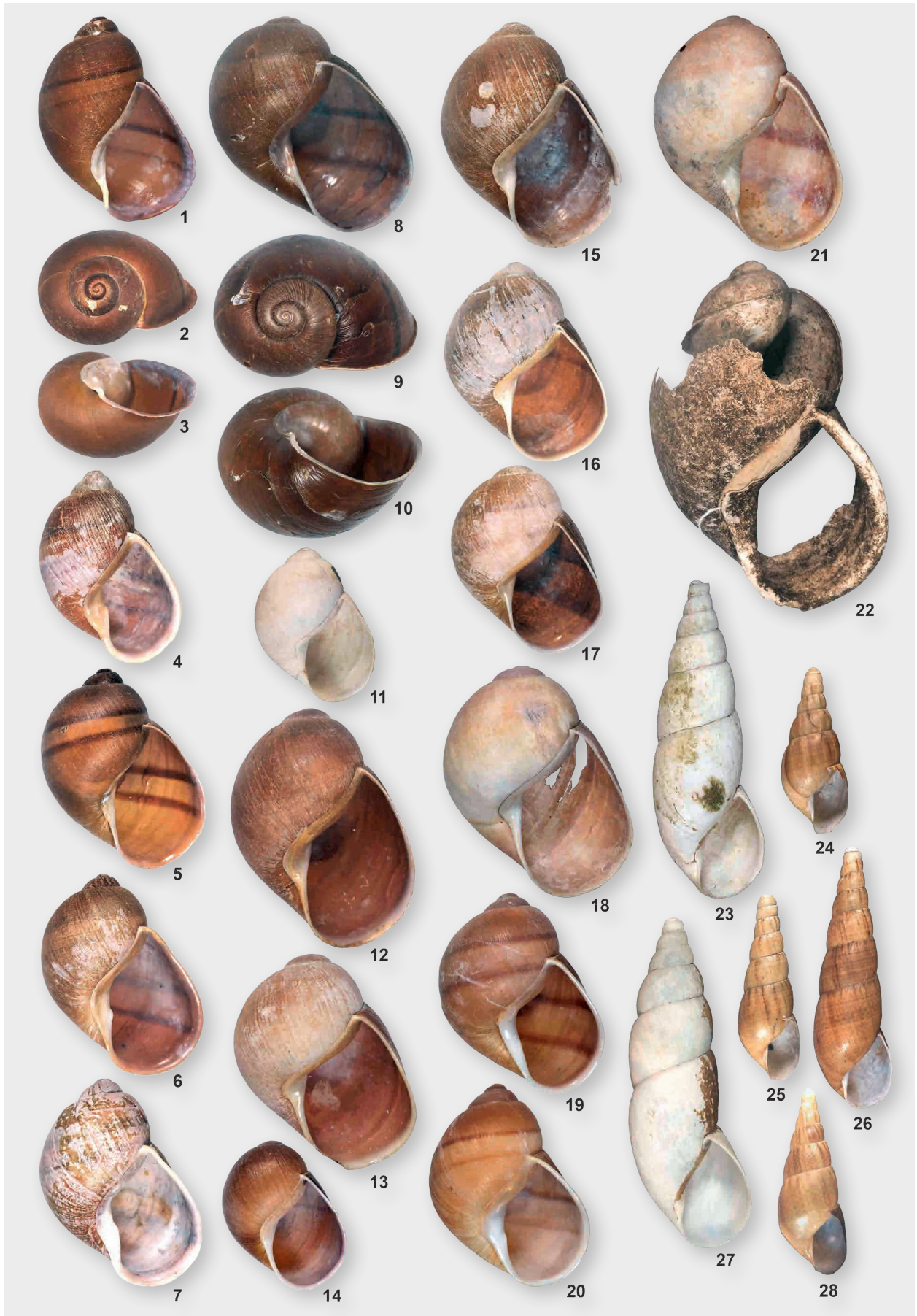
Figs 190-193

Ampelita analamerae Emberton, 1999: 89-91, fig. 7. Type locality: "12°44'S, 49°30'E: Madagascar: Analamera Reserve, 315 m: dry deciduous forest".

Material examined. — Illustrated voucher specimens: Stations 2079 (UF 419023, 1 adult, Figs 191-193), 2075 (UF 419024, 1 adult, Fig. 190). Other dry vouchers: Stations 2073 (UF 418578, 1 juv), 2075 (UF 418579, 13 juv), 2076 (UF 418580, 1 ad), 2078 (UF 418581, 5 ad, 9 juv), 2082 (UF 418582, 2 ad). Voucher in 90% ethanol: Station 2078 (UF 420113, 1 ad, source of tissue sample 0099).

Description of illustrated voucher from station 2079 (adult, Figs 192-194). — Shell shape thick-lenticular. Height 14.0 mm, diameter 27.2 mm (h/d 0.51). Whorls 4.65, coiling tightness (W/lnD) 1.41. Body-whorl periphery keeled, sutures rather shallowly impressed, whorls very narrowly shouldered. Spire very low, domed; apex flattened. Umbilicus 3.88 mm (0.14 shell diameter). Pre-apertural body-whorl deflection rather greatly downward, about 0.10 whorl. Aperture ovate; aperture internal height (in apertural view, parallel to axis of rotation 5.38 mm (0.38 shell height); aperture greatest internal width (perpendicular to same) 11.88 mm (0.44 shell diameter). Apertural basal gape 9.66 mm (1.78 apertural height). Distance between upper and lower peristome insertions 2.22 mm (0.08 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 7.12 mm (1.32 apertural internal height); peristome width (perpendicular to axis of rotation) 14.57 mm (1.23 apertural internal width). Peristome thin, narrowly reflected palatally, slightly wider baso-palatally and at columellar insertion. Peristome thin, narrowly reflected palatally, moderately reflected from baso-palatal to columella, which widens at its insertion. First-whorl diameter 1.49 mm, first-two-whorls diameter 4.27 mm, embryonic whorl-count 2.2. Embryonic sculpture before 1.5 whorl consisting of minute spiral lines, after 1.5 whorl consisting of thin radial riblets. Body-whorl sculpture of moderately strong, dense, radial riblets, inscribed by minute, dense, spiral lines; sculpture continuing onto base of shell. Shell color light yellow-brown, with faint lighter sub-sutural and circum-umbilical color bands.

Variation. — An extreme variant from station 2075 (Fig. 190, diameter 25.5 mm, whorls 4.8) is taller (h/d 0.57), and has larger first-whorl and first-two-whorls diameters (1.67 mm and 4.65 mm).



***Ampelita andavakoerae* spec. nov.**

Figs 114-116

Material examined. — Holotype: UF 419025 (adult), station 2558, Madagascar, Andavakoera massif, valley by stream, 250 m elevation, 13°05.567'S, 49°14.946'E, dry-deciduous forest with some big trees, sandstone bedrock, 29 Aug 07. Small specimens fixed and preserved in 98% ethanol: Station 2558 (UF 420217, 9 juv, 4 eggs).

Diagnosis. — Differs from *A. madecassina* (A. Férussac, 1822) by its relatively smaller aperture, broader umbilicus, lesser apertural basal gape, and different color and banding. Differs from both *A. grandidieri* Fischer-Piette, 1952 and *A. dingeoni* Fischer-Piette, Blanc & Salvat, 1975 by its more depressed shell, more ovate aperture, weaker sculpture, and different color and banding.

Description of holotype (adult). — Shell shape depressed helicoid. Height 16.6 mm, diameter 31.9 mm (h/d 0.52). Whorls 4.7, coiling tightness (W/lnD) 1.36. Body-whorl periphery rounded, with trace angulation; sutures moderately impressed, whorls narrowly shouldered. Spire very low domed-conic; apex broadly rounded. Umbilicus 6.02 mm (0.19 shell diameter). Pre-apertural body-whorl deflection slightly downward, about 0.04 whorl. Aperture oval, slightly flattened above; aperture internal height (in apertural view, parallel to axis of rotation) 7.92 mm (0.48 shell height); aperture greatest internal width (perpendicular to same) 13.14 mm (0.41 shell diameter). Apertural basal gape 9.02 mm (1.14 apertural height). Distance between upper and lower peristome insertions 3.96 mm (0.12 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 9.97 mm (1.26 apertural internal height); peristome width (perpendicular to axis of rotation) 15.99 mm (1.22 apertural internal width). Peristome moderately thick, unreflected upper-palatally, moderately reflected baso-palatally, basally, and thickening and widening to a moderately reflected columella. First-whorl diameter 1.55 mm, first-two-whorls diameter 4.30 mm, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture (judging from remnant periostracum) smooth, except for irregular growth lines; sculpture on base of shell unknown. Shell basic color (judging from remnant periostracum) a yellowish brown, with broad, dark-purple color bands just below suture and on base midway between periphery and umbil-

icus; peristome and pre-apertural area dark purple, except for baso-columella; umbilicus dark purple within.

Etymology. — For the Andavakoera Massif, type locality.

***Ampelita anjajaviensis* spec. nov.**

Figs 187-189

Material examined. — Holotype: UF 419072 (adult), station 2592, Madagascar, Anjajavy area (N of Mahajanga, near coast), isolated steep limestone hill near Antsangabe, base of cliff, SE aspect, 30 m elevation, 15°03.858'S, 47°14.238'E, dry-deciduous forest, limestone bedrock, 8 Oct 07. Paratypes: Stations 2582 (UF 418626, 1 egg in fragments), 2589 (UF 418627, 1 juv [2 frags], 1 egg), 2592 (UF 418628, 1 ad, 3 juv), 2594 (UF 418629, 1 juv).

Diagnosis. — Most similar to *A. namerokoensis* Fischer-Piette 1952, from which it differs by its more rounded, less sharply keeled, periphery; more deeply impressed sutures; spiral-line sculpture that is only about half as dense; presence of extremely minute, oblique, cross-hatch body-whorl sculpture; and different coloration.

Description of holotype (adult with incompletely developed aperture). — Shell shape lenticular. Height 11.3 mm, diameter 23.9 mm (h/d 0.47). Whorls 4.5, coiling tightness (W/lnD) 1.42. Body-whorl periphery keeled, sutures rather shallowly impressed, whorls slightly shouldered. Spire low domed; apex rounded. Umbilicus 5.22 mm (0.22 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.03 whorl. Aperture ovate-keeled; aperture internal height (in apertural view, parallel to axis of rotation) 5.88 mm (0.52 shell height); aperture greatest internal width (perpendicular to same) 10.45 mm (0.44 shell diameter). Apertural basal gape 7.40 mm (1.26 apertural height). Distance between upper and lower peristome insertions 3.04 mm (0.13 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 6.59 mm (1.12 apertural internal height); peristome width (perpendicular to axis of rotation) 11.46 mm (1.10 apertural internal width). Peristome thin, unreflected palatally to basally; columella narrowly reflected. First-whorl diameter 1.74 mm, first-two-whorls diameter 4.0 mm, embryonic whorl-count seemingly 2.15. Embryonic sculpture consisting of a minute, oblique cross-hatch pattern, crossed by moderately widely

< **Figs 1-7.** *Embertoniphanta amphibulima* (L. Pfeiffer, 1847). **1-3.** Station 2236 (UF 420087). **4.** Station 2238 (UF 420088). **5.** Station 2526 (UF 420089). **6.** Station 2532 (UF 420090). **7.** Station 2601 (UF 420091). **Figs 8-21.** *Embertoniphanta oviformis* (Grateloup, 1840). **8-10.** Station 2620 (UF 420104). **11.** Station 2003 (UF 420105). **12.** Station 2049 (UF 420096). **13, 15.** Station 2129 (UF 420097). **14.** Station 2074 (UF 420092). **16.** Station 2365 (UF 420098). **17.** Station 2550 (UF 420099). **18.** Station 2558 (UF 420100). **19-20.** Station 2565 (UF 420102). **21.** Station 2582 (UF 420103). **Fig. 22.** *Embertoniphanta socii* Fischer-Piette, F. Blanc & Salvat, 1975, station 2046 (UF 420107). **Figs 23-28.** *Paraclavator moreletii* (Deshayes, 1851). **23-24.** Station 2339 (UF 420108). **25-26.** Station 2355 (UF 420109). **27.** Station 2601 (UF 420112). **28.** Station 2599 (UF 420111). All photographs K. Emberton, 0.7 ×.



spaced spiral lines. Body-whorl sculpture of minute, somewhat dense, fairly evenly spaced, spiral lines, made wavy, and in some cases broken into pustules, by irregular axial lines of growth, and extremely minute, oblique, cross-hatch sculpture; sculpture continuing onto base of shell. Shell color light yellowish brown, darker in umbilicus; apertural lip white.

Variation. — A paratype from station 2592 (UF 418628, adult with missing apex, not illustrated) has a more elevated shell and an aperture more flattened above.

Etymology. — For Anjajavy, the type locality.

***Ampelita atropos* (Deshayes, 1850)**

Figs 80-87

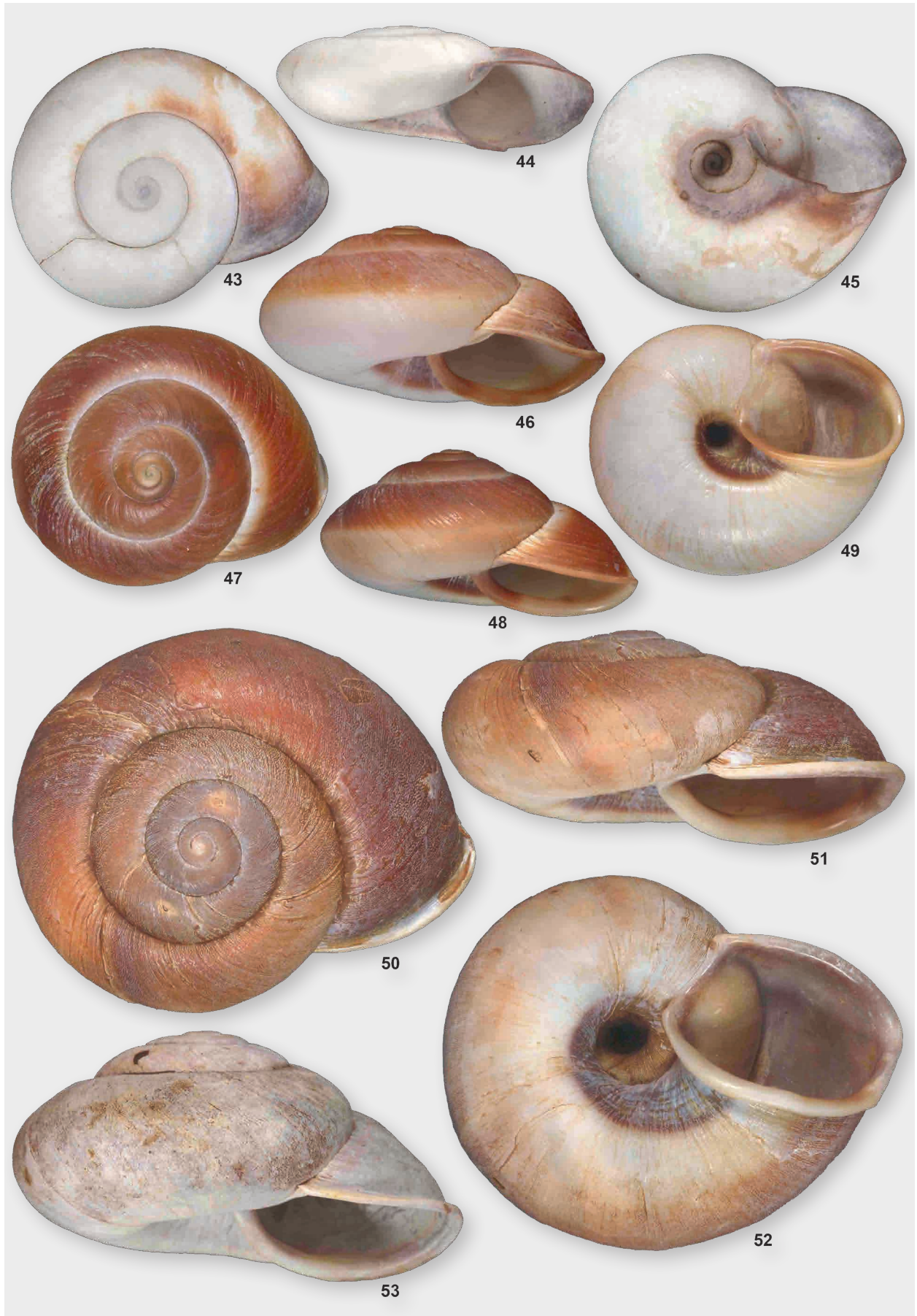
Helix atropos Deshayes, 1850b: 56. Type locality: “Madagascar, aux environs de la baie Diego-Suarez”. Note (1): refers to plate 69H figs 13-14 (published in 1840c), but there was no explanation on the plate or on the wrappers. Note (2): name attributed to Férussac by Deshayes, but it was the latter who validly introduced the name *lachesis*.

Material examined. — Illustrated voucher specimens: Stations 2145 (UF 419060, 1 adult, Figs 80-82; UF 419061, 1 adult, Figs 83-84; UF 419062, 1 adult, Fig. 85; UF 419063, 1 adult, Figs 86-87). Other dry vouchers: 2101 (UF 418802, 1 ad, 4 juv), 2104 (UF 418803, 4 ad, 7 juv), 2108 (UF 418804, 2 ad, 5 juv), 2111 (UF 418805, 1 juv), 2112 (UF 418806, 1 ad), 2113 (UF 418807, 6 juv), 2114 (UF 418808, 1 juv), 2115 (UF 418809, 1 ad, 2 juv), 2116 (UF 418810, 1 juv), 2117 (UF 418811, 6 ad, 34 juv), 2119 (UF 418812, 4 ad, 34 juv), 2120 (UF 418813, 3 ad, 11 juv), 2122 (UF 418814, 10 ad, 17 juv), 2123 (UF 418815, 2 ad, 32 juv), 2124 (UF 418816, 5 juv, 2 eggs), 2125 (UF 418817, 1 ad, 55 juv, 3 eggs), 2126 (UF 418818, 5 ad, 52 juv, 5 eggs), 2127 (UF 418819, 5 ad, 53 juv, 28 eggs), 2129 (UF 418820, 3 ad, 5 juv), 2130 (UF 418821, 5 ad, 20 juv), 2132 (UF 418822, 2 juv), 2133 (UF 418823, 1 ad, 2 juv), 2134 (UF 418824, 22 juv, 8 eggs), 2138 (UF 418825, 1 juv), 2141 (UF 418826, 2 ad, 2 juv), 2142 (UF 418827, 2 ad, 43 juv, 2 eggs), 2143 (UF 418828, 1 ad, 5 juv), 2144 (UF 418829, 2 ad, 26 juv, 2 eggs), 2145 (UF 418830, 6 ad, 43 juv, 7 eggs; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2146 (UF 418831, 3 ad), 2147 (UF 418832, 5 ad, 37 juv), 2148 (UF 418833, 2 juv), 2149 (UF 418834, 4 ad, 15 juv), 2150 (UF 418835, 4 ad, 2 juv), 2151 (UF 418836, 5 ad, 36 juv, 1 egg), 2152 (UF 418837, 5 juv, 1 egg), 2153 (UF 418838, 16 juv), 2154 (UF 418839, 1 ad, 1 juv), 2155 (UF 418840, 2 juv), 2156 (UF 418841, 2 ad, 6 juv), 2157 (UF 418842, 3 ad, 3 juv), 2159 (UF 418843, 10 juv), 2164 (UF 418844, 1 juv). Vouchers in 90% eth-

anol: Stations 2117 (UF 420184, 1 ad, source of tissue sample 0196), 2119 (UF 420185, 1 ad, source of tissue sample 0197), 2126 (UF 420186, 3 ad, source of tissue sample 0198-200), 2127 (UF 420187, 2 ad, 2 juv, source of tissue sample 0201-204), 2130 (UF 420188, 3 ad, source of tissue sample 0205-207), 2142 (UF 420189, 1 ad), 2145 (UF 420190, 4 ad, 5 ad pulled bodies, 1 juv), 2151 (UF 420191, 4 ad, source of tissue sample 0227-30). Small specimens fixed and preserved in 98% ethanol: Stations 2104 (UF 420237, 1 juv), 2119 (UF 420238, 1 juv), 2126 (UF 420239, 2 juv), 2127 (UF 420240, 2 juv), 2134 (UF 420241, 3 juv), 2144 (UF 420242, 7 juv), 2145 (UF 420243, 11 juv), 2147 (UF 420244, 2 juv), 2149 (UF 420245, 1 juv).

