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Ten new species of Mascarene land snails (Mollusca : Gastropoda) and their conservation status

Owen Lee Griffiths[A,C] *and F. B. Vincent Florens*[B]

[A]Bioculture (Mtius) Ltd, Senneville, Rivière des Anguilles, Mauritius.
[B]Department of Biosciences, University of Mauritius, Réduit, Mauritius.
[C]To whom correspondence should be addressed. Email: olgmas@intnet.mu

Abstract

Ten new species of Mascarene land snails are described from surveys carried out between 1990 and 2000 in the three islands of the Mascarenes. Eight of the species are endemic to Mauritius, one to Réunion and one to Rodrigues. While most of these species are assignable to genera already present in the archipelago, three of them belong to new genera. Apart from the Réunion species and one from Mauritius, which are critically endangered, all are known only as old shells from subfossil deposits and are presumed extinct. Some differences in diversity and extinction rates between the three islands are discussed.

Additional keywords: extinction rate, Mascarene Islands, Mauritius, Réunion, Rodrigues, subfossil, threatened species.

Introduction

Description of the terrestrial molluscs of the Mascarene islands (Réunion, Mauritius and Rodrigues) began as early as 1774 and to date 184 strictly terrestrial species are known, including 34 alien and three cryptogenic species (Griffiths and Florens unpublished data). Of the 147 known native species, 95% are endemic to the Mascarenes; however, endemism per island is somewhat lower given that many native species occur on more than one of the three islands. Thus island endemism reaches 63% for Mauritius, 57% for Rodrigues and 31.5% for Réunion (Griffiths and Florens unpublished data).

This paper describes ten new species of Mascarene snails and gives their conservation status according to IUCN criteria (IUCN 2001). Eight of these are apparently extinct species described from subfossil specimens from Mauritius and Rodrigues and two are extant species from Réunion and Mauritius.

All the species described here can be assigned to families occurring on the Mascarenes and continue to highlight the remarkable molluscan radiation of these isolated volcanic islands.

The higher classification used herein follows Beesley *et al*. (1998).

Materials and methods

The material described here was collected between 1990 and 2000 and comes from ~100 surveys totaling some 500 man-hours of sampling, mainly by Owen Griffiths (O. G.) and Vincent Florens (V. F.). Surveys were carried out on all three islands in a wide variety of habitats, ranging from the best preserved remnants of native forests to completely modified vegetation comprised solely of alien plant communities. Large ground species were visually searched for in the leaf litter, under rock overhangs and by overturning rocks and logs. Leaf litter samples were taken to sample microscopic species on the ground as well as in caves or under rock overhangs that contained some accumulation of soil or scree. Live arboreal species were surveyed by visual search of both foliage and tree trunks and by beating foliage above an inverted umbrella. Ecological notes, such as level of threats posed to the habitat by invasive alien species or degree of fragmentation of habitat, were taken at the sampling sites to allow an assessment of the threat categories of

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the species using the Categories and Criteria (version 3.1) of the IUCN Red List of Threatened Species (IUCN 2001). All type material has been lodged with the Australian Museum, Sydney (AMS).

Systematics

Superorder **CAENOGASTROPODA**

Order **ARCHITAENIOGLOSSA**

Superfamily **CYCLOPHOROIDEA**

Family **CYCLOPHORIDAE**

Subfamily **Cyclophorinae**

This subfamily occurs throughout the world except for the Americas. In the Mascarenes it is represented by three genera including those of the species described here.

Madgeaconcha n