Description of illustrated voucher from station 2145 (adult, Figs 80-82). — Shell shape helicoid with a very low-placed aperture. Height 24.1 mm, diameter 38.6 mm (h/d 0.62). Whorls 5.4, coiling tightness (W/lmD) 1.48. Body-whorl periphery rounded, sutures moderately impressed, whorls unshouldered. Spire domed-conic; apex somewhat sharply rounded. Umbilicus 5.54 mm (0.14 shell diameter). Pre-apertural body-whorl deflection greatly downward, about 0.18 whorl. Aperture greatly depressed-ovate, straight-edged above; aperture internal height (in apertural view, parallel to axis of rotation) 4.91 mm (0.20 shell height); aperture greatest internal width (perpendicular to same) 17.26 mm (0.45 shell diameter). Apertural basal gape 15.52 mm (3.16 apertural height). Distance between upper and lower peristome insertions 0.87 mm (0.02 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 7.92 mm (1.61 apertural internal height); peristome width (perpendicular to axis of rotation) 21.69 mm (1.26 apertural internal width). Peristome moderately thick, narrowly reflected palatally and baso-palatally, moderately reflected basally and at columella, broadening slightly at columellar insertion. First-whorl diameter 1.81 mm, first-two-whorls diameter 4.37 mm, embryonic whorl-count seemingly 1.8. Embryonic sculpture consisting of weak, minute, moderately spaced, spiral lines, between which appear very weak, minute, oblique wrinkles. Body-whorl sculpture of radially aligned pustules, rather widely and unevenly spaced, crossed by weak, moderately and unevenly spaced spiral lines; pustules absent from base of shell, where spiral lines are much more evident and more evenly spaced. Shell basic color very dark, slightly purplish brown, much lighter on apex, upper spire, and within umbilicus; with one fairly narrow, white, upper color band midway between the periphery and suture; and with one broad, whitish, lower color band below the periphery; apertural lip brownish purple.

< Figs 29-31. *Ampelita lincolni* spec. nov., station 2285 (holotype UF 420066). Figs 32-42. *Ampelita gaudens* (Mabille, 1884). 32-34. Station 2620 (UF 419041). 35. Station 2345 (UF 419034). 36. Station 2348 (UF 419035). 37. Station 2369 (UF 419036). 38. Station 2543 (UF 419037). 39. Station 2552 (UF 419038). 40-41. Station 2558 (UF 419039). 42. Station 2598 (UF 419040). All photographs K. Emberton, 1.0 ×.



Variation. — Quite a variable species, even within a single population. Among four extreme variants from the type locality (including holotype, Figs 80–87, diameters 38.5–40.6 mm, whorls 5.2–5.55), h/d ranged 0.55–0.66, coiling tightness (W/lnD) ranged 1.40–1.52, umbilicus/shell diameter 0.14–0.16, aperture height/shell height 0.20–0.32, aperture width/shell diameter 0.42–0.46, apertural basal gape/apertural height 1.87–3.16 (!), peristomal insertions distance/shell diameter 0.01–0.05, peristome height/apertural height 1.30–1.61, peristome width/apertural width 1.24–1.35, first-whorl diameter 1.63–1.86 mm, and first-two-whorls diameter 4.09–4.48 mm.

Remarks. — Differs from *A. stilpna* (Mabille, 1884), with which it is sympatric at station 2129 (Mt. Ambatojanahary, northern Cap d'Ambre), by its conspicuously larger adult size, smaller first-whorl and first-two-whorls diameters, tighter coiling, much weaker embryonic sculpture without radial wrinkles, and different body-whorl sculpture. Differs from *A. consanguinea* (Deshayes, 1850) by its relatively greater umbilicus, more pustulose body-whorl sculpture, and more curved and more reflected columellar insertion. Differs from *A. pfeifferi* Fischer-Piette, 1952 by its larger umbilicus, much weaker sculpture, and different coloration. Differs from *A. lachesis* (Deshayes, 1850) by its tighter coiling ($W/lnD = 1.44$ vs. 1.38–1.39), pustulations on the radial-striae sculpture, more elevated spire ($h/d = 0.59$ vs. 0.44–0.47), more rounded and non-angulate periphery, and presence of upper white color band. Differs from *A. duvalii* (Petit de la Saussaye, 1844) by its tighter coiling ($W/lnD = 1.38$ vs. 1.27), lesser apertural basal gape (less constricted aperture in apertural view), and different banding pattern.

***Ampelita capdambrae* spec. nov.**

Figs 120–123

Material examined. — Holotype: UF 419026 (adult, Figs 120–122), station 2149, Madagascar, southern Cap d'Ambre (NW of Diego Suarez, near coast), limestone outcrop by river, 21 m elevation, 12°06.558'S, 49°19.389'E, dry-deciduous, viny forest, limestone bedrock, 15 May 07. Illustrated Paratype: Stations 2165 (UF 419027, 1 adult, Fig. 123). Other Dry Paratypes: Stations 2149 (UF 418845, 1 ad, 1 juv; ANSP, 1 ad), 2150 (UF 418846, 1 juv; AMS, 1 ad; SMF, 1 ad), 2151 (UF 418847, 1 ad), 2162 (UF 418848, 1 subadult), 2166 (UF 418849, 6 juv), 2168 (UF 418850, 2 juv). Small specimens fixed and preserved in 98% ethanol: Station 2151 (UF 420218, 3 juv).

Diagnosis. — Most similar to *A. consanguinea* (Desh-

ayes, 1850) from which it differs by its tighter coiling; denser, stronger, and less pustulose subsutural body-whorl sculpture; and narrower, less funneled umbilicus.

Description of holotype (adult). — Shell shape helicoid. Height 19.7 mm, diameter 30.7 mm (h/d 0.64). Whorls 5.1, coiling tightness (W/lnD) 1.49. Body-whorl periphery rounded, sutures well impressed, whorls rounded and unshouldered. Spire low conic, very slightly domed; apex relatively prominent, somewhat acute. Umbilicus 4.27 mm (0.14 shell diameter). Pre-apertural body-whorl deflection greatly downward, about 0.13 whorl. Aperture flattened-ovate; aperture internal height (in apertural view, parallel to axis of rotation 4.91 mm (0.25 shell height); aperture greatest internal width (perpendicular to same) 13.93 mm (0.45 shell diameter). Apertural basal gape 11.08 mm (2.26 apertural height). Distance between upper and lower peristome insertions 2.69 mm (0.09 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 7.12 mm (1.45 apertural internal height); peristome width (perpendicular to axis of rotation) 16.15 mm (1.16 apertural internal width). Peristome moderately thick, slightly reflected palatally, moderately reflected baso-palatally, basally, and at columella, broadening slightly at columellar insertion. First-whorl diameter 1.64 mm, first-two-whorls diameter 4.31 mm, embryonic whorl-count seemingly 2.5. Embryonic sculpture consisting of fine, minute, spiral lines. Body-whorl sculpture smoothish, with irregular, moderately strong, radial growth lines; scattered, small, rare pustules; and traces of minute, dense, spiral lines; on base of shell, spiral lines are much more evident. Shell basic color light yellow-brown (white where periostracum is missing), and with two broad, dark purple-brown color bands above the periphery; umbilicus dark purple-brown within; peristomal lip light pinkish-brown, white at baso-columella.

Variation. — An extreme variant (Fig. 123) has a much lesser pre-apertural deflection and a concomitantly much higher aperture and much lesser basal gape; it also has a larger first-whorl diameter (1.73 mm), but a smaller first-two-whorls diameter (4.09 mm).

Etymology. — For Cap d'Ambre (northwest of Diego Suarez), the type locality.

***Ampelita celestinae* spec. nov.**

Figs 71–73

Material examined. — Holotype: UF 419028 (adult), station 2290, Madagascar, sw of Antalaha, w of Amboditralalana,

< Figs 43–45. *Ampelita michellae* spec. nov., station 2616 (holotype UF 419073). Figs 46–49. *Ampelita lachesis* (Deshayes, 1850), station 2008 (UF 419048, 2 adults). Figs 50–53. *Ampelita clotho* (Deshayes, 1850). 50–52. Station 2195 (UF 419029). 53. Station 2179 (UF 419030). All photographs K. Emberton, 1.5 ×.



hill slope on S bank of Onive River E of Mt. Ambato, 70 m elevation, 15°18.375'S, 50°20.880'E, rainforest, quartzite-and-lava bedrock, 26 June 07. Other Paratypes: Stations 2286 (UF 418708, 3 ad), 2286 (UF 418708, 3 ad), 2293 (SMF, 1 ad), 2301 (AMS, 1 ad; ANSP, 1 ad). Paratypes in 90% ethanol: Stations 2290 (UF 420114, 1 adult pulled body, source of tissue sample 0348), 2301 (UF 420115, 2 adult pulled bodies, sources of tissue samples 0349-50). Small specimens fixed and preserved in 98% ethanol: Station 2245 (UF 420219, 1 juv).

Diagnosis. — Most similar to *A. josephinae* Emberton, 1999, from which it differs by its absence of two parallel grooves within the umbilicus, much lesser pre-apertural downward deflection of body whorl, higher insertion and greater reflection of upper peristome, sharper and more elevated apex, broader apertural basal gape, and slightly tighter coiling ($W/lnD = 1.23$ vs. 1.13). Differs from *A. perampla* Dautzenberg, 1907 by its lack of circum-umbilical sulci and its more rounded, less reflected columellar insertion. Differs from *A. watersi* (Angas, 1878) by its pustular but smoother sculpture, and by its less reflected baso-columellar peristome.

Description of holotype (adult). — Shell shape globular with a greatly flared aperture. Height 21.1 mm, diameter 39.1 mm (h/d 0.54). Whorls 4.5, coiling tightness (W/lnD) 1.23. Body-whorl periphery broadly rounded, sutures moderately impressed, whorls unshouldered. Spire low; apex somewhat rounded. Umbilicus 3.80 mm (0.10 shell diameter). Pre-apertural body-whorl deflection slightly downward, about 0.05 whorl. Aperture roughly curved-trapezoidal; aperture internal height (in apertural view, parallel to axis of rotation) 11.56 mm (0.55 shell height); aperture greatest internal width (perpendicular to same) 17.26 mm (0.44 shell diameter). Apertural basal gape 17.26 mm (1.49 apertural height). Distance between upper and lower peristome insertions 4.27 mm (0.11 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 16.47 mm (1.42 apertural internal height); peristome width (perpendicular to axis of rotation) 23.59 mm (1.37 apertural internal width). Peristome thick, rounded, very greatly reflected palatally, moderately reflected baso-palatally, basally, and at columella, broadening slightly at columellar insertion. First-whorl diameter 1.51 mm, first-two-whorls diameter 3.85 mm, embryonic whorl-count seemingly 2.2. Embryonic sculpture consisting of large, radially arrayed pustules. Body-whorl sculpture of smallish, dense, unevenly distributed pustules, much denser and more radially arrayed on

shell base. Shell color yellowish brown with purplish cast toward periphery, with scattered light-yellow flecks, and with broad yellow circum-umbilical band; peristomal lip a rich, dark purple; apertural interior white; apex purplish brown.

Variation. — No notable variation.

Etymology. — For Celestine Ruth Emberton, daughter of the senior author.

Ampelita clotho (Deshayes, 1850)

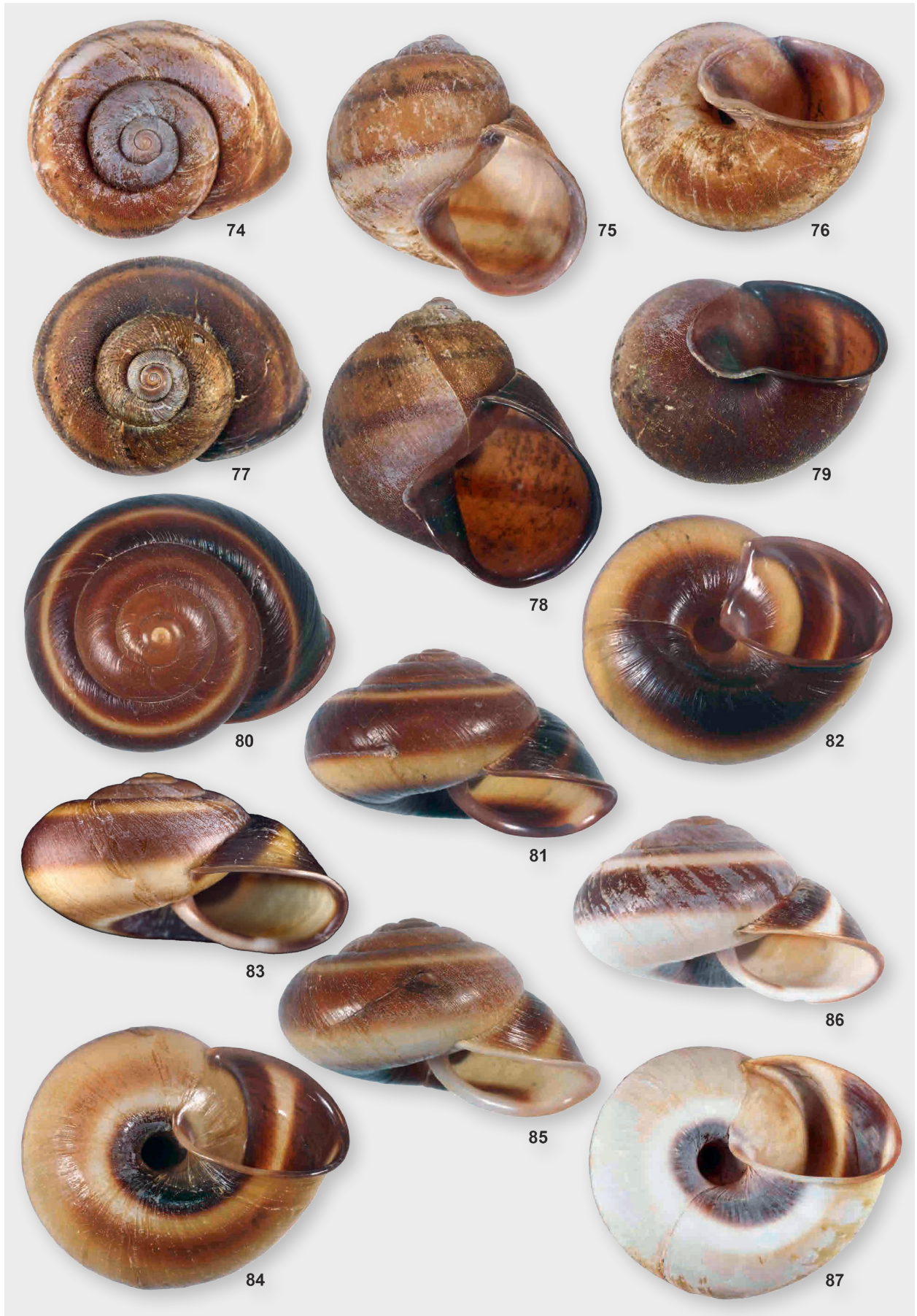
Figs 50-53

Helix clotho Deshayes, 1850b: 57-58. Type locality: “Madagascar, aux environs de la baie Diego-Suarez”. Note (1): refers to plate 69I fig. 3 (published in 1840c), but there was no explanation on the plate or on the wrappers. Note (2): name attributed to Férussac by Deshayes, but it was the latter who validly introduced the name *clotho*.

Material examined. — Illustrated voucher specimens: Station 2195 (UF 419029, 1 adult, Figs 50-52), 2179 (UF 419030, 1 adult, Fig. 53). Other dry vouchers: Stations 2179 (UF 418736, 1 ad), 2180 (UF 418736, 1 ad; SMF, 1 ad), 2184 (UF 418738, 2 ad), 2188 (UF 418738, 2 ad), 2193 (AMS, 1 ad), 2198 (UF 418740, 1 ad; ANSP, 1 ad), 2200 (UF 418741, 1 ad), 2201 (UF 418742, 3 ad, 1 juv), 2202 (UF 418743, 1 ad), 2204 (UF 418744, 1 ad fragment), 2209 (UF 418745, 2 ad), 2211 (UF 418746, 1 ad), 2213 (UF 418747, 1 juv), 2218 (UF 418748, 2 ad, 4 juv). Vouchers in 90% ethanol: Stations 2179 (UF 420116, 1 ad, source of tissue sample 0288), 2209 (UF 420117, 1 ad, source of tissue sample 0289).

Description of illustrated voucher from station 2195 (adult, Figs 50-52). — Shell shape low helicoid; shell very thick, massive. Height 27.6 mm, diameter 57.4 mm (h/d 0.48). Whorls 5.6, coiling tightness (W/lnD) 1.38. Body-whorl periphery rounded, sutures well impressed, whorls rounded and unshouldered. Spire low, domed; apex rounded. Umbilicus 10.4 mm (0.18 shell diameter). Pre-apertural body-whorl deflection moderate at first, then nearly vertically downward, total about 0.18 whorl. Aperture very depressed-ovate; aperture internal height (in apertural view, parallel to axis of rotation) 7 mm (0.25 shell height); aperture greatest internal width (perpendicular to same) 25 mm (0.44 shell diameter). Apertural basal gape 19.5 mm (2.79 apertural height). Distance between upper and lower peristome insertions 3 mm (0.05 shell diameter). Peristome

< Figs 54-59. *Ampelita lamarei lamarei* (L. Pfeiffer, 1846). 54-56. Station 2306 (UF 419050, 1 adult). 57-58. Station 2286 (UF 419049). 59. Station 2532 (UF 419051). Figs 60-70. *Ampelita lamarei sakalava* (Angas, 1878). 60-62. Station 2339 (UF 419052, 1 adult). 63-64. Station 2341 (UF 419053). 65. Station 2347 (UF 419054). 66. Station 2354 (UF 419055). 67. Station 2374 (UF 419056). 68. Station 2538 (UF 419057). 69. Station 539 (UF 419058). 70. Station 2604 (UF 419059). Figs 71-73. *Ampelita celestinae* spec. nov., station 2290 (holotype UF 419028). All photographs K. Emberton, 1.5 ×.



height (in apertural view, parallel to axis of rotation) 12 mm (1.71 apertural internal height); peristome width (perpendicular to axis of rotation) 30 mm (1.20 apertural internal width). Peristome thick, rounded, moderately reflected palatally, rather widely reflected basally and at columella, narrowing slightly and curving abruptly at columellar insertion. First-whorl diameter 1.80 mm, first-two-whorls diameter 4.77 mm, embryonic whorl-count seemingly 1.5. Embryonic sculpture consisting of radial riblets and tiny, extremely dense, inscribed spiral lines. Body-whorl sculpture of strong, very dense, anastomosing, generally radially arrayed pustules; on shell base, pustules fuse into branching, pustulose, radial riblets. Shell color dark purplish brown above, much lighter below; umbilicus and circum-umbilicus dark purple-brown; peristomal lip whitish to light purple-brown.

Variation. — The illustrated extreme variant (Fig. 53) has a much more elevated spire, less steep downward pre-apertural deflection, slightly tighter coiling (W/lnD 1.44), lesser basal gape (2.23 apertural height), greater distance between peristomal insertions (0.10 shell diameter), and greater first-whorl and first-two-whorls diameters (1.86 mm and 4.92 mm).

***Ampelita consanguinea* (Deshayes, 1850)**

Figs 136-139

Helix consanguinea Deshayes, 1850b: 59. Type locality: “Madagascar, aux environs de la baie Diego-Suarez”. Note (1): refers to plate 69H figs 1-2 (published in 1840c), but there was no explanation on the plate or on the wrappers. Note (2): name attributed to Férussac by Deshayes, but it was the latter who validly introduced the name *consanguinea*.

Material examined. — Illustrated voucher specimens: Station 2003 (UF 419031, 1 adult, Figs 136-138), 2006 (UF 419032, 1 adult, Fig. 139). Other dry vouchers: Stations 2002 (UF 418533, 4 ad, 11 juv), 2003 (UF 418534, 7 ad, 5 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2004 (UF 418535, 1 ad, 2 juv), 2005 (UF 418536, 2 juv), 2007 (UF 418537, 1 ad, 2 juv), 2008 (UF 418538, 4 juv). Vouchers in 90% ethanol: Stations 2002 (UF 420118, 2 ad, source of tissue samples 0001-2), 2003 (UF 420119, 1 ad, source of tissue sample 0003), 2004 (UF 420120, 2 ad, source of tissue samples 0004-5), 2005 (UF 420121, 2 ad, source of tissue samples 0006-7), 2006 (UF 420122, 2 ad, source of tis-

sue sample 0008-9), 2069 (UF 420123, 1 ad, source of tissue sample 0085), 2075 (UF 420124, 1 ad, source of tissue sample 0094), 2078 (UF 420125, 1 ad, source of tissue sample 0098), 2081 (UF 420126, 1 ad, source of tissue sample 0116), 2083 (UF 420127, 1 ad, source of tissue sample 0120), 2149 (UF 420128, 1 ad, source of tissue sample 0224), 2151 (UF 420129, 2 ad, source of tissue samples 0225-26). Small specimens fixed and preserved in 98% ethanol: Station 2002 (UF 420220, 2 juv).

Description of illustrated voucher station 2003 (adult, Figs 136-138). — Shell shape depressed helicoid. Height 17.8 mm, diameter 30.5 mm (h/d 0.58). Whorls 4.7, coiling tightness (W/lnD) 1.38. Body-whorl periphery rounded, sutures moderately impressed, whorls unshouldered. Spire low, domed; apex rounded. Umbilicus 4.27 mm (0.14 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.04 whorl. Aperture depressed ovate; aperture internal height (in apertural view, parallel to axis of rotation) 6.65 mm (0.37 shell height); aperture greatest internal width (perpendicular to same) 13.22 mm (0.43 shell diameter). Apertural basal gape 10.93 mm (1.64 apertural height). Distance between upper and lower peristome insertions 3.01 mm (0.10 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 8.39 mm (1.26 apertural internal height); peristome width (perpendicular to axis of rotation) 15.99 mm (1.21 apertural internal width). Peristome thinnish, unreflected palatally, slightly reflected baso-palatally, basally, and at columella, broadening slightly at columellar insertion. First-whorl diameter 1.67 mm, first-two-whorls diameter 4.58 mm, embryonic whorl-count 2.25. Embryonic sculpture seemingly of minute, dense, spiral lines. Body-whorl sculpture smoothish, with irregular, moderately strong, radial growth lines; scattered, radially arrayed pustules; and traces of minute, dense, spiral lines; on base of shell, spiral lines are much more evident. Shell basic color lightish brown, with two broad, very dark purple-brown color bands above the periphery (one sutural) and one indistinct white band around the umbilicus; umbilicus dark purple-brown; peristomal lip and pre-aperture dark purple-brown, except for whitish baso-columella.

Variation. — An extreme variant from station 2006 (Fig. 139) sustained pre-apertural injury, causing upward pre-apertural deflection before a slight and brief turn down, resulting in a conspicuously higher aperture. This specimen also differs in its larger first-whorl and first-two-whorls diameters (1.92 mm and 4.68 mm).

< Figs 74-76. *Embertoniphanta josephinae* spec. nov., station 2078 (holotype UF 420094). Figs 77-79. *Embertoniphanta echinophora* (Deshayes, 1850), station 2550 (UF 420095, 1 adult). Figs 80-87. *Ampelita atropos* (Deshayes, 1850). 80-82. Station 2145 (UF 419060, 1 adult). 83-84. Station 2145 (UF 419061, 1 adult). 85. Station 2145 (UF 419062). 86-87. Station 2145 (UF 419063, 1 adult). All photographs K. Emberton, 1.5 ×.



Ampelita ela spec. nov.

Figs 117-119

Material examined. — Holotype: UF 419033 (adult fossil), station 2563, Madagascar, southern Namoroka Reserve, karstic cul de sac above dry pool, 124 m elevation, 16°27.812'S, 45°20.291'E, dry-deciduous forest, limestone bedrock, 24 Sep 07. Other Paratypes: Stations 2286 (UF 418708, 3 ad), 2286 (UF 418708, 3 ad), 2293 (SMF, 1 ad), 2301 (AMS, 1 ad; ANSP, 1 ad).

Diagnosis. — Differs from *A. zonata* Fischer-Piette & Garreau, 1965 by its tighter coiling, relatively broader umbilicus, and lower spire. Differs from both *A. michellae* spec. nov. and *A. kirae* spec. nov. by its much more widely reflected peristome, more rounded body-whorl periphery, and greater downward pre-apertural body-whorl deflection, among other differences. Not readily mistaken for any other *Ampelita* species.

Description of holotype (adult). — Shell shape discoidal. Height 14.4 mm, diameter 31.2 mm (h/d 0.46). Whorls estimated at 5.0, coiling tightness (W/lnD) estimated at 1.45. Body-whorl periphery rounded, sutures moderately impressed, whorls unshouldered. Spire low; apex flattish. Umbilicus 7.12 mm (0.23 shell diameter). Pre-apertural body-whorl deflection rather greatly downward, about 0.10 whorl. Aperture depressed ovate; aperture internal height (in apertural view, parallel to axis of rotation 4.91 mm (0.34 shell height); aperture greatest internal width (perpendicular to same) 11.88 mm (0.38 shell diameter). Apertural basal gape 12.35 mm (2.52 apertural height). Distance between upper and lower peristome insertions 0.95 mm (0.03 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 8.55 mm (1.74 apertural internal height); peristome width (perpendicular to axis of rotation) 16.78 mm (1.41 apertural internal width). Peristome thick, slightly reflected palatally, moderately reflected baso-palatally, basally, and at columella, broadening slightly at columellar insertion. First-whorl diameter unknown, first-two-whorls diameter unknown, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture unknown. Shell color unknown.

Etymology. — “Old, from olden times” (Malagasy “ela”), for the only known shell being fossil.

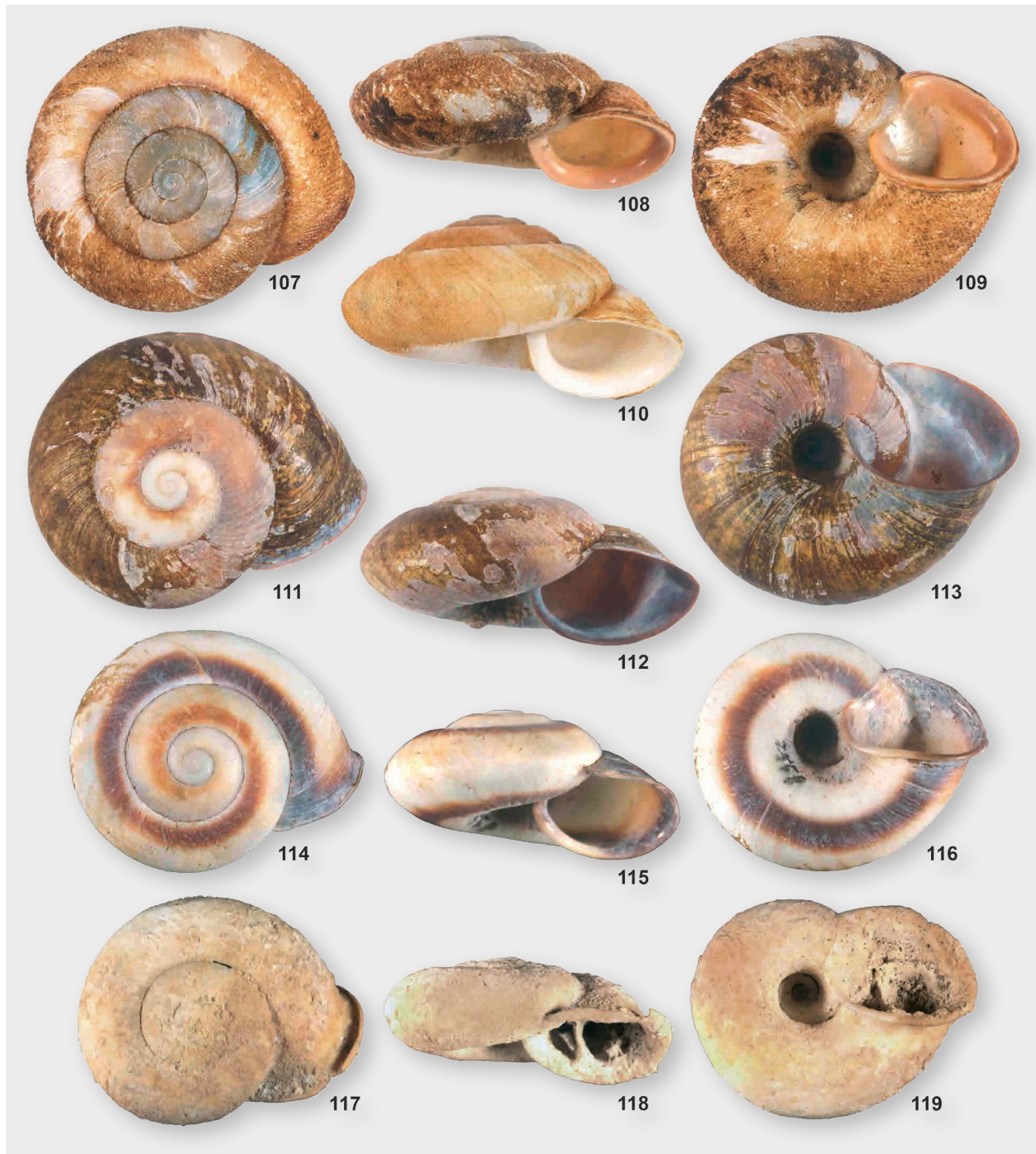
Ampelita gaudens (Mabille, 1884)

Figs 32-42

Helix gaudens Mabille, 1884: 125. Type locality: “Madagascar”.

Material examined. — Illustrated voucher specimens: Stations 2345 (UF 419034, 1 adult, Fig. 35), 2348 (UF 419035, 1 adult, Fig. 36), 2369 (UF 419036, 1 adult, Fig. 37), 2543 (UF 419037, 1 adult, Fig. 38), 2552 (UF 419038, 1 adult, Fig. 39), 2558 (UF 419039, 2 adults, Figs 40-41), 2598 (UF 419040, 1 adult, Fig. 42), 2620 (UF 419041, 1 adult, Figs 32-34). Other dry vouchers: Stations 2338 (UF 418753, 2 ad, 1 juv), 2339 (UF 418754, 2 ad, 3 juv), 2341 (UF 418755, 7 juv), 2343 (UF 418756, 7 juv), 2344 (UF 418757, 10 ad, 16 juv), 2345 (UF 418758, 1 ad, 2 juv), 2348 (UF 418759, 2 ad, 1 juv), 2349 (UF 418760, 1 ad), 2351 (UF 418761, 1 ad, 7 juv), 2354 (UF 418762, 1 ad, 2 juv), 2357 (UF 418763, 1 ad, 1 juv; SMF, 1 ad), 2358 (UF 418764, 6 ad), 2359 (UF 418765, 1 ad, 4 juv), 2360 (UF 418766, 1 ad), 2369 (UF 418767, 1 ad), 2374 (UF 418768, 1 ad), 2376 (UF 418769, 1 juv), 2379 (UF 418770, 2 ad), 2380 (UF 418771, 1 ad, 1 juv), 2533 (UF 418772, 1 juv), 2538 (UF 418773, 4 juv), 2539 (UF 418774, 2 juv), 2543 (UF 418775, 1 juv), 2546 (UF 418776, 5 ad, 2 juv), 2547 (UF 418777, 4 ad, 3 juv), 2548 (UF 418778, 7 ad, 3 juv, 1 egg), 2549 (UF 418779, 2 ad), 2550 (UF 418780, 7 ad, 8 juv), 2551 (UF 418781, 3 ad, 1 juv), 2552 (UF 418782, 4 ad, 2 juv), 2556 (UF 418783, 1 ad), 2558 (UF 418784, 2 ad, 2 juv), 2559 (UF 418785, 2 ad, 2 juv), 2598 (UF 418786, 3 ad), 2599 (UF 418787, 1 juv), 2600 (UF 418788, 1 ad), 2601 (UF 418789, 1 ad, 2 juv; AMS, 1 ad), 2607 (UF 418790, 1 ad), 2609 (UF 418791, 2 ad, 3 juv), 2611 (UF 418792, 1 ad; ANSP, 1 ad), 2612 (UF 418793, 1 ad, 1 juv), 2613 (UF 418794, 1 ad), 2614 (UF 418795, 1 ad), 2617 (UF 418796, 1 juv), 2619 (UF 418797, 1 ad), 2620 (UF 418798, 2 ad, 6 juv), 2622 (UF 418799, 1 juv), 2626 (UF 418800, 1 juv), 2632 (UF 418801, 1 ad). Vouchers in 90% ethanol: Stations 2344 (UF 420130, 2 ad pulled bodies, 1 juv, sources of tissue samples 0395-97), 2375 (UF 420131, 1 ad, source of tissue sample 0422), 2537 (UF 420132, 1 ad, source of tissue sample 0499), 2539 (UF 420133, 2 ad, sources of tissue sample 0500-01), 2546 (UF 420134, 1 ad, source of tissue sample 0502), 2548 (UF 420135, 1 juv, source of tissue sample 0503), 2550 (UF 420136, 1 juv, source of tissue sample 0504), 2552 (UF 420137, 1 ad pulled body, source of tissue sample 0505), 2601 (UF 420138, 3 ad, sources of tissue samples 0620-22), 2603 (UF 420139, 1 ad, source of tissue sample 0623). Small specimens fixed and preserved in 98% ethanol: Stations 2339 (UF 420221, 2 juv), 2551 (UF 420222, 1 juv), 2609 (UF 420223, 1 juv).

< Figs 88-92. *Eurystyla julii julii* (Fischer-Piette & Garreau, 1965). 88-91. Station 2331 (UF 420082, 1 adult). 92. Station 2300 (UF 420081). Figs 93-95. *Eurystyla julii soa* (Emberton & Griffiths, 2009), station 2288 (UF 420086, 1 adult). Figs 96-102. *Eurystyla julii kely* subspec. nov. 96-98. Station 2528 (holotype UF 420083). 99-101. Station 2531 (paratype UF 420085). 102. Station 2524 (paratype UF 420084). Figs 103-106. *Eurystyla ambatoensis* (Emberton & Griffiths, 2009). 103-105. Station 2276 (holotype UF 417591 [from Emberton & Griffiths 2009]). 106. Station 2256 (UF 420216, juvenile). All photographs K. Emberton (Figs 88-102 = 1.5 x; Figs 103-106 = 3.0 x).



Figs 107-110. *Ampelita granulosa* (Deshayes, 1850). **107-109.** Station 2183 (UF 419042, 1 adult). **110.** Station 2217 (UF 419044). **Figs 111-113.** *Ampelita kirae* spec. nov., station 2625 (holotype UF 419066). **Figs 114-116.** *Ampelita andavakoerae* spec. nov., station 2558 (holotype UF 419025). **Figs 117-119.** *Ampelita ela* spec. nov., station 2563 (holotype UF 419033). All photographs K. Emberton, 1.5 ×.

Description of illustrated voucher from station 2620 (adult, Figs 32-34). — Shell shape very depressed helicoid. Height 27.7 mm, diameter 62.8 mm (h/d 0.44). Whorls 4.75, coiling tightness (W/lnD) 1.15. Body-whorl periphery rounded, sutures somewhat shallowly impressed,

whorls unshouldered. Spire very low domed; apex low rounded. Umbilicus 11.8 mm (0.19 shell diameter). Pre-apertural body-whorl deflection greatly downward, about 0.10 whorl. Aperture very depressed ovate, flared at the periphery; aperture internal height (in apertural view, parallel to

axis of rotation 7.5 mm (0.27 shell height); aperture greatest internal width (perpendicular to same) 26.5 mm (0.42 shell diameter). Apertural basal gape 22 mm (2.93 apertural height). Distance between upper and lower peristome insertions 1 mm (0.02 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 10.5 mm (1.40 apertural internal height); peristome width (perpendicular to axis of rotation) 31 mm (1.17 apertural internal width). Peristome rather thick, rounded, slightly reflected palatally and baso-palatally, moderately reflected at baso-columella and columella, broadening slightly at columellar insertion. First-whorl diameter 1.89 mm, first-two-whorls diameter 6.07 mm, embryonic whorl-count unknown. Embryonic sculpture with a very minutely beaded appearance to about 1.5 whorls, caused by minute, very dense, axial striae crossed by minute, dense, spiral lines; then with strong pustules to just above the suture, where minute spiral lines appear. Body-whorl sculpture consisting of dense, radial lines of small pustules; on shell base, pustules are more fused to form pustulose riblets. Shell color dark chestnut brown, with a yellow circum-umbilical color band; peristomal lip purple-brown above, white below.

Variation. — An highly variable species. Among nine extreme variants (including described voucher, Figs 32-42, diameters 46.0-65.3 mm, whorls 4.7-5.3), h/d ranged 0.44-0.60, coiling tightness (W/lnD) ranged 1.15-1.36, umbilicus/shell diameter 0.14-0.20, aperture height/shell height 0.26-0.40, aperture width/shell diameter 0.38-0.44, apertural basal gape/apertural height 1.71-2.93, peristomal insertions distance/shell diameter 0.02-0.09, peristome height/apertural height 1.25-1.40, peristome width/apertural width 1.17-1.27, first-whorl diameter 1.55-2.04 mm, and first-two-whorls diameter 4.00-6.07 mm (!).

***Ampelita granulosa* (Deshayes, 1850)**

Figs 107-110

Helix granulosa Deshayes, 1850b: 61. Type locality: “Madagascar, aux environs de la baie Diego-Suarez”. Note (1): refers to plate 69H figs 7-10 (published in 1840c), but there was no explanation on the plate or on the wrappers. Note (2): name attributed to Férussac by Deshayes, but it was the latter who validly introduced the name *granulosa*.

Material examined. — Illustrated and/or measured voucher specimens: Stations 2183 (UF 419042, 1 adult, Figs 107-109), 2200 (UF 419043, 1 juv), 2217 (UF 419044, 1 adult, Fig. 110). Other dry vouchers: Stations 2179 (UF 418709, 5 ad, 10 juv, 10 eggs), 2181 (UF 418710, 4 ad, 5 juv), 2182 (UF 418711, 1 ad, 1 juv), 2183 (UF 418712, 2 ad, 17 juv), 2184 (UF 418713, 9 ad, 1 juv), 2185 (UF 418714, 11 ad, 2 juv), 2186 (UF 418715, 3 ad), 2187 (UF 418716, 1 ad, 1 juv), 2188 (UF 418717, 7 ad, 2 juv), 2189 (UF

418718, 1 ad, 20 juv; AMS, 1 ad), 2191 (UF 418719, 3 juv), 2192 (UF 418720, 2 juv), 2193 (UF 418721, 3 juv), 2194 (UF 418722, 1 ad, 3 juv), 2196 (UF 418723, 6 ad, 17 juv, 10 eggs), 2198 (UF 418724, 9 ad, 7 juv), 2199 (UF 418725, 1 ad), 2200 (UF 418726, 6 ad, 19 juv; ANSP, 1 ad), 2201 (UF 418727, 5 ad, 6 juv), 2202 (UF 418728, 6 ad, 17 juv, 1 egg), 2206 (UF 418729, 6 ad), 2207 (UF 418730, 1 ad, 13 juv, 1 egg), 2209 (UF 418731, 1 ad, 3 juv, SMF, 1 ad), 2210 (UF 418732, 5 ad, 17 juv, 3 eggs), 2211 (UF 418733, 1 juv), 2217 (UF 418734, 6 ad), 2218 (UF 418735, 1 ad, 1 juv). Vouchers in 90% ethanol: Stations 2179 (UF 420140, 1 ad, 4 juv, sources of tissue samples 0278-81), 2182 (UF 420141, 1 ad, source of tissue sample 0282), 2207 (UF 420142, 1 juv), 2209 (UF 420143, 2 ad, sources of tissue samples 0283-4), 2209 (UF 420144, 4 juv), 2215 (UF 420145, 2 ad, sources of tissue samples 0285-6), 2218 (UF 420146, 1 ad, source of tissue sample 0287). Small specimens fixed and preserved in 98% ethanol: Stations 2179 (UF 420224, 2 juv), 2183 (UF 420225, 1 juv), 2204 (UF 420226, 2 juv), 2209 (UF 420227, 2 juv).

Description of illustrated voucher from station 2183 (adult, Figs 107-109). — Shell shape somewhat discoid. Height 17.9 mm, diameter 35.5 mm (h/d 0.50). Whorls 5.4, coiling tightness (W/lnD) 1.51. Body-whorl periphery slightly angulate, sutures deeply impressed, whorls shouldered. Spire low, domed; apex flat. Umbilicus 8.79 mm (0.25 shell diameter). Pre-apertural body-whorl deflection moderately downward, beginning slightly downward, then gradually increasing, about 0.12 whorl. Aperture ovate; aperture internal height (in apertural view, parallel to axis of rotation) 4.59 mm (0.26 shell height); aperture greatest internal width (perpendicular to same) 11.72 mm (0.33 shell diameter). Apertural basal gape 11.88 mm (2.59 apertural height). Distance between upper and lower peristome insertions 2.06 mm (0.06 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 8.87 mm (1.93 apertural internal height); peristome width (perpendicular to axis of rotation) 16.63 mm (1.42 apertural internal width). Peristome very thick, unreflected at palatal insertion, moderately reflected thereafter. First-whorl diameter 1.55 mm, first-two-whorls diameter 4.15 mm, embryonic whorl-count seemingly 2.2. Embryonic sculpture consisting of very strong, very dense, radial striae, variable in size, sometimes slightly pustular. Body-whorl sculpture a pronounced field of strong, upright, triangular-shaped, periostracal hairs, continuing onto base of shell, but diminished in size at the umbilicus; where periostracum is missing, sculpture consists of strong, elongate, radially arrayed pustules. Shell color light yellowish brown.

Variation. — A variant voucher (Fig. 110) has a conspicuously more elevated spire (h/d 0.56), a lower aperture (apertural height/shell height 0.21) and a greater apertural basal gape (gape/apertural height 2.74). Among the three measured vouchers, coiling tightness (W/lnD) ranges 1.45-1.55, first-whorl diameter 1.55-1.77 mm, and first-two-whorls diameter 4.15-4.62 mm.



***Ampelita kendrae* spec. nov.**

Figs 140-144

Material examined. — Holotype: UF 419045 (adult), station 2617, Madagascar, Manongarivo Reserve, slope above upper Manongarivo River near small tributary stream, 202-358 m elevation, 13°59'S, 48°17'E, rainforest, granite bedrock, 20 Oct 07. Illustrated paratypes: Stations 2615 (UF 419046, 1 adult, Fig. 144), 2617 (UF 419047, 1 adult, Fig. 143). Other dry paratypes: Stations 2613 (UF 418585, 1 ad, 1 juv), 2617 (UF 418587, 1 ad), 2618 (UF 418588, 1 juv), 2619 (UF 418589, 1 juv), 2620 (UF 418590, 4 ad, 2 juv), 2623 (UF 418591, 1 juv), 2626 (UF 418592, 2 ad, 3 juv), 2627 (UF 418593, 1 juv), 2628 (UF 418594, 1 ad), 2629 (UF 418595, 1 ad, 1 juv), 2630 (UF 418596, 1 juv), 2632 (UF 418597, 1 ad, 2 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad). Paratypes in 90% ethanol: Station 2626 (UF 420168, 1 juv, source of tissue sample 0638).

Diagnosis. — Unique within the genus for its combination of angulate mid-periphery, medium size, and domed spire.

Description of holotype (adult, Figs 141-143). — Shell shape depressed helicoid-lenticular. Height 17.2 mm, diameter 31.7 mm (h/d 0.54). Whorls 4.5, coiling tightness (W/lnD) 1.30. Body-whorl periphery angulate, sutures rather shallowly impressed, whorls unshouldered. Spire low domed; apex slightly sharp. Umbilicus 5.07 mm (0.16 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.05 whorl. Aperture broadly depressed-ovate; aperture internal height (in apertural view, parallel to axis of rotation) 6.02 mm (0.35 shell height); aperture greatest internal width (perpendicular to same) 13.93 mm (0.44 shell diameter). Apertural basal gape 10.29 mm (1.71 apertural height). Distance between upper and lower peristome insertions 2.45 mm (0.08 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 8.55 mm (1.42 apertural internal height); peristome width (perpendicular to axis of rotation) 16.31 mm (1.17 apertural internal width). Peristome moderately thick, slightly reflected upper-palately, moderately reflected thereafter, but upper columella narrower. First-whorl diameter 1.74 mm, first-two-whorls diameter 4.49 mm, embryonic whorl-count seemingly 2.0. Embryonic sculpture minutely granular, with minute radial wrinkles. Body-whorl sculpture consisting of moderately strong, moderately and fairly evenly spaced, spiral lines, made wavy by irregular, fairly weak lines of growth; sculpture continuing undiminished onto base of shell. Shell basic color a dark brownish green; apex dark, some-

what rosy brown; with a white sutural color band that is lined on each side by a thin dark purple-brown band; with a moderately wide peripheral, tannish-yellow color band lined above and below by equally wide dark purple-brown color bands; and with a broad, very light-tannish-yellow, circum-umbilical color band; apertural lip purple-brown, except for a white baso-columella.

Variation. — Among three extreme variants (including holotype, Figs 140-144, diameters 30.0-31.7 mm, whorls 4.5-4.75), h/d ranged 0.52-0.60, coiling tightness (W/lnD) ranged 1.30-1.40, umbilicus/shell diameter 0.13-0.16, aperture height/shell height 0.32-0.42, aperture width/shell diameter 0.44-0.45, apertural basal gape/apertural height 1.35-1.76, peristomal insertions distance/shell diameter 0.08 (invariable), peristome height/apertural height 1.37-1.42, peristome width/apertural width 1.16-1.17, first-whorl diameter 1.51-1.74 mm, and first-two-whorls diameter 4.04-4.57 mm.

Etymology. — For Kendra Rasoanavony Emberton, daughter of the senior author.

***Ampelita kirae* spec. nov.**

Figs 111-113

Material examined. — Holotype: UF 419066 (adult), station 2625, Madagascar, Manongarivo Reserve, east side upper Manongarivo River, summit ridge, 324-410 m elevation, 13°59.1'S, 48°16.8'E, rainforest, granite bedrock, 21 Oct 07. Measured paratype: Stations 2626 (UF 419067, 1 juv). Small specimen fixed and preserved in 98% ethanol: Station 2611 (UF 420246, 1 juv).

Diagnosis. — Differs from *A. bizonalis* Odhner, 1919 by its much weaker sculpture, thinner and less reflected peristome, and looser coiling. Differs from *A. omphalodes* (L. Pfeiffer, 1845) by its lower-situated and much weaker body-whorl peripheral angulation, tighter coiling, more rounded upper peristome, and much darker coloration. Differs from *A. michellae* spec. nov. by its tighter coiling, higher spire, more angulate periphery, and relatively narrower umbilicus.

Description of holotype (adult). — Shell shape very depressed helicoid. Height 18.5 mm, diameter 36.8 mm (h/d 0.50). Whorls 4.55, coiling tightness (W/lnD) 1.26. Body-whorl periphery slightly angulate, sutures moderately impressed, whorls unshouldered. Spire low domed; apex low rounded. Umbilicus 6.97 mm (0.19 shell diameter). Pre-apertural body-whorl deflection moderately downward,

< Figs 120-123. *Ampelita capdambrae* spec. nov. 120-122. Station 2149 (holotype UF 419026). 123. Station 2165 (paratype UF 419027). Figs 124-135. *Ampelita stilpna* (Mabille, 1884). 124-129. Station 2069 (UF 420071, 2 adults). 130.. Station 2024 (UF 420068). 131. Station 2081 (UF 420073). 132. Station 2082 (UF 420074). 133. Station 2030 (UF 420069). 134. Station 2036 (UF 420070). 135. Station 2093 (UF 420075). Figs 136-139. *Ampelita consanguinea* (Deshayes, 1850). 136-138. Station 2003 (UF 419031, 1 adult), 139. Station 2006 (UF 419032). All photographs K. Emberton, 1.6 ×.



about 0.15 whorl. Aperture ovate; aperture internal height (in apertural view, parallel to axis of rotation 8.63 mm (0.47 shell height); aperture greatest internal width (perpendicular to same) 16.86 mm (0.46 shell diameter). Apertural basal gape 12.59 mm (1.46 apertural height). Distance between upper and lower peristome insertions 3.17 mm (0.09 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 10.45 mm (1.21 apertural internal height); peristome width (perpendicular to axis of rotation) 19.40 mm (1.15 apertural internal width). Peristome thin, unreflected upper-palatally, slightly reflected baso-palatally and basally, somewhat narrowly reflected at columella, broadening slightly at columellar insertion. First-whorl diameter 1.88 mm, first-two-whorls diameter 5.39 mm, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture malleate, with somewhat randomly distributed, large, shallow dimples or depressions; upon which appear weak, irregular lines of growth, and patchy traces of spiral lines; malleations absent from base, where spiral lines are more evident. Shell color very dark purple-brown, with greenish-yellow patches (apparently where periostracum is delaminated); purple to whitish where periostracum missing; apertural lip dark purple-brown.

Partial description of juvenile paratype from station 2626. — Embryonic sculpture consisting of minute radial ribs, seemingly slightly pustulose, crossed by minute, dense, spiral lines.

Variation. — The juvenile paratype (diameter 25.7 mm, whorls 4.0) is keeled.

Etymology. — For Kira Cathy Emberton, daughter of the senior author.

***Ampelita lachesis* (Deshayes, 1850)**

Figs 46-49

Helix lachesis Deshayes, 1850b: 57. Type locality: “Madagascar, aux environs de la baie Diego-Suarez”. Note (1): refers to plate 69H figs 3-4 (published in 1840c), but there was no explanation on the plate or on the wrappers. Note (2): name attributed to Férussac by Deshayes, but it was the latter who validly introduced the name *lachesis*.

Material examined. — Illustrated voucher specimens: Station 2008 (UF 419048, 2 adults, Figs 46-49). Other dry vouchers: Stations 2008 (UF 418583, 8 ad, 4 juv), 2009 (UF 418584, 7 ad, 7 juv). Voucher in 90% ethanol: Station 2008

(UF 420169, 1 ad, source of tissue sample 0010). Small specimen fixed and preserved in 98% ethanol: Station 2009 (UF 420231, 1 juv).

Description of illustrated voucher from station 2008 (adult, Figs 47-49). — Shell shape helicoid-conic. Height 21.6 mm, diameter 39.3 mm (h/d 0.55). Whorls 5.1, coiling tightness (W/lnD) 1.39. Body-whorl periphery rounded, very slightly angulate; sutures moderately impressed, whorls unshouldered. Spire domed-conic; apex somewhat flat. Umbilicus 5.54 mm (0.14 shell diameter). Pre-apertural body-whorl deflection strongly downward, about 0.12 whorl. Aperture very depressed-ovate, flattened and straight-sided above; aperture internal height (in apertural view, parallel to axis of rotation 4.33 mm (0.21 shell height); aperture greatest internal width (perpendicular to same) 17.26 mm (0.44 shell diameter). Apertural basal gape 14.57 mm (3.2 apertural height). Distance between upper and lower peristome insertions 0.55 mm (0.01 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 7.60 mm (1.71 apertural internal height); peristome width (perpendicular to axis of rotation) 21.53 mm (1.25 apertural internal width). Peristome thick, slightly reflected palatally, moderately reflected baso-palatally, basally, and at columella, broadening slightly at columellar insertion. First-whorl diameter 1.86 mm, first-two-whorls diameter 5.08 mm, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture of strong, irregular, radial lines of growth, crossed by trace to weak spiral lines that are visible only in patches; spiral line sculpture is much stronger on shell. Shell color above periphery brown, with a thin, white color band at the suture; shell color at and below periphery white, except for umbilicus, which is dark brown; apertural lip light brownish pink, darker above and on columella.

Variation. — A larger voucher (Fig. 46) has diameter 42.9 mm, whorls 5.25, and a virtually identical coiling tightness; this specimen differs from the described by its greater first-whorl diameter (2.04 mm), although its first-two-whorls diameter is identical.

***Ampelita lamarei lamarei* (L. Pfeiffer, 1846)**

Figs 54-59

Helix lamarei L. Pfeiffer, 1846: 79. Type locality: “Madagascar”.

< Figs 140-144. *Ampelita kendrae* spec. nov. 140-142. Station 2617 (holotype UF 419045). 143. Station 2617 (UF 419047). 144. Station 2615 (UF 419046). Figs 145-158. *Ampelita miovaova* spec. nov. 145-147. Station 2551 (holotype UF 419074). 148-150, 154. Station 2533 (UF 420064, 2 paratypes). 151-153. Station 2367 (paratype UF 419076). 155. Station 2544 (paratype UF 420065). 156. Station 2378 (paratype UF 419078). 157. Station 2372 (paratype UF 419077). 158. Station 2365 (paratype UF 419075). All photographs K. Emberton, 1.7 ×.



Material examined. — Illustrated voucher specimens: Stations 2286 (UF 419049, 2 adults, Figs 57-58), 2306 (UF 419050, 1 adult, Figs 54-56), 2532 (UF 419051, 1 adult, Fig. 59). Other dry vouchers: Stations 2285 (UF 418680, 2 ad), 2286 (UF 418681, 3 ad, 2 juv), 2297 (UF 418682, 1 ad), 2302 (UF 418683, 1 ad), 2306 (UF 418684, 1 juv), 2336 (UF 418685, 1 juv), 2419 (UF 418686, 1 ad), 2510 (UF 418687, 2 ad), 2524 (UF 418688, 1 ad). Vouchers in 90% ethanol: Stations 2299 (UF 420170, 1 ad, source of tissue sample 0346), 2301 (UF 420171, 1 ad, source of tissue sample 0347). Small specimens fixed and preserved in 98% ethanol: Station 2295 (UF 420232, 2 juv).

Description of illustrated voucher from station 2306 (adult, Figs 54-56). — Shell shape ovate-angulate, with a spiral groove above. Height 16.0 mm, diameter 32.5 mm (h/d 0.49). Whorls 4.3, coiling tightness (W/lnD) 1.24. Body-whorl periphery angulate, with a concavity above produced by a pronounced, supra-peripheral, spiral sulcus or groove; sutures well impressed, recessed; body whorl also bearing a high, rounded, shoulder. Spire very low, domed, partially hidden by elevated body-whorl shoulder; apex scarcely protruding. Umbilicus 3.25 mm (0.10 shell diameter). Pre-apertural body-whorl deflection gradually downward, about 0.25 whorl. Aperture capacious, ovate, with indentation above corresponding with spiral sulcus; aperture internal height (in apertural view, parallel to axis of rotation 8.31 mm (0.52 shell height); aperture greatest internal width (perpendicular to same) 15.52 mm (0.48 shell diameter). Apertural basal gape 11.56 mm (0.39 apertural height). Distance between upper and lower peristome insertions 5.15 mm (0.16 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 11.72 mm (1.41 apertural internal height); peristome width (perpendicular to axis of rotation) 18.53 mm (1.19 apertural internal width). Peristome moderately thick, roundly reflected (curling backward), widely above, moderately below. First-whorl diameter 1.80 mm, first-two-whorls diameter 4.09 mm, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture consisting of moderately strong, rather dense pustules that anastomose into random shapes; irregular axial growth lines; moderately and irregularly spaced low spiral ridges; and, in isolated places, weak, moderately dense, spiral lines; on the shell base, the pustules are much more radially arrayed, and the spiral lines are much more evident. Shell color light brownish-greenish yellow.

Variation. — An extremely variable species (also see its subspecies *A. lamarei sakalava* below). Among four

extreme variants (including described voucher, Figs 54-59, diameters 29.8-41.7 mm, whorls 4.25-4.55), h/d ranged 0.45-0.59, coiling tightness (W/lnD) ranged 1.22-1.27, umbilicus/shell diameter 0.10-0.12, aperture height/shell height 0.42-0.52, aperture width/shell diameter 0.45-0.48, apertural basal gape/apertural height 1.39-2.00 (!), peristomal insertions distance/shell diameter 0.11-0.16, peristome height/apertural height 1.41-1.67, peristome width/apertural width 1.18-1.33, first-whorl diameter 1.73-1.86 mm, and first-two-whorls diameter 4.09-4.96 mm.

Ampelita lamarei sakalava (Angas, 1878)

Figs 60-70

Helix sakalava Angas, 1878: 804-805, pl. 80 figs 6-11. Type locality: "Madagascar".

Material examined. — Illustrated voucher specimens: Stations 2339 (UF 419052, 1 adult, Figs 60-62), 2341 (UF 419053, 2 adults, Figs 63-64), 2347 (UF 419054, 1 adult, Fig. 65), 2354 (UF 419055, 1 adult, Fig. 66), 2374 (UF 419056, 1 adult, Fig. 67), 2538 (UF 419057, 1 adult, Fig. 68), 2539 (UF 419058, 1 adult, Fig. 69), 2604 (UF 419059, 1 adult, Fig. 70). Other dry vouchers: Stations 2339 (UF 418645, 14 ad, 10 juv), 2341 (UF 418646, 21 ad, 7 juv), 2342 (UF 418647, 3 ad, 1 juv), 2343 (UF 418648, 10 ad, 26 juv), 2344 (UF 418649, 45 ad, 26 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2345 (UF 418650, 2 ad, 1 juv), 2346 (UF 418651, 1 ad, 2 juv), 2347 (UF 418652, 6 ad, 3 juv), 2348 (UF 418653, 3 ad), 2349 (UF 418654, 7 ad, 17 juv), 2351 (UF 418655, 2 ad), 2352 (UF 418656, 1 ad), 2353 (UF 418657, 4 ad, 4 juv), 2354 (UF 418658, 3 ad), 2355 (UF 418659, 5 ad, 5 juv), 2356 (UF 418660, 1 ad, 1 juv), 2357 (UF 418661, 3 ad, 6 juv), 2374 (UF 418662, 9 ad, 4 juv), 2375 (UF 418663, 2 ad), 2537 (UF 418664, 6 juv), 2538 (UF 418665, 1 ad), 2539 (UF 418666, 1 ad, 1 juv), 2541 (UF 418667, 1 juv), 2542 (UF 418668, 1 ad), 2543 (UF 418669, 6 ad, 4 juv), 2550 (UF 418670, 1 juv), 2600 (UF 418671, 1 ad), 2601 (UF 418672, 1 ad, 3 juv), 2602 (UF 418673, 1 ad), 2603 (UF 418674, 1 ad), 2604 (UF 418675, 5 ad, 3 juv), 2605 (UF 418676, 1 ad), 2609 (UF 418677, 3 ad, 9 juv), 2611 (UF 418678, 2 ad, 5 juv), 2612 (UF 418679, 2 ad). Vouchers in 90% ethanol: Stations 2347 (UF 420172, 1 ad pulled body, source of tissue sample 0399), 2354 (UF 420173, 1 ad, 1 juv, sources of tissue samples 0423-24), 2376 (UF 420174, 1 juv, source of tissue sample 0443), 2600 (UF 420175, 2 ad, sources of tissue samples 0609-10), 2604 (UF 420176, 1 ad, source of tissue sample 0611), 2606

< Figs 159-161. *Ampelita akoratsara paulayi* subsp. nov., station 2354 (holotype UF 419021). Figs 162-165. *Ampelita akoratsara akoratsara* Emberton, 1999. 162-164. Station 2344 (UF 419019, 1 adult). 165. Station 2339 (UF 419020). Figs 166-171. *Ampelita niarae* spec. nov. 166-168. Station 2546 (holotype UF 419064). 169-171. Station 2546 (paratype UF 419065). Figs 172-177. *Ampelita masoalae* Emberton, 1999. 172-174. Station 2339 (UF 419068, 1 adult). 175. Station 2341 (UF 419069). 176. Station 2345 (UF 419070). 177. Station 2348 (UF 419071). All photographs K. Emberton, 2.0 ×.



(UF 420178, 1 ad, 1 juv, sources of tissue samples 0612-613), 2608 (UF 420179, 1 ad, source of tissue sample 0614), 2609 (UF 420180, 2 ad, sources of tissue samples 0615-616), 2611 (UF 420181, 1 ad, 1 juv, sources of tissue samples 0617-618), 2612 (UF 420182, 1 ad, source of tissue sample 0619). Small specimens fixed and preserved in 98% ethanol: Stations 2355 (UF 420233, 1 juv), 2359 (UF 420234, 1 juv), 2546 (UF 420235, 2 juv), 2548 (UF 420236, 1 juv).

Description of illustrated voucher from station 2339 (adult, Figs 60-62). — Shell shape depressed-helicoid with greatly flared aperture. Height 18.1 mm, diameter 33.8 mm (h/d 0.54). Whorls 4.2, coiling tightness (W/lnD) 1.19. Body-whorl periphery rounded, with a shallow spiral sulcus above the periphery; sutures well impressed; body whorl with a low rounded shoulder. Spire slightly domed, low, partially hidden by raised whorl shoulder; apex rounded. Umbilicus 3.8 mm (0.11 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.15 whorl. Aperture somewhat lima-bean-shaped; aperture internal height (in apertural view, parallel to axis of rotation) 9.2 mm (0.51 shell height); aperture greatest internal width (perpendicular to same) 15.3 mm (0.45 shell diameter). Apertural basal gape 13.6 mm (1.48 apertural height). Distance between upper and lower peristome insertions 4.0 mm (0.12 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 12.5 mm (1.36 apertural internal height); peristome width (perpendicular to axis of rotation) 19.7 mm (1.29 apertural internal width). Peristome moderately thick, roundly reflected (curling backward), widely above, moderately below. First-whorl diameter 1.98 mm, first-two-whorls diameter 5.33 mm, embryonic whorl-count seemingly 1.85. Embryonic sculpture of large, scattered pustules; interrupted radial riblets; sparse, low, spiral ridges; and traces of minute, dense, spiral lines. Body-whorl sculpture consisting of moderately strong, rather dense pustules that anastomose into random shapes; irregular axial growth lines; and faint, scattered, spiral elements; sculpture continues onto base of shell. Shell basic color dark brown, with a distinctive color pattern of white zig-zagging lines; shell base with a moderately wide, white, spiral color band even in position with the columellar insertion and surrounding the outer edge of the umbilicus; apertural lip white.

Variation. — An extremely variable subspecies (also see *A. lamarei lamarei* above). Among nine extreme variants (including described voucher, Figs 60-70, diameters 28.6-40.8 mm, whorls 4.05-4.65), h/d ranged 0.43-0.56, coiling tightness (W/lnD) ranged 1.12-1.25, umbilicus/shell diameter 0.08-0.15,

aperture height/shell height 0.40-0.58, aperture width/shell diameter 0.41-0.48, apertural basal gape/apertural height 1.19-1.93 (!), peristomal insertions distance/shell diameter 0.07-0.13, peristome height/apertural height 1.27-1.47, peristome width/apertural width 1.19-1.38, first-whorl diameter 1.86-2.08 mm (!), and first-two-whorls diameter 4.96-6.07 mm (!).

Ampelita lincolni spec. nov.

Figs 29-31

Material examined. — Holotype: UF 420066 (adult), station 2285, Madagascar, vicinity Mt. Ambato, NE Masoala NP, elevation unknown, 15°17'S, 50°21'E, rainforest, metamorphic bedrock, 24 Jun 07, purchased from a villager of Anjiafotsy. Other Paratypes: Stations 2225 (UF 418749, 1 juv), 2236 (UF 418750, 1 juv), 2245 (UF 418751, 1 juv fragment), 2286 (UF 418752, 2 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad).

Diagnosis. — Unique for its gigantic shell with sharply angulate periphery. Similar in shape to *A. xyстера* (L. Pfeiffer, 1841), but nearly twice as large for the same number of whorls. Differs from *A. gaudens* (Mabille, 1884) by its looser coiling and strong keel.

Description of holotype (adult): Shell shape conic-lenticular with greatly flared aperture. Height 34.7 mm, diameter 73.5 mm (h/d 0.47). Whorls 5.1, coiling tightness (W/lnD) 1.19. Body-whorl periphery sharply angulate to keeled, sutures shallowly impressed, broadly and shallowly guttered above; whorls narrowly shouldered, nearly straight-sided from shoulder to keel. Spire low domed-conic; apex rather flat. Umbilicus 12.0 mm (0.16 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.05 whorl. Aperture very depressed, flat-sided above, with two embayments below; aperture internal height (in apertural view, parallel to axis of rotation) 12.5 mm (0.36 shell height); aperture greatest internal width (perpendicular to same) 33 mm (0.45 shell diameter). Apertural basal gape 27 mm (2.16 apertural height). Distance between upper and lower peristome insertions 2.3 mm (0.03 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 15.5 mm (1.24 apertural internal height); peristome width (perpendicular to axis of rotation) 39 mm (1.18 apertural internal width). Peristome thick, slightly reflected palatally, moderately reflected baso-palatally, basally, and at columella, broadening slightly at columellar insertion. First-whorl diameter 2.35 mm, first-two-whorls diameter 6.97 mm, embryonic whorl-count unknown. Embryonic sculpture

< Figs 178-186. *Ampelita thompsoni* spec. nov. 178-180. Station 2567 (holotype UF 420076). 181-183. Station 2574 (paratype UF 420079). 184. Station 2567 (paratype UF 420078). 185. Station 2579 (paratype UF 420080). 186. Station 2565 (paratype UF 420077). Figs 187-189. *Ampelita anjajaviensis* spec. nov., station 2592 (holotype: UF 419072). Figs 190-193. *Ampelita analamarae* Emberton, 1999. 190. Station 2075 (UF 419024). 191-193. Station 2079 (UF 419023, 1 adult). All photographs K. Emberton, 2.0 ×.

unknown. Upper body-whorl sculpture malleate (with random array of small, shallow dimples), with traces of minute, dense, spiral lines; base of shell glossy, with malleations absent, and with trace, very minute and dense, spiral lines. Shell color dark orangish brown above, very dark brown below, with broad, indistinctly edged, light yellow-brown, circum-umbilical color band; apertural lip white.

Etymology. — For Lincoln Djaohasara Emberton, son of the senior author.

***Ampelita masoalae* Emberton, 1999**

Figs 172-177

Ampelita masoalae Emberton, 1999: 84, 87, fig. 3. Type locality: “15°33'S, 50°0'E: Madagascar: Masoala National Park, 1000 m: hardwood rainforest with palms, pandanus, and tree moss”.

Material examined. — Illustrated voucher specimens: Stations 2339 (UF 419068, 1 adult, Figs 172-174), 2341 (UF 419069, 1 adult, Fig. 175), 2345 (UF 419070, 1 adult, Fig. 176), 2348 (UF 419071, 1 adult, Fig. 177). Other dry vouchers: Stations 2339 (UF 418598, 2 ad, 4 juv), 2341 (UF 418599, 5 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2342 (UF 418600, 1 ad), 2344 (UF 418601, 9 ad, 7 juv), 2345 (UF 418602, 1 juv), 2348 (UF 418603, 1 ad). Voucher in 90% ethanol: Station 2345 (UF 420183, 1 ad, source of tissue sample 0398).

Description of illustrated voucher from station 2339 (adult, Figs 172-174). — Shell shape depressed-helicoid. Height 13.5 mm, diameter 24.7 mm (h/d 0.55). Whorls 4.35, coiling tightness (W/lnD) 1.36. Body-whorl periphery rounded, sutures moderately impressed, whorls unshouldered. Spire low, slightly domed; apex rounded. Umbilicus 3.64 mm (0.15 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.05 whorl. Aperture ovate; aperture internal height (in apertural view, parallel to axis of rotation) 5.62 mm (0.42 shell height); aperture greatest internal width (perpendicular to same) 10.61 mm (0.43 shell diameter). Apertural basal gape 8.39 mm (1.49 apertural height). Distance between upper and lower peristome insertions 3.48 mm (0.14 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 7.84 mm (1.39 apertural internal height); peristome width (perpendicular to axis of rotation) 12.75 mm (1.20 apertural internal width). Peristome moderately thick, narrowly reflected above, moderately reflected below; in apertural view, columella narrows at insertion. First-whorl diameter 1.67 mm, first-two-whorls diameter 4.40 mm, embryonic whorl-count not evident. Embryonic sculpture unknown. Body-whorl sculpture faintly pustulose, with rare traces of minute spiral lines; pustules absent from base. Shell color yellow with slight greenish cast, with three nar-

row, reddish-brown color bands: midway between suture and periphery, just above periphery, and below periphery; umbilicus dark reddish-brown within; apertural lip white.

Variation. — A moderately variable species. Among four extreme variants (including described voucher, Figs 172-177, diameters 21.8-24.7 mm, whorls 4.05-4.35), h/d ranged 0.50-0.55, coiling tightness (W/lnD) ranged 1.30-1.36, umbilicus/shell diameter 0.14-0.16, aperture height/shell height 0.34-0.42, aperture width/shell diameter 0.43-0.45, apertural basal gape/apertural height 1.49-2.13, peristomal insertions distance/shell diameter 0.08-0.14, peristome height/apertural height 1.39-1.47, peristome width/apertural width 1.18-1.25, first-whorl diameter 1.67-1.92 mm, and first-two-whorls diameter 4.37-4.83 mm.

***Ampelita michellae* spec. nov.**

Figs 43-45

Material examined. — Holotype: UF 419073 (adult), station 2616, Madagascar, Manongarivo Reserve, slope above and near upper Manongarivo River, circa 250 m elevation, 13°59'S, 48°17'E, rainforest, granite bedrock, 19 Oct 07.

Diagnosis. — Unique for its combination of broad, flat, angulate shell; broad umbilicus; and broadly ovate aperture.

Description of holotype (adult). — Shell shape discoidal. Height 16.2 mm, diameter 39.4 mm (h/d 0.41). Whorls 4.8, coiling tightness (W/lnD) 1.31. Body-whorl periphery slightly angulate, sutures somewhat shallowly impressed, whorls unshouldered. Spire very low, domed; apex broadly rounded. Umbilicus 8.23 mm (0.21 shell diameter). Pre-apertural body-whorl deflection slightly up for about 0.10 whorl, then moderately downward for about 0.06 whorl. Aperture ovate; aperture internal height (in apertural view, parallel to axis of rotation) 9.18 mm (0.57 shell height); aperture greatest internal width (perpendicular to same) 17.73 mm (0.45 shell diameter). Apertural basal gape 12.67 mm (1.38 apertural height). Distance between upper and lower peristome insertions 1.58 mm (0.04 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 10.77 mm (1.17 apertural internal height); peristome width (perpendicular to axis of rotation) 20.58 mm (1.16 apertural internal width). Peristome thin, very slightly reflected palatally to basally, moderately reflected at columella, which gradually widens to its insertion. First-whorl diameter 1.42 mm, first-two-whorls diameter 4.40 mm, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture unknown. Shell color in life inferred to have elements of brown and purple.

Etymology. — For Michelle Kintana Emberton, daughter of the senior author.

Ampelita miovaova spec. nov.

Figs 145-158

Material examined. — Holotype: UF 419074 (adult, Figs 145-147), station 2551, Madagascar, circa 40 km W of Vohemar, Mt. Bobakora, slope, 324-410 m elevation, 13°12.8'S, 49°45.4'E, rainforest, basalt bedrock, 26 Aug 07. Illustrated paratypes: Stations 2365 (UF 419075, 1 adult, Fig. 158), 2367 (UF 419076, 1 adult, Figs 151-153), 2372 (UF 419077, 1 adult, Fig. 157), 2378 (UF 419078, 1 adult, Fig. 156), 2533 (UF 420064, 2 adults, Figs 148-150, 154), 2544 (UF 420065, 1 adult, Fig. 155). Other dry paratypes: Stations 2359 (UF 418609, 1 subad, 2 juv), 2367 (UF 418610, 1 juv), 2372 (UF 418611, 1 subad, 1 juv), 2373 (UF 418612, 2 ad), 2374 (UF 418613, 6 ad, 1 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2376 (UF 418614, 1 juv), 2379 (UF 418615, 1 ad), 2533 (UF 418616, 3 ad, 1 juv), 2534 (UF 418617, 1 ad), 2537 (UF 418618, 3 juv), 2544 (UF 418619, 1 ad, 1 juv), 2547 (UF 418620, 1 ad), 2548 (UF 418621, 1 juv), 2550 (UF 418622, 1 ad; AMS, 1 ad), 2551 (UF 418623, 1 ad; ANSP, 1 ad), 2552 (UF 418624, 1 juv; SMF, 1 subad). Paratype in 90% ethanol: Station 2367 (UF 420215, 1 adult pulled body, source of tissue sample 0442). Small specimen fixed and preserved in 98% ethanol: Station 2533 (UF 420247, 1 juv).

Note. — Initially this was judged to be two species, because of the much smaller, keeled paratype from station 2378 (Fig. 156). However, this station is at a local mountain summit, and under that presumably harsher environment, adulthood seems to have been reached at fewer whorls, giving rise to the conchological differences. This reasoning was supported by paratypes from lowland, partially cleared forest (station 2533, Figs 148-150, 154), where the same early maturity and similar conchological differences occurred. Nevertheless, full descriptions are given of both paratypical variants, in case further evidence indicates that they are separate species after all.

Diagnosis of large, rounded-periphery form (Stations 2365, 2367, 2372, 2551, Figs 145-147, 151-153, 157-158). — Differs from *A. grandidieri* Fischer-Piette, 1952 by its much smaller umbilicus, more angulate periphery, and different color and banding. Differs from *A. dingeoni* Fischer-Piette, Blanc & Salvat, 1975 by its smaller umbilicus, more acute and more elevated spire, more capacious aperture, and absence of a thick apertural callus. Differs from *A. stilpna* (Mabille, 1844) by its different embryonic sculpture lacking pustules, its different upper-body-whorl sculpture with distinct spiral lines and lacking radial wrinkles, and its different color and banding. Differs from *A. pfeifferi* Fischer-Piette, 1952 by its less compact shape, weaker sculpture, and angulate periphery, among other differences. Differs from both *A. andavakoerae* spec. nov. and *A. kirae* spec. nov. by its much narrower umbilicus, among other differences.

Diagnosis of small, keeled forms (Stations 2378, 2533, 2544, Figs 148-150, 155-156). — Differs from *A. nameroko-*

sis Fischer-Piette, 1852 by its less lenticular shape, higher spire, more deeply impressed sutures, more reflected apertural lip, and rainforest (vs. dry-deciduous-forest) habitat. Differs from *A. anjajaviensis* spec. nov. by its smaller umbilicus, twice-as-dense spiral-line body-whorl sculpture, and different color and banding. Differs from both *A. milloti* Fischer-Piette, 1952 and *A. thompsoni* spec. nov. by its much smaller umbilicus, more compact shape, tighter coiling, and different sculpture. Differs from *A. kendrae* spec. nov. by its more rounded aperture, narrower apertural lip, more sharply angulate periphery, denser and more deeply inscribed spiral-line body-whorl sculpture, and different basic color. Much more loosely coiled than *A. analamerae* Emberton, 1999, among other differences.

Description of holotype (adult, Figs 145-147). — Shell shape depressed helicoid. Height 19.2 mm, diameter 32.9 mm (h/d 0.58). Whorls 4.9, coiling tightness (W/lnD) 1.40. Body-whorl periphery slightly angulate, sutures well impressed, whorls unshouldered. Spire low domed; apex somewhat acute. Umbilicus 4.27 mm (0.13 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.10 whorl. Aperture ovate with straight upper edge; aperture internal height (in apertural view, parallel to axis of rotation) 8.23 mm (0.43 shell height); aperture greatest internal width (perpendicular to same) 15.83 mm (0.48 shell diameter). Apertural basal gape 11.40 mm (1.38 apertural height). Distance between upper and lower peristome insertions 4.43 mm (0.13 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 9.82 mm (1.19 apertural internal height); peristome width (perpendicular to axis of rotation) 18.26 mm (1.15 apertural internal width). Peristome thin, unreflected above, slightly reflected below, broadening slightly at columellar insertion. First-whorl diameter 1.67 mm, first-two-whorls diameter 4.34 mm, embryonic whorl-count seemingly 1.85. Embryonic sculpture unknown. Body-whorl sculpture uncertain, beyond irregular radial lines of growth. Shell color dark brownish purple, with one sutural, one peripheral, and one circum-umbilical white color band.

Partial description of juvenile paratype from station 2367. — Embryonic sculpture consisting of minute spiral lines that start at about 0.5 whorl, then sutural wrinkles that start at about 1.0 whorl, then minute granulation that starts at about 1.5 whorl. Body-whorl sculpture of moderately impressed, rather dense, evenly distributed, spiral lines, made slightly wavy by weak, irregular, radial growth lines; sculpture continuing undiminished onto base of shell.

Description of paratype from station 2378 (adult with slightly distorted aperture due to injury, Fig. 156). — Shell shape helicoid-keeled. Height 15.0 mm, diameter 24.3 mm (h/d 0.62). Whorls 4.45, coiling tightness (W/lnD) 1.39. Body-whorl periphery keeled; sutures moderately impressed; whorls slightly, narrowly shouldered. Spire low domed-conic;

apex rounded. Umbilicus 4.12 mm (0.17 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.03 whorl. Aperture somewhat lima-bean-shaped (upper indentation due to injury); aperture internal height (in apertural view, parallel to axis of rotation 5.70 mm (0.38 shell height); aperture greatest internal width (perpendicular to same) 11.08 mm (0.46 shell diameter). Apertural basal gape 8.87 mm (1.56 apertural height). Distance between upper and lower peristome insertions 2.38 mm (0.10 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 7.20 mm (1.26 apertural internal height); peristome width (perpendicular to axis of rotation) 12.83 mm (1.16 apertural internal width). Peristome thin, unreflected above, slightly reflected below, broadening slightly at columellar insertion. First-whorl diameter 1.73 mm, first-two-whorls diameter 4.43 mm, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture of strongly impressed, moderately dense, evenly distributed, spiral lines, made slightly wavy by weak, irregular, radial growth lines; sculpture continuing undiminished onto base of shell. Shell color very dark purple-brown, with one sutural, one peripheral, and one circum-umbilical orange-brown color band; apertural lip purple baso-palatally and at columellar insertion, light orangish elsewhere.

Description of paratype from station 2533 (fresh adult, Figs 148-150). — Shell shape very thick lenticular. Height 12.3 mm, diameter 23.4 mm (h/d 0.53). Whorls 4.25, coiling tightness (W/lnD) 1.35. Body-whorl periphery keeled, sutures moderately impressed, whorls unshouldered. Spire low domed; apex somewhat acute. Umbilicus 3.32 mm (0.14 shell diameter). Pre-apertural body-whorl deflection moderate, about 0.10 whorl. Aperture ovate-keeled; aperture internal height (in apertural view, parallel to axis of rotation 4.12 mm (0.33 shell height); aperture greatest internal width (perpendicular to same) 10.53 mm (0.45 shell diameter). Apertural basal gape 9.02 mm (2.19 apertural height). Distance between upper and lower peristome insertions 2.22 mm (0.09 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 5.70 mm (1.38 apertural internal height); peristome width (perpendicular to axis of rotation) 12.35 mm (1.17 apertural internal width). Peristome thin, very slightly reflected above, narrowly reflected below, broadening slightly at columellar insertion. First-whorl diameter 1.77 mm, first-two-whorls diameter 4.18 mm, embryonic whorl-count seemingly 2.05. Embryonic sculpture unknown. Body-whorl sculpture of strongly impressed, moderately dense, fairly evenly distributed, spiral lines, made slightly wavy by weak, irregular, radial growth lines; sculpture continuing undiminished onto base of shell. Shell color very dark purple-brown, with one narrow sutural, one narrow peripheral, and one rather broad circum-umbilical white color band; apertural lip purplish brown, lighter at baso-columella.

Variation. — An extremely variable species, primarily, it is assumed, due to maturity at different numbers of whorls and retention of juvenile peripheral sharp angulation (see Note above). Among eight extreme variants (including holotype, Figs 145-158, diameters 21.3-32.9 mm, whorls 4.15-4.9), h/d ranged 0.53-0.66, coiling tightness (W/lnD) ranged 1.30-1.45, umbilicus/shell diameter 0.12-0.17, aperture height/shell height 0.30-0.44, aperture width/shell diameter 0.45-0.48, apertural basal gape/apertural height 1.35-2.23 (!), peristomal insertions distance/shell diameter 0.06-0.20 (!), peristome height/apertural height 1.19-1.38, peristome width/apertural width 1.14-1.19, first-whorl diameter 1.61-1.83 mm, and first-two-whorls diameter 4.18-4.71 mm.

Etymology. — “Variable” (Malagasy “miovaova”), for the shell-shape variability.

Ampelita niarae spec. nov.

Figs 166-171

Material examined. — Holotype: UF 419064 (adult, Figs 166-168), station 2546, Madagascar, circa 40 km W of Voehemar, Mt. Bobankora, summit, 524 m elevation, 13°13.052'S, 49°45.529'E, rainforest, basalt bedrock, 26 Aug 07. Illustrated Paratype: Station 2546 (UF 419065, 1 adult, Figs 169-171). Other Paratypes: Stations 2547 (AMS, 1 ad), 2550 (UF 418625, 1 juv).

Diagnosis. — Unique in its combination of small size, rounded whorls, and tricolor banding. Much more tightly coiled than either *A. consanguinea*, *A. stilpna*, or *A. bathiei* Fischer-Piette, 1952. Differs from *A. raxworthyi* Emberton, 1999 by its tighter coiling, smaller umbilicus, much thinner peristomal lip, and very different color and banding.

Description of holotype from station 2546 (adult): Shell shape helicoid-conic. Height 12.7 mm, diameter 20.3 mm (h/d 0.63). Whorls 4.25, coiling tightness (W/lnD) 1.41. Body-whorl periphery angulate, sutures moderately impressed, whorls unshouldered. Spire domed conic; apex somewhat acute. Umbilicus 2.33 mm (0.11 shell diameter). Pre-apertural body-whorl deflection slightly downward, about 0.04 whorl. Aperture ovate; aperture internal height (in apertural view, parallel to axis of rotation 4.87 mm (0.35 shell height); aperture greatest internal width (perpendicular to same) 9.54 mm (0.47 shell diameter). Apertural basal gape 7.61 mm (1.56 apertural height). Distance between upper and lower peristome insertions 3.35 mm (0.16 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 6.24 mm (1.28 apertural internal height); peristome width (perpendicular to axis of rotation) 10.90 mm (1.4 apertural internal width). Peristome thin, narrowly reflected throughout. First-whorl diameter 1.65 mm, first-two-whorls diameter 4.19 mm, embryonic whorl-count seemingly 2.1. Embryonic sculpture seemingly

includes minute radial wrinkles. Body-whorl sculpture consisting of fairly strong, evenly spaced, rather dense, spiral lines, crossing irregular growth lines; sculpture continuing undiminished onto base of shell. Shell basic color light brown, with three white color bands: sutural, peripheral, and circum-umbilical, the two upper bands each bordered on each side by narrower, dark-purple-brown color bands; umbilicus dark purple-brown; apertural lip white.

Variation. — A variant paratype from station 2546 (Figs 169-171) has a conspicuously more capacious aperture and slightly weaker peripheral angulation; it also differs in its smaller first-whorl and first-two-whorls diameters (1.58 mm and 3.92 mm).

Etymology. — For Niara Haja Emberton, daughter of the senior author.

***Ampelita stilpna* (Mabille, 1884)**

Figs 124-135

Helix stilpna Mabille, 1884: 152-153. Type locality: “l’île de Madagascar”.

Material examined. — Illustrated and/or measured voucher specimens: Stations 2016 (UF 420067, 1 adult), 2024 (UF 420068, 1 adult, Fig. 130), 2030 (UF 420069, 1 adult, Fig. 133), 2036 (UF 420070, 1 adult, Fig. 134), 2069 (UF 420071, 2 adults, Figs 124-129), 2080 (UF 420072, 1 adult), 2081 (UF 420073, 1 adult, Fig. 131), 2082 (UF 420074, 1 adult, Fig. 132), 2093 (UF 420075, 1 adult, Fig. 135). Other dry vouchers: Stations 2010 (UF 418586, 2 juv), 2016 (UF 418539, 18 ad, 13 juv), 2017 (UF 418540, 2 ad), 2020 (UF 418541, 4 ad, 5 juv), 2021 (UF 418542, 4 ad), 2022 (UF 418543, 4 ad, 4 juv), 2023 (UF 418544, 2 ad, 2 juv), 2024 (UF 418545, 2 ad, 12 juv), 2025 (UF 418546, 2 ad, 2 juv), 2026 (UF 418547, 5 ad, 1 juv), 2027 (UF 418548, 1 ad), 2029 (UF 418549, 1 ad, 13 juv), 2030 (UF 418550, 3 ad), 2032 (UF 418551, 2 ad, 2 juv), 2034 (UF 418552, 1 ad), 2039 (UF 418553, 1 ad, 16 juv), 2048 (UF 418554, 1 ad), 2066 (UF 418555, 1 ad), 2069 (UF 418556, 10 ad, 4 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2070 (UF 418557, 4 ad, 5 juv), 2072 (UF 418558, 2 juv), 2074 (UF 418559, 12 ad), 2075 (UF 418560, 7 ad, 10 juv), 2076 (UF 418561, 2 ad, 1 juv), 2077 (UF 418562, 1 juv), 2078 (UF 418563, 5 ad, 20 juv), 2079 (UF 418564, 1 juv), 2080 (UF 418565, 1 ad), 2081 (UF 418566, 1 ad, 7 juv), 2082 (UF 418567, 1 ad, 2 juv), 2083 (UF 418568, 2 ad, 3 juv), 2084 (UF 418569, 1 ad), 2086 (UF 418570, 1 ad), 2088 (UF 418571, 4 juv), 2089 (UF 418572, 1 ad, 1 juv), 2093 (UF 418573, 3 ad), 2094 (UF 418574, 4 ad, 1 juv), 2095 (UF 418575, 1 ad), 2099 (UF 418576, 1 ad), 2129 (UF 418577, 5 ad, 14 juv). Vouchers in 90% ethanol: Stations 2016 (UF 420193, 1 ad, source of tissue sample 0023), 2022 (UF 420194, 1 juv, source of tissue sample 0032), 2029 (UF 420195, 1 ad, 1 juv, sources of tissue samples 0035-36), 2039 (UF 420196, 2 ad, 1 juv, sources of tissue samples 0058-60).

Small specimens fixed and preserved in 98% ethanol: Stations 2029 (UF 420248, 8 juv), 2039 (UF 420249, 2 juv), 2124 (UF 420250, 2 juv), 2125 (UF 420251, 8 juv), 2126 (UF 420252, 6 juv), 2127 (UF 420253, 39 juv), 2129 (UF 420254, 4 juv).

Description of illustrated voucher from station 2069 (adult, Figs 124-126). — Shell shape depressed helicoid. Height 17.8 mm, diameter 31.5 mm (h/d 0.56). Whorls 4.65, coiling tightness (W/lnD) 1.34. Body-whorl periphery rounded, with very faint angulation; sutures moderately impressed; whorls rounded, unshouldered. Spire low domed-conic; apex slightly rounded. Umbilicus 4.27 mm (0.13 shell diameter). Pre-apertural body-whorl deflection greatly downward, about 0.04 whorl. Aperture depressed-ovate, compressed and slightly concave above; aperture internal height (in apertural view, parallel to axis of rotation 4.43 mm (0.25 shell height); aperture greatest internal width (perpendicular to same) 14.25 mm (0.45 shell diameter). Apertural basal gape 11.24 mm (2.54 apertural height). Distance between upper and lower peristome insertions 2.69 mm (0.09 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 6.97 mm (1.57 apertural internal height); peristome width (perpendicular to axis of rotation) 16.31 mm (1.14 apertural internal width). Peristome moderately thick, slightly reflected palatally, rather narrowly reflected baso-palatally, basally, and at columella, which narrows slightly at columellar insertion. First-whorl diameter 1.92 mm, first-two-whorls diameter 5.08 mm, embryonic whorl-count unknown. Embryonic sculpture (somewhat eroded) consisting of strong, pustulose, radial striae. Body-whorl sculpture with extremely minute and dense, radial wrinkles between irregular growth lines; wrinkles nearly absent on shell base, where traces of minute, dense, spiral lines appear. Shell color very dark purple-brown (almost black), grading to white on apex; with sub-peripheral, moderately broad, very light yellow-brown color band; apertural lip darkish purple-brown.

Partial description of illustrated voucher from station 2036 (adult with uneroded apex, Fig. 134). — Embryonic sculpture consisting of pustulose radial striae crossed by minute, unevenly spaced, spiral lines.

Variation. — Polymorphic in color and banding: a voucher from the same station as the described specimen, for example, has additional subsutural and circum-umbilical white color bands, and the sub-peripheral color band is whiter and much broader (Figs 127-129 vs. Figs 124-126). Also extremely variable in shell shape. Among ten extreme variants (including described voucher, Figs 124-135, diameters 29.9-34.9 mm, whorls 4.6-5.3), h/d ranged 0.46-0.66, coiling tightness (W/lnD) ranged 1.30-1.49, umbilicus/shell diameter 0.13-0.17, aperture height/shell height 0.19-0.34, aperture width/shell diameter 0.44-0.47, apertural basal gape/apertural height 1.97-3.70 (!), peristomal insertions distance/shell diameter 0.01-0.09, peristome height/aper-

tural height 1.19–1.80 (!), peristome width/apertural width 1.14–1.25, first-whorl diameter 1.52–1.92 (!) mm, and first-two-whorls diameter 4.31–5.27 mm (!).

***Ampelita thompsoni* spec. nov.**

Figs 178–186

Material examined. — Holotype: UF 420076 (adult, Figs 178–180), station 2567, Madagascar, southern Namoroka Reserve, valley on NE of isolated karst hill, 143 m elevation, 16°28.138'S, 45°21.881'E, dry-deciduous forest, limestone bedrock, 25 Sep 07. Illustrated and/or measured paratypes: Stations 2565 (UF 420077, 1 adult, Fig. 186), 2567 (UF 420078, 1 adult, Fig. 184; 1 juvenile), 2574 (UF 420079, 1 adult, Figs 181–183), 2579 (UF 420080, 1 adult, Fig. 185). Other dry paratypes: Stations 2561 (UF 418630, 12 ad, 4 juv, 1 dried juv in alcohol), 2562 (UF 418631, 2 ad, 1 juv), 2563 (UF 418632, 10 ad), 2564 (UF 418633, 1 ad, 5 juv), 2565 (UF 418634, 21 ad, 23 juv), 2566 (UF 418635, 1 ad, 1 juv), 2567 (UF 418636, 16 ad, 19 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2568 (UF 418637, 1 ad), 2569 (UF 418638, 3 ad, 4 juv), 2570 (UF 418639, 1 ad, 1 juv), 2571 (UF 418640, 3 ad, 9 juv), 2572 (UF 418641, 5 ad, 2 juv), 2574 (UF 418642, 4 ad, 7 juv), 2579 (UF 418643, 2 juv), 2580 (UF 418644, 2 juv). Small specimen fixed and preserved in 98% ethanol: Station 2561 (UF 420255, 1 juv).

Diagnosis. — Most similar to *A. milloti* Fischer-Piette, 1952, from which it differs by its tighter coiling ($W/lnD = 1.44$ vs. 1.23), pustulose radial riblets embryonic sculpture, much weaker granular body-whorl sculpture, and different coloration and banding. Differs from *A. namerokoensis* Fischer-Piette, 1952 by its looser coiling, much broader umbilicus, stronger keel, and different coloration. Differs from both *A. xystrera* (L. Pfeiffer, 1841) and *A. lancula* (A. Férussac, 1832) by its relatively much smaller aperture, broader umbilicus, and tighter coiling. Differs from *A. stumpfi* (Kobelt, 1880) by its much broader umbilicus, more compact aperture, more depressed spire, weaker sculpture, and different coloration and banding. Differs from *A. ambanianae* Emberton, 1999 by its absence of a spiral gutter above and below the keel, sharper keel, absence of oblique marks in sculpture, and very different coloration.

Description of holotype (adult, Figs 178–180). — Shell shape conic-lenticular. Height 14.4 mm, diameter 30.4 mm (h/d 0.47). Whorls 5.1, coiling tightness (W/lnD) 1.49. Body-whorl periphery keeled; sutures shallowly impressed, hidden by overlapping keel of previous whorl; whorls unshouldered, slightly convex below suture, then slightly concave above keel. Spire domed-conic; apex somewhat acutely rounded. Umbilicus 6.81 mm (0.22 shell diameter). Pre-apertural body-whorl deflection slightly downward, about 0.03 whorl. Aperture somewhat semicircular, flat above, rounded below; aperture internal height (in apertural view, parallel to axis of rotation) 4.27 mm (0.30 shell

height); aperture greatest internal width (perpendicular to same) 12.03 mm (0.40 shell diameter). Apertural basal gape 9.18 mm (2.15 apertural height). Distance between upper and lower peristome insertions 0.63 mm (0.02 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 6.49 mm (1.52 apertural internal height); peristome width (perpendicular to axis of rotation) 14.65 mm (1.22 apertural internal width). Peristome somewhat thin, roundly (curving backward) and narrowly reflected throughout, but wider at base and columella, which widens slightly at its insertion. First-whorl diameter 1.52 mm, first-two-whorls diameter 4.03 mm, embryonic whorl-count seemingly 2.1. Embryonic sculpture consisting of strong, pustulose, radial riblets. Body-whorl sculpture complex, consisting, above the keel, of small, thin radial riblets and radially arrayed rows of irregularly spaced pustules, between which appears a very faint, oblique, cross-hatch pattern; on shell base, radial elements are greatly reduced, and cross-hatch pattern dominates, consisting of minute, crossing, oblique wrinkles. Shell basic color dark purple-brown, grading lighter above, rapidly grading half-way on base to yellowish white, which continues into the umbilicus; with very narrow sutural and peripheral (on keel only) white color bands; apertural lip white.

Variation. — The sutural white color band varies in width, as does the yellowish-white basal zone (compare Figs 181–183 to Figs 178–180). Variable in shell shape: among five adult extreme variants (including holotype, Figs 178–186, diameters 26.6–32.4 mm, whorls 4.8–5.3), h/d ranged 0.39–0.51, coiling tightness (W/lnD) ranged 1.39–1.54, umbilicus/shell diameter 0.22–0.26, aperture height/shell height 0.30–0.49, aperture width/shell diameter 0.37–0.40, apertural basal gape/apertural height 1.37–2.15, peristomal insertions distance/shell diameter 0.02–0.10, peristome height/apertural height 1.16–1.52 (!), peristome width/apertural width 1.16–1.31, first-whorl diameter 1.52–1.82 mm (!), and first-two-whorls diameter 4.00–4.89 mm.

Etymology. — Named after the late Dr. Fred G. Thompson, formerly Curator of Malacology, Florida Museum of Natural History, colleague, friend, and esteemed mentor to the senior author.

Genus *Eurystyla* Ancey, 1887

Eurystyla Ancey, 1887: 39. Type species (designated by Pilsbry, 1890: 56): *Helix cerina* Morelet, 1877.

***Eurystyla ambatoensis* (Emberton & Griffiths, 2009)**

Figs 103–106

Ampelita (*Eurystyla*) *ambatoensis* Emberton & Griffiths,

2009: 151-152, pl. 1 figs 13-16. Type locality: “station 2276, Madagascar, NE Masoala National Park (S of Antalaha, W and S of Ambohitralanana), mountain just E of Ambato, 100 m, 15°17.3'S 50°20.57'E, rainforest, lava bedrock”.

Material examined. — Illustrated shells: Stations 2276 (UF 417591, holotype, Figs 103-105 [from Emberton & Griffiths 2009]), 2256 (UF 420216, juvenile voucher, Fig. 106).

Partial description of illustrated voucher specimen (juvenile, missing apex and part of body whorl, Fig. 106). — Height estimated at 9.4 mm, diameter 11.1 mm (h/d approximately 0.85). Post-embryonic sculpture of thin, rather dense, wavy, branching, sometimes interrupted, radial striae, inscribed by, and sometimes broken into pustules by, spiral lines that are moderately widely and unevenly spaced, and that are variable in strength. Shell basic color tannish-yellow, grading darker onto base, with four dark-purple-brown spiral color bands: one narrow sutural, one moderately broad midway between suture and periphery, one moderately broad below the periphery, and one moderately broad on the base midway between periphery and umbilicus.

Variation. — The juvenile voucher (Fig. 106) reveals that this species is polymorphic for banding. The holotype and paratypes have only one, sutural band (Emberton & Griffiths 2009).

Eurystyla julii julii (Fischer-Piette & Garreau, 1965)

Figs 88-92

Ampelita (*Poecilostylus*) *julii* Fischer-Piette & Garreau, 1965: 158-159, pl. 9 figs 31-33. Type locality: “Madagascar”.

Material examined. — Illustrated voucher specimens: Station 2300 (UF 420081, 1 adult, Fig. 92) 2331 (UF 420082, 2 adults, Figs 88-90, 91). Other dry vouchers: Stations 2306 (UF 418689, 1 ad), 2310 (UF 418690, 4 ad), 2311 (UF 418691, 2 juv), 2314 (UF 418692, 4 eggs), 2330 (UF 418693, 2 ad), 2331 (UF 418694, 2 ad, 4 juv), 2332 (UF 418695, 1 ad), 2333 (UF 418696, 6 juv), 2335 (UF 418697, 1 egg), 2336 (UF 418698, 1 ad, 1 juv). Vouchers in 90% ethanol: Stations 2293 (UF 420147, 1 ad, source of tissue sample 0333), 2297 (UF 420148, 1 juv, source of tissue sample 0334), 2299 (UF 420149, 3 ad, sources of tissue samples 0335-7), 2301 (UF 420150, 3 ad, sources of tissue samples 0338-40), 2303 (UF 420151, 1 ad, 1 juv, sources of tissue samples 0341-42), 2305 (UF 420152, 1 ad, source of tissue sample 0343), 2306 (UF 420153, 2 ad, sources of tissue samples 0344-45), 2309 (UF 420154, 1 ad, 1 juv), 2311 (UF 420155, 4 ad, 4 juv), 2312 (UF 420156, 2 ad, 1 juv), 2313 (UF 420157, 1 ad, 2 juv), 2314 (UF 420158, 4 ad, 2 juv), 2329 (UF 420159, 1 ad, 1 juv), 2330 (UF 420160, 1 ad), 2331 (UF 420161, 2 ad), 2333 (UF 420162, 3 ad, 4 juv, 1 egg), 2333 (UF 420163, 10 ad, sources of tissue samples 0361-70), 2335 (UF 420164, 1 ad, 4 eggs). Small specimens fixed

and preserved in 98% ethanol: Stations 2296 (UF 420228, 1 juv), 2299 (UF 420229, 6 eggs), 2305 (UF 420230, 1 juv).

Description of illustrated voucher from station 2331 (large adult, Figs 88-90). — Shell shape high-domed-helicoid. Height 27.8 mm, diameter 32.5 mm (h/d 0.86). Whorls 4.7, coiling tightness (W/lnD) 1.35. Body-whorl periphery rounded with trace sub-peripheral angulation, sutures deeply impressed, whorls rounded and unshouldered. Spire high domed; apex rounded. Umbilicus 1.11 mm (0.03 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.10 whorl. Aperture broad-ovate; aperture internal height (in apertural view, parallel to axis of rotation 8.42 mm (0.30 shell height); aperture greatest internal width (perpendicular to same) 15.13 mm (0.47 shell diameter). Apertural basal gape 13.88 mm (1.65 apertural height). Distance between upper and lower peristome insertions 4.06 mm (0.12 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 11.47 mm (1.36 apertural internal height); peristome width (perpendicular to axis of rotation) 19.19 mm (1.27 apertural internal width). Peristome rather thick, roundly reflected (curving backward), narrow palatally, moderately wide baso-palatally, basally, and at columella, which broadens at its insertion. First-whorl diameter 2.02 mm, first-two-whorls diameter 6.17 mm, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture of low, dense, fairly evenly spaced, spiral ridges, made slightly wavy and sometimes interrupted by low, irregular, axial lines of growth; sculpture continuing onto base of shell, but fading toward umbilicus. Shell color very light greenish-yellow-brown, grading to white on the apex.

Variation. — A voucher from station 2300 (Fig. 92) has much less rounded whorls, much shallower sutures, and much stronger peripheral angulation. Other shell variation among three adult extreme variants (including described voucher, Figs 88-92, diameters 28.6-32.5 mm, whorls 4.7-4.75), h/d ranged 0.83-0.86, coiling tightness (W/lnD) ranged 1.35-1.42, umbilicus/shell diameter 0.02-0.05, aperture height/shell height 0.26-0.33, aperture width/shell diameter 0.44-0.49, apertural basal gape/apertural height 1.55-2.00, peristomal insertions distance/shell diameter 0.02-0.12, peristome height/apertural height 1.27-1.51, peristome width/apertural width 1.26-1.28, first-whorl diameter 2.02 mm (invariant), and first-two-whorls diameter 5.73-6.17 mm.

Eurystyla julii kely subsp. nov.

Figs 96-102

Material examined. — Holotype: UF 420083 (adult), station 2528, Madagascar, NW of Antalaha, Antsahanoro, sacred forest across river from village, 80-130 m elevation, 14°50.6'S, 50°08.2'E, rainforest, quartzite bedrock, 15 Aug 07,

purchased from villager of Antsahanoro. Illustrated paratypes: Stations 2524 (UF 420084, 1 adult, Fig. 102), 2531 (UF 420085, 1 adult, Figs 99-101). Other dry paratypes: Stations 2524 (UF 418706, 1 ad), 2528 (UF 418707, 1 ad).

Diagnosis. — Differs from the parent species by its smaller first-whorl diameter (1.83-1.89 mm vs. 2.02), smaller first-two-whorls diameter (5.25-5.48 mm vs. 5.73-6.17 mm), and consistent early maturation (whorls 4.3-4.4 vs. 4.7-4.75). No intergrades or sympatry detected.

Description of holotype from station 2528 (adult). — Shell shape depressed helicoid. Height 18.3 mm, diameter 27.0 mm (h/d 0.68). Whorls 4.3, coiling tightness (W/lnD) 1.30. Body-whorl periphery angulate, sutures moderately impressed, whorls rounded and unshouldered. Spire low domed-conic; apex broadly rounded. Umbilicus 1.58 mm (0.06 shell diameter). Pre-apertural body-whorl deflection slightly downward, about 0.03 whorl. Aperture oblique-ovate, intruded by a columellar bulge; aperture internal height (in apertural view, parallel to axis of rotation 7.02 mm (0.38 shell height); aperture greatest internal width (perpendicular to same) 11.70 mm (0.43 shell diameter). Apertural basal gape 11.54 mm (1.64 apertural height). Distance between upper and lower peristome insertions 1.27 mm (0.06 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 9.36 mm (1.33 apertural internal height); peristome width (perpendicular to axis of rotation) 16.07 mm (1.37 apertural internal width). Peristome moderately thick, roundly reflected (curving backward), narrow upper-palatally, moderately wide baso-palatally, basally, and at columella, which is concave on its outer (umbilical) surface, and which bears a large, thick, elongate bulge (or denticle) on its apertural surface, and which broadens at its insertion. First-whorl diameter 1.85 mm, first-two-whorls diameter 5.25 mm, embryonic whorl-count seemingly 2.1. Embryonic sculpture unknown. Body-whorl sculpture of moderately and somewhat unevenly spaced, moderately impressed, spiral lines, made slightly wavy by irregular, axial lines of growth; sculpture continuing onto base of shell. Shell color seemingly originally very light greenish-yellow, with sutural and sub-peripheral, narrow, purple color bands; apertural lip and pre-apertural and umbilical regions purple.

Variation. — Polymorphic for color banding, which is lacking in some paratypes (Figs 99-102). Other shell variation among three adult extreme variants (including holotype, Figs 96-102, diameters 24.2-27.0 mm, whorls 4.3-4.4), h/d ranged 0.68-0.76, coiling tightness (W/lnD) ranged 1.30-1.35, umbilicus/shell diameter 0.00-0.06, aperture height/shell height 0.30-0.38, aperture width/shell diameter 0.43-0.47, apertural basal gape/apertural height 1.64-1.95, peristomal insertions distance/shell diameter 0.06-0.09, peristome height/apertural height 1.26-1.36, peristome width/apertural width 1.25-1.37, first-whorl diameter 1.83-1.89 mm, and first-two-whorls diameter 5.25-5.48 mm.

Etymology. — “Small” (Malagasy “kely”), for the shell size, relative to the parent species.

Eurystyla julii soa (Emberton & Griffiths, 2009)

Figs 93-95

Ampelita (*Eurystyla*) *julii soa* Emberton & Griffiths, 2009: 152-153, pl. 1 figs 9-12. Type locality: “station 2269, Madagascar, NE Masoala National Park (S of Antalaha, W and S of Ambohitralanana), mountain just E of Mt. Ambato, 200 m, 15°17.12'S 50°20.62'E, rainforest, lava bedrock”.

Material examined. — Illustrated voucher specimen: Stations 2288 (UF 420086, 1 adult). Other dry vouchers: Stations 2271 (UF 418699, 1 ad), 2285 (UF 418700, 3 ad), 2286 (UF 418701, 3 ad, 1 juv), 2288 (UF 418702, 1 ad), 2289 (UF 418703, 1 ad), 2290 (UF 418704, 1 ad), 2305 (UF 418705, 1 juv). Vouchers in 90% ethanol: Stations 2240 (UF 420165, 1 ad, source of tissue sample 0302), 2292 (UF 420166, 1 ad, source of tissue sample 0332), 2246 (UF 420167, 1 ad, source of tissue sample 0303).

Description of illustrated voucher from station 2288 (adult). — Shell shape high-domed-helicoid. Height 24.8 mm, diameter 30.0 mm (h/d 0.83). Whorls 4.55, coiling tightness (W/lnD) 1.34. Body-whorl periphery slightly angulate, sutures well impressed, whorls unshouldered. Spire high domed; apex protruding slightly. Umbilicus 0.47 mm (0.02 shell diameter). Pre-apertural body-whorl deflection slightly downward, about 0.04 whorl. Aperture ovate, flattened above; aperture internal height (in apertural view, parallel to axis of rotation 8.11 mm (0.33 shell height); aperture greatest internal width (perpendicular to same) 14.66 mm (0.49 shell diameter). Apertural basal gape 14.82 mm (1.83 apertural height). Distance between upper and lower peristome insertions 2.65 mm (0.09 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 10.92 mm (1.35 apertural internal height); peristome width (perpendicular to axis of rotation) 18.25 mm (1.24 apertural internal width). Peristome rather thick, roundly reflected (curving backward), narrow palatally, moderately wide baso-palatally, basally, and at columella, which broadens toward and at its insertion. First-whorl diameter 1.76 mm, first-two-whorls diameter 5.54 mm, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture of moderately dense, fairly evenly spaced, spiral lines, made slightly wavy by low, irregular, axial lines of growth; sculpture continuing onto base of shell, but fading toward umbilicus. Shell color very light greenish-yellow-brown, grading to white on the apex; outer apertural lip, edge of apertural lip, and shell immediately surrounding peristome and callus dark reddish purple.

Genus *Embertoniphanta* Groh & Poppe, 2002

Embertoniphanta Groh & Poppe, 2002: 13, 42 Type species (by original designation): *Helix amphibulima* L. Pfeiffer, 1847.

***Embertoniphanta amphibulima* (L. Pfeiffer, 1847)**

Figs 1-7

Helix amphibulima L. Pfeiffer, 1847: 18. Nomen nudum (name in synonymy), but name made available (with Pfeiffer as its author) by means of ICZN Article 11.6.1 as it has been used as an available name before 1961. Note (1): a lectotype has been selected by Groh & Poppe (2002: 42, fig. 15) from the Férussac collection (MNHN, Paris). Note (2): figured by Deshayes (1839c: pl. 10A figs 4-5), but without a name on the plate or the wrappers.

Material examined. — Illustrated voucher specimens: Station 2236 (UF 420087, 1 adult, Figs 1-3), 2238 (UF 420088, 1 adult, Fig. 4), 2526 (UF 420089, 1 adult, Fig. 5), 2532 (UF 420090, 1 adult, Fig. 6), 2601 (UF 420091, 1 adult, Fig. 7). Other vouchers: Stations 2236 (UF 418980, 1 ad, 1 juv), 2245 (UF 418981, 1 ad), 2286 (UF 418982, 7 ad), 2338 (UF 418983, 4 ad, 2 juv; SMF, 1 ad), 2339 (UF 418984, 1 ad; AMS, 1 ad), 2340 (UF 418985, 1 ad), 2341 (UF 418986, 1 ad, 1 juv), 2342 (UF 418987, 1 ad), 2344 (UF 418988, 1 ad), 2352 (UF 418989, 1 ad), 2354 (UF 418990, 1 juv), 2355 (UF 418991, 1 ad, 1 juv; ANSP, 1 ad), 2357 (UF 418992, 1 ad, 2 juv), 2419 (UF 418993, 1 ad), 2449 (UF 418994, 1 ad), 2528 (UF 418995, 1 ad, 2 juv), 2532 (UF 418995, 2 ad, 1 juv).

Description of illustrated voucher from station 2236 (adult with some apical breakage that was repaired in life, Figs 1-3). — Shell shape bulimiform. Height 60.4 mm, diameter 42 mm (h/d 1.44). Whorls 4.75, coiling tightness (W/lnH) 1.16. Body-whorl periphery broadly and smoothly curved, sutures well impressed, whorls very narrowly shouldered. Spire ovate; apex flat. Umbilicus imperforate. Pre-apertural body-whorl deflection very slightly downward, then even more slightly upward, total about 0.1 whorl. Aperture roughly tear-drop in shape; aperture internal height (in apertural view, parallel to axis of rotation 37 mm (0.61 shell height); aperture greatest internal width (perpendicular to same) 22.5 mm (0.54 shell diameter). Apertural basal gape 11 mm (0.30 apertural height). Distance between upper and lower peristome insertions 17 mm (0.40 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 42 mm (1.14 apertural internal height); peristome width (perpendicular to axis of rotation) 30.7 mm (1.36 apertural internal width). Peristome rather thin, slightly reflected palatally, moderately reflected baso-palatally, basally, and at columella, which inserts very

low. First-whorl diameter 1.76 mm, first-two-whorls diameter 4.79 mm, embryonic whorl-count unknown. Embryonic sculpture consisting of strong ribs, occasionally branched, inscribed by moderately dense spiral lines. Body-whorl sculpture of very dense, spiral rows of pustules, somewhat uneven in width, continuing onto base of shell. Shell color brown, darker toward and on apex, lighter and somewhat yellowish below, with two peripheral, dark reddish brown, spiral color bands, the upper about four times as wide as the narrow lower; apertural lip purple-brown, except for white columella.

Variation. — Quite variable. Variation among five extreme variants (including described voucher, Figs 1-7, heights 52.4-60.4 mm, whorls 4.4-4.75), h/d ranged 1.26-1.44, coiling tightness (W/lnH) ranged 1.11-1.19, aperture height/shell height 0.56-0.65, aperture width/shell diameter 0.48-0.54, apertural basal gape/apertural height 0.19-0.39, peristomal insertions distance/shell diameter 0.29-0.40, peristome height/apertural height 1.07-1.18, peristome width/apertural width 1.18-1.44, first-whorl diameter 1.76-1.92 mm, and first-two-whorls diameter 4.79-5.92 mm (!).

***Embertoniphanta echinophora* (Deshayes, 1850)**

Figs 77-79

Helix echinophora Deshayes, 1850b: 287-288. Type locality: "Madagascar". Note (1): refers to plate 10A figs 7-9 (published in 1839c), but there was no explanation on the plate or on the wrappers. Note (2): name attributed to Férussac by Deshayes, but it was the latter who validly introduced the name *echinophora*. Note (3): a lectotype has been selected by Groh & Poppe (2002: 43, fig. 16) from the Férussac collection (MNHN, Paris).

Material examined. — Illustrated voucher specimen: Stations 2550 (UF 420095, 1 adult). Other vouchers: Stations 2358 (UF 418967, 5 ad, 1 juv), 2365 (UF 418968, 4 ad), 2368 (UF 418969, 1 ad), 2373 (UF 418970, 2 ad), 2374 (UF 418971, 5 ad, 1 juv), 2375 (UF 418972, 1 juv), 2546 (UF 418973, 1 ad; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2547 (UF 418974, 2 ad, 2 juv), 2548 (UF 418975, 9 ad, 1 juv), 2549 (UF 418976, 1 ad, 1 juv), 2550 (UF 418977, 2 ad), 2551 (UF 418978, 4 ad), 2552 (UF 418979, 1 ad, 1 juv). Small specimen fixed and preserved in 98% ethanol: Station 2365 (UF 420258, 1 juv).

Description of illustrated voucher from station 2550 (adult). — Shell shape roughly ovate. Height 36.2 mm, diameter 34.6 mm (h/d 1.05). Whorls 5.05, coiling tightness (W/lnH) 1.41. Body-whorl periphery rounded, sutures well impressed, whorls narrowly shouldered. Spire subconic, undomed; apex acute. Umbilicus 1.8 mm (0.05 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.13 whorl. Aperture roughly ovate; aper-

ture internal height (in apertural view, parallel to axis of rotation 22 mm (0.61 shell height); aperture greatest internal width (perpendicular to same) 16.3 mm (0.47 shell diameter). Apertural basal gape 9.5 mm (0.43 apertural height). Distance between upper and lower peristome insertions 17.5 mm (0.51 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 24.6 mm (1.12 apertural internal height); peristome width (perpendicular to axis of rotation) 24 mm (1.47 apertural internal width). Peristome rather thick, narrowly but gradually increasingly reflected from the upper-palatal insertion to the baso-columella; columella very wide, dished, further expanding slightly at its insertion. First-whorl diameter 1.51 mm, first-two-whorls diameter 3.97 mm, embryonic whorl-count seemingly 2.8. Embryonic sculpture consisting of very strong radial ribs, unbranched, non-pustulose, not inscribed. Body-whorl sculpture of densely and evenly distributed, upright, acutely triangular, periostacal hairs, continuing onto base of shell; between which are extremely minute, spiral wrinkles. Shell basic color yellow-brown, much darker and more reddish-brown toward base, with three dark-reddish-brown color bands: a very broad sutural, just below this a moderately wide supra-peripheral, and a moderately wide sub-peripheral; apertural lip dark purple-brown, except for interior of lower columella (including denticle), which is white.

Variation. — No notable variation.

***Embertoniphanta josephinae* spec. nov.**

Figs 74-76

Material examined. — Holotype: UF 420094 (adult), station 2078, Madagascar, NE Analamerana Reserve (E of Irodo), W bank of upper Antafiamantsina River, circa 150 m elevation, circa 12°43.2'S, circa 49°34.6'E, dry-deciduous forest, limestone bedrock, 24 Apr 07. Paratypes: Stations 2078 (UF 418966, 1 ad, 3 juv).

Diagnosis. — Most similar to *E. echinophora* (Deshayes, 1850), from which it differs by its tighter coiling (W/lnH 2.5 vs. 1.8), smaller first-whorl and first-two-whorls diameters (1.28 and 3.43 mm vs. 1.51 and 3.97 mm), less acute apex, more compact shape, presence of weak columellar denticle, presence of minute radial-wrinkle sculpture, dry-deciduous-forest (vs. rainforest) habitat, thicker-edged and more dished columella, generally more open umbilicus, and generally more indented outer edge of lower columella.

Description of holotype (adult). — Shell shape roughly ovate. Height 32.9 mm, diameter 32.9 mm (h/d 1.00). Whorls 5.05, coiling tightness (W/lnH) 1.45. Body-whorl periphery rounded, sutures well impressed, whorls strongly but narrowly shouldered. Spire domed, stepped; apex rather acute. Umbilicus 2.5 mm (0.08 shell diameter). Pre-apertural body-whorl deflection moderately downward, about 0.13

whorl. Aperture roughly ovate, slightly intruded by small columellar denticle; aperture internal height (in apertural view, parallel to axis of rotation) 18 mm (0.55 shell height); aperture greatest internal width (perpendicular to same) 15 mm (0.46 shell diameter). Apertural basal gape 8.7 mm (0.48 apertural height). Distance between upper and lower peristome insertions 8 mm (0.24 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 21 mm (1.17 apertural internal height); peristome width (perpendicular to axis of rotation) 20.5 mm (1.37 apertural internal width). Peristome rather thick, narrowly but gradually increasingly reflected from the upper-palatal insertion to the baso-columella; columella wide, dished, bearing a small denticle, expanding greatly to its insertion. First-whorl diameter 1.28 mm, first-two-whorls diameter 3.43 mm, embryonic whorl-count seemingly 2.65. Embryonic sculpture consisting of very strong radial ribs, unbranched, non-pustulose, not inscribed. Body-whorl sculpture of densely and evenly distributed, upright, acutely triangular, periostacal hairs, continuing onto base of shell. Shell basic color light yellow-brown, with four dark-reddish-brown color bands: a broad sutural, a narrow supra-peripheral, a narrow sub-peripheral, and a broad mid-basal; apertural lip purple-brown, except for interior of lower columella (including denticle), which is white.

Variation. — The one other adult is virtually identical, but with weaker columellar denticle.

Etymology. — For Josephine Djaohasara Emberton, who co-discovered this species with the senior author.

***Embertoniphanta oviformis* (Grateloup, 1840)**

Figs 8-21

Helix oviformis Grateloup, 1840: 161. Type locality: “Madagascar”. Note (1): a more detailed description is given by Grateloup (1841: 396, pl. 2 fig. 2). Note (2): Note (1): a lectotype has been selected by Groh & Poppe (2002: 45, fig. 18/1) from the MNHN collection (Paris).

Helix goudotiana L. Pfeiffer, 1845: 155. Type locality: “Madagascar”. Note (1): name attributed to Férussac. In fact, Pfeiffer based his description on material present in the Férussac collection. Note (2): the species was illustrated by Deshayes (1839c: pl. 10A fig. 6; 1840c: pl. 10B figs 1-2), but there was no explanation on the plates or on the wrappers (i.e. no name was mentioned). Note (3): a lectotype has been selected by Groh & Poppe (2002: 45, fig. 18/2) from the Férussac collection (MNHN, Paris).

Material examined. — Illustrated and/or measured voucher specimens: Stations 2002 (UF 420106, 1 juvenile), 2003 (UF 420105, 1 adult, Fig. 11), 2049 (UF 420096, 1 adult, Fig. 12), 2074 (UF 420092, 1 adult, Fig. 14; UF 420093, 1 adult), 2129

(UF 420097, 2 adults, Figs 13, 15), 2365 (UF 420098, 1 adult, Fig. 16), 2550 (UF 420099, 1 adult, Fig. 17), 2558 (UF 420100, 1 adult, Fig. 18), 2559 (UF 420101, 1 juvenile), 2565 (UF 420102, 2 adults, Figs 19–20), 2582 (UF 420103, 1 adult, Fig. 21), 2620 (UF 420104, 1 adult, Figs 8–10). Other dry vouchers: Stations 2002 (UF 418851, 4 juv), 2004 (UF 418852, 1 juv), 2005 (UF 418853, 1 juv), 2010 (UF 418854, 5 ad, 1 juv), 2012 (UF 418855, 1 ad), 2013 (UF 418856, 4 ad), 2014 (UF 418857, 1 ad, 1 juv), 2015 (UF 418858, 1 ad), 2016 (UF 418859, 8 ad, 11 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2017 (UF 418860, 2 juv), 2019 (UF 418861, 2 juv), 2020 (UF 418862, 1 ad, 1 juv), 2021 (UF 418863, 9 ad, 2 juv), 2022 (UF 418864, 3 ad, 6 juv), 2023 (UF 418865, 4 ad), 2024 (UF 418866, 2 ad, 2 juv), 2025 (UF 418867, 1 ad), 2026 (UF 418868, 3 ad, 2 juv), 2029 (UF 418869, 6 ad, 1 juv), 2030 (UF 418870, 2 ad, 1 juv), 2032 (UF 418871, 1 ad), 2033 (UF 418872, 1 ad), 2034 (UF 418873, 1 ad), 2039 (UF 418874, 1 juv), 2041 (UF 418875, 1 ad, 1 juv), 2042 (UF 418876, 2 ad, 1 juv), 2043 (UF 418877, 2 ad), 2045 (UF 418878, 1 ad), 2046 (UF 418879, 2 ad), 2047 (UF 4188780, 1 ad), 2048 (UF 418881, 1 ad, 1 juv), 2049 (UF 418882, 2 juv), 2050 (UF 418883, 1 ad), 2051 (UF 418884, 1 ad), 2052 (UF 418885, 1 ad), 2053 (UF 418886, 1 ad, 1 juv), 2054 (UF 418887, 2 ad), 2055 (UF 418888, 1 ad), 2057 (UF 418889, 2 ad, 1 juv), 2058 (UF 418890, 1 ad), 2059 (UF 418891, 1 ad), 2060 (UF 418892, 2 ad), 2063 (UF 418893, 2 juv), 2064 (UF 418894, 2 ad, 1 juv), 2065 (UF 418895, 2 ad), 2066 (UF 418896, 1 juv), 2069 (UF 418941, 4 ad, 5 juv), 2070 (UF 418942, 3 ad, 10 juv), 2072 (UF 418943, 1 ad), 2073 (UF 418944, 1 ad, 1 juv), 2074 (UF 418945, 11 ad, 3 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2075 (UF 418946, 5 ad, 6 juv), 2076 (UF 418947, 2 ad, 1 juv), 2077 (UF 418948, 2 juv), 2078 (UF 418949, 1 ad, 1 juv), 2079 (UF 418950, 1 juv), 2080 (UF 418951, 2 ad), 2081 (UF 418952, 5 ad, 2 juv), 2082 (UF 418953, 5 ad, 1 juv), 2083 (UF 418954, 4 ad), 2084 (UF 418955, 2 ad, 2 juv), 2086 (UF 418956, 2 ad, 2 juv), 2087 (UF 418957, 1 ad), 2089 (UF 418958, 1 ad), 2091 (UF 418959, 2 ad, 3 juv), 2092 (UF 418960, 1 ad, 2 juv), 2093 (UF 418961, 2 ad), 2094 (UF 418962, 2 ad, 1 juv), 2095 (UF 418963, 5 ad, 2 juv), 2096 (UF 418964, 1 juv), 2099 (UF 418965, 2 ad, 2 juv), 2147 (UF 418897, 1 juv), 2358 (UF 418898, 3 ad), 2359 (UF 418899, 4 ad, 2 juv), 2365 (UF 418900, 4 ad, 1 juv), 2370 (UF 418901, 1 ad), 2371 (UF 418902, 1 ad), 2372 (UF 418903, 1 ad), 2380 (UF 418904, 2 ad, 1 juv), 2546 (UF 418905, 2 ad), 2547 (UF 418906, 4 ad, 4 juv), 2548 (UF 418907, 3 ad), 2549 (UF 418908, 1 ad, 1 juv), 2550 (UF 418909, 4 ad, 5 juv), 2551 (UF 418910, 3 ad, 3 juv), 2552 (UF 418911, 13 ad, 2 juv), 2555 (UF 418912, 1 ad, 1 juv), 2556 (UF 418913, 1 juv), 2559 (UF 418914, 3 ad, 1 juv), 2560 (UF 418915, 3 juv), 2565 (UF 418916, 3 ad, 6 juv), 2567 (UF 418917, 1 adult fragment), 2580 (UF 418918, 2 ad, 12 juv), 2582 (UF 418919, 1 juv), 2594 (UF 418920, 1 ad, 1 juv), 2598 (UF 418921, 1 ad), 2609 (UF 418922, 1 ad, 3 juv), 2611 (UF 418923, 1 ad, 1 juv), 2612 (UF 418924, 1 ad), 2613 (UF 418925, 6 ad, 2 juv), 2614 (UF 418926, 4 ad), 2615 (UF 418927, 1 ad, 2 juv), 2617 (UF 418928, 1 juv), 2618 (UF 418929, 1 ad, 3 juv), 2619 (UF 418930, 1 juv), 2620 (UF 418931, 4 ad, 7 juv), 2624 (UF 418932, 3 ad, 2

juv), 2625 (UF 418933, 3 ad), 2626 (UF 418934, 3 juv), 2627 (UF 418935, 1 ad), 2628 (UF 418936, 2 ad, 1 juv), 2629 (UF 418937, 3 ad), 2631 (UF 418938, 1 ad, 1 juv), 2632 (UF 418939, 3 ad, 1 juv), 2633 (UF 418940, 1 ad, 1 juv). Vouchers in 90% ethanol: Stations 2011 (UF 420202, 1 ad, source of tissue sample 0020), 2022 (UF 420203, 1 ad, source of tissue sample 0031), 2024 (UF 420204, 1 ad, source of tissue sample 0027), 2029 (UF 420205, 1 juv, source of tissue sample 0034), 2078 (UF 420206, 1 ad, source of tissue sample 0097), 2081 (UF 420207, 1 ad, source of tissue sample 0117), 2094 (UF 420208, 1 ad, source of tissue sample 0146), 2096 (UF 420209, 1 ad, source of tissue sample 0151), 2098 (UF 420210, 1 ad, source of tissue sample 0156), 2359 (UF 420211, 1 ad, source of tissue sample 0444), 2559 (UF 420212, 1 ad, source of tissue sample 0510), 2565 (UF 420213, 2 ad, sources of tissue samples 0534–5), 2615 (UF 420214, 1 ad, source of tissue sample 0639). Small specimens fixed and preserved in 98% ethanol: Stations 2024 (UF 420259, 1 juv), 2081 (UF 420260, 1 juv), 2365 (UF 420261, 1 juv), 2558 (UF 420262, 1 juv), 2560 (UF 420263, 1 juv), 2580 (UF 420264, 1 juv).

Description of illustrated voucher from station 2620 (adult, Figs 8–10). — Shell shape somewhat ovate with flared aperture. Height 57.1 mm, diameter 53.8 mm (h/d 0.06). Whorls 4.4, coiling tightness (W/lnH) 1.09. Body-whorl periphery rounded, sutures well impressed, whorls narrowly and roundly shouldered. Spire domed; apex flat. Umbilicus imperforate. Pre-apertural body-whorl deflection slightly downward, about 0.05 whorl. Aperture roughly teardrop-shaped; aperture internal height (in apertural view, parallel to axis of rotation 41.5 mm (0.73 shell height); aperture greatest internal width (perpendicular to same) 29 mm (0.54 shell diameter). Apertural basal gape 8.5 mm (0.20 apertural height). Distance between upper and lower peristome insertions 17 mm (0.32 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 44 mm (1.06 apertural internal height); peristome width (perpendicular to axis of rotation) 35.5 mm (1.22 apertural internal width). Peristome moderately thick, slightly and roundly reflected palatally to basally, narrowly and roundly reflected at columella, which inserts very low. First-whorl diameter 1.95 mm, first-two-whorls diameter 5.67 mm, embryonic whorl-count seemingly 2.9. Embryonic sculpture consisting of weakish radial riblets made pustulose by inscribed spiral lines. Body-whorl sculpture of tiny pustules formed at intersections of radial striae and spiral lines, continuing onto base of shell. Shell color brown, darkening along body whorl, with three dark-purple-brown, narrow color bands: one sutural, one supra-peripheral, and one sub-peripheral; apertural lip white.

Partial description of juvenile voucher from station 2002. — Embryonic sculpture consisting of strong, thin, sometimes branching, radial riblets, crossed by trace spiral lines. Post-embryonic sculpture of wavy, radial lirae, crossed

by spiral rows of small pustules; this sculpture gradually changes on base of shell to minute, dense spiral lines crossed by radial growth lines.

Variation. — An extremely variable species. Dwarf races at eastern Analamera Reserve (Fig. 14) and Fôret Orangea (Fig. 11) may prove to be separate subspecies, but more data from intervening forests are needed. Among 13 extreme variants (including described voucher and two dwarf races, Figs 8-21, heights 39.4-62.7 mm, whorls 4.3-5.05), h/d ranged 1.06-1.30, coiling tightness (W/lnH) ranged 1.09-1.27, aperture height/shell height 0.54-0.73, aperture width/shell diameter 0.48-0.57, apertural basal gape/apertural height 0.16-0.42 (!), peristomal insertions distance/shell diameter 0.28-0.40, peristome height/apertural height 1.06-1.13, peristome width/apertural width 1.19-1.37, first-whorl diameter (including two juveniles, thus $n = 15$) 1.58-1.97 mm (!), and first-two-whorls diameter (ditto) 4.66-6.24 mm (!).

Embertoniphanta socii

(Fischer-Piette, F. Blanc & Salvat, 1975)

Fig. 22

Helicophanta socii Fischer-Piette, F. Blanc & Salvat, 1975: 245-246, pl. 3 figs 53-54. Type locality: "Ankarana".

Material examined. — Illustrated voucher specimen: Station 2046 (UF 420107, 1 adult).

Description of illustrated voucher from station 2046 (adult, broken and eroded). — Shell shape ovoid-bulimiform. Height 91.7 mm, diameter 62.5 mm (h/d 1.47). Whorls 5.35, coiling tightness (W/lnH) 1.18. Body-whorl periphery rounded, sutures well impressed, whorls unshouldered. Spire ovate-stepped; apex protruding, rounded. Umbilicus 2.6 mm (0.04 shell diameter). Pre-apertural body-whorl deflection very slight, about 0.02 whorl. Aperture ovate-teardrop; aperture internal height (in apertural view, parallel to axis of rotation) 45.5 mm (0.50 shell height); aperture greatest internal width (perpendicular to same) 27 mm (0.43 shell diameter). Apertural basal gape 13.5 mm (0.30 apertural height). Distance between upper and lower peristome insertions 23 mm (0.37 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 52 mm (1.14 apertural internal height); peristome width (perpendicular to axis of rotation) 41.5 mm (1.54 apertural internal width). Peristome thick, moderately reflected, columella broader and widening gradually to its insertion. First-whorl diameter 1.92 mm, first-two-whorls diameter 5.17 mm, embryonic whorl-count seemingly 2.45. Embryonic sculpture (much eroded) includes radial riblets. Body-whorl sculpture minutely pustulose from dense radial striae intersected by dense spiral lines, continuing onto base of shell. Shell color unknown.

Family Clavatoridae Thiele, 1926

Genus *Paraclavator* Groh & Poppe, 2002

Paraclavator Groh & Poppe, 2002: 12, 39 Type species (by original designation): *Helix obtusata* Gmelin, 1791.

Paraclavator moreleti (Deshayes, 1851)

Figs 23-28

Bulimus moreleti Deshayes, 1851: 114, pl. 154 figs 5-6. Type locality: "Madagascar".

Material examined. — Illustrated and/or measured voucher specimens: Station 2339 (UF 420108, 1 ad, 1 juv, Figs 23-24), 2355 (UF 420109, 1 ad, 1 juv, Figs 25-26), 2348 (UF 420110, 1 adult), 2599 (UF 420111, 1 juvenile, Fig. 28), 2601 (UF 420112, 1 adult, Fig. 27). Other dry vouchers: Station 2286 (UF 418997, 1 ad), 2329 (UF 418998, 1 juv), 2330 (UF 418999, 4 juv), 2331 (UF 419000, 2 juv), 2339 (UF 419001, 1 ad), 2341 (UF 419002, 1 ad, 1 juv), 2342 (UF 419003, 1 ad), 2343 (UF 419004, 1 ad, 2 juv), 2344 (UF 419005, 14 ad, 27 juv; AMS, 1 ad; ANSP, 1 ad; SMF, 1 ad), 2345 (UF 419006, 2 ad, 1 juv), 2347 (UF 419007, 4 juv), 2349 (UF 419008, 1 juv), 2350 (UF 419009, 1 ad), 2353 (UF 419010, 2 juv), 2354 (UF 419011, 2 juv), 2354 (UF 419011, 2 juv), 2357 (UF 419013, 3 juv), 2602 (UF 419014, 1 ad), 2604 (UF 419015, 1 juv), 2605 (UF 419016, 1 juv), 2611 (UF 419017, 2 juv), 2612 (UF 419018, 2 juv). Vouchers in 90% ethanol: Stations 2341 (UF 420197, 1 juv), 2344 (UF 420198, 3 juv), 2344 (UF 420199, 3 ad, 1 juv, sources of tissue samples 0400-03), 2345 (UF 420200, 2 ad, 1 juv, sources of tissue samples 0404-09), 2348 (UF 420201, 1 ad). Small specimens fixed and preserved in 98% ethanol: Station 2344 (UF 420256, 3 juv), 2346 (UF 420257, 1 juv).

Description of illustrated voucher from station 2355 (adult, Fig. 26). — Shell turritiform with truncated apex. Height 68.4 mm, diameter 20.5 mm (h/d 3.34). Whorls 7.95, coiling tightness (W/lnH) 1.88. Body-whorl periphery gently curved, sutures shallowly impressed. Spire relatively straight-sided; apex truncate. Umbilicus imperforate. Pre-apertural body-whorl deflection absent. Aperture ovate; aperture internal height (in apertural view, parallel to axis of rotation) 19 mm (0.28 shell height); aperture greatest internal width (perpendicular to same) 12 mm (0.54 shell diameter). Apertural basal gape 4.4 mm (0.23 apertural height). Distance between upper and lower peristome insertions 9.6 mm (0.47 shell diameter). Peristome height (in apertural view, parallel to axis of rotation) 21 mm (1.11 apertural internal height); peristome width (perpendicular to axis of rotation) 13 mm (1.18 apertural internal width). Peristome rather thin, very slightly reflected palatally to basally, narrowly reflected at columella, broadening slightly at columellar insertion. First-whorl diameter

unknown, first-two-whorls diameter unknown, embryonic whorl-count unknown. Embryonic sculpture unknown. Body-whorl sculpture of low, uneven, dense, radial riblets, interrupted by irregular, widely and unevenly spaced, very shallow, spiral grooves. Shell basic color light greenish-yellow-brown, with dark-reddish-brown radial streaks from the suture, and with multiple, dense, minute, interrupted color bands.

Partial description of illustrated voucher from station 2599 (juvenile with intact apex, Fig. 28). — Embryonic sculpture consisting of rounded, crowded, branching, axial riblets, cut by fairly widely and unevenly spaced spiral striae.

Variation. — Extreme shell variation exists that seems to be environmentally correlated. Adults from high altitudes (Figs 23, 27) are less slender, more robust, than those from lower elevations (Fig. 26).

Coloration and banding vary. A voucher from station 2348 (unfigured) is generally darker in color, and its multiple minute color bands are virtually uninterrupted. Remnant periostracum on an adult from station 2601 (Fig. 27) is virtually lacking in spiral color-banding.

Shell shape variation among four truncate adult extreme variants (including described voucher, Figs 23, 26, 27, and unfigured, heights 68.4–86.3 mm, remaining whorls 7.15–7.95), h/d ranged 2.92–3.34, coiling tightness (W/lnH) ranged 1.62–1.88, aperture height/shell height 0.28–0.32, aperture width/shell diameter 0.53–0.57, apertural basal gape/apertural height 0.23–0.30, peristomal insertions distance/shell diameter 0.39–0.47, peristome height/apertural height 1.07–1.13, peristome width/apertural width 1.14–1.23. Shell shape variation among three juvenile extreme variants with intact apices (Figs 24, 25, 28, heights 41.6–49.0 mm, whorls 8.1–9.0), h/d ranged 1.03–2.72, coiling tightness (W/lnH) ranged 2.15–2.31, umbilicus width/shell diameter 0.00–0.34, first-whorl diameter 1.56–1.80 mm, and first-two-whorls diameter 3.28–3.80 mm.

DISCUSSION

Species and subspecies collected in 2007 are listed below, along with their availabilities of at least one adult anatomy (“A”) for dissection and/or at least one tissue sample (“T”) preserved in 98% ethanol for DNA sequencing. A tissue sample may be either one cut from a live large snail, or one consisting of an entire small snail or egg.

<i>Ampelita akoratsara akoratsara</i>	–	–
<i>Ampelita akoratsara paulayi</i>	–	–
<i>Ampelita analamerae</i>	A	T
<i>Ampelita andavakoerae</i>	–	T
<i>Ampelita anjajaviensis</i>	–	–
<i>Ampelita atropos</i>	A	T
<i>Ampelita capdambrae</i>	–	T

<i>Ampelita celestinae</i>	A	T
<i>Ampelita clotho</i>	A	T
<i>Ampelita consanguinea</i>	A	T
<i>Ampelita ela</i>	–	–
<i>Ampelita gaudens</i>	A	T
<i>Ampelita granulosa</i>	A	T
<i>Ampelita kendrae</i>	–	T
<i>Ampelita kirae</i>	–	T
<i>Ampelita lachesis</i>	A	T
<i>Ampelita lamarei lamarei</i>	A	T
<i>Ampelita lamarei sakalava</i>	A	T
<i>Ampelita lincolni</i>	–	–
<i>Ampelita masoalae</i>	A	T
<i>Ampelita michellae</i>	–	–
<i>Ampelita miovaova</i>	A	T
<i>Ampelita niarae</i>	–	–
<i>Ampelita stilpna</i>	A	T
<i>Ampelita thompsoni</i>	–	T
<i>Eurystyla ambatoensis</i>	–	–
<i>Eurystyla julii julii</i>	A	T
<i>Eurystyla julii kely</i>	–	–
<i>Eurystyla julii soa</i>	A	T
<i>Paraclavator moreleti</i>	A	T
<i>Embertoniphanta amphibulima</i>	–	–
<i>Embertoniphanta echinophora</i>	–	T
<i>Embertoniphanta josephinae</i>	–	–
<i>Embertoniphanta oviformis</i>	A	T
<i>Embertoniphanta socii</i>	–	–

Thus, of the total 35 taxa, one or more adult anatomies are available for 17 taxa, and one or more tissue samples are available for 22 taxa.

The new species described herein bring Madagascar’s total described rhytidoids to 135 species (Acavidae: 114 species; Clavatoridae: 20 species; Rhytididae: 1 species). A much needed revision will surely result in synonymizing some of the previously described species, but many further new species await discovery, including within already collected materials.

Several discoveries within these 2007 acavid collections are worth noting. The unusual, hairy-shelled *Embertoniphanta echinophora* was previously reported solely from Montagne d’Ambre; now it is known from rainforests over a much wider range, and the discovery of its also hairy-shelled, apparently sister species *E. josephinae* spec. nov. from far-distant, dry-deciduous forest has important biogeographic implications. The gigantic (shell height 91.7 mm), micro-endemic *Embertoniphanta socii* is effectively absent from northern Ankarana Reserve and vicinity, where only a single, very old shell was encountered; thus this gigantic, conchologically unusual species has a restricted range within the Reserve, its only known habitat. The *Eurystyla* radiation is proving to be much more

extensive than previously imagined: *E. griffithsi* (Emberton, 1999), *E. ambatoensis* (Emberton & Griffith, 2009) (discovered to be polymorphic for color-banding in this paper), and two new subspecies of *E. julii* (described in Emberton & Griffiths 2009 and in this paper) greatly extend the ecological, conchological, and geographical ranges of the genus. No *Ampelita namerokoensis* Fischer-Piette, 1952 were found at southern Namoroka Reserve, but *A. thompsoni* spec. nov. instead; oddly, Fischer-Piette described *A. namerokoensis* not from its namesake Reserve, but from the Bemaraha Reserve area, far to the south (see also the remarks given by Griffiths & Herbert, 2013: 28). Our hypothesis concerning *Ampelita miovaova* spec. nov. would make this one of the most conchologically variable known species of land snails (compare Figs 145-147 with Figs 148-150; clearly, this hypothesis needs testing with anatomical and biochemical data. Other especially variable nominal taxa include *Ampelita lamarei lamarei*, *A. lamarei sakalava*, *A. gaudens*, *A. stilpna*, and *Embertoniphanta oviformis* (see Plates and Variation sections), all of which require testing as well; 2007 collections provide much of the needed materials for such tests. Last but not least, *A. lincolni* spec. nov., at 73.5 mm shell diameter, is the largest known species of *Ampelita*.

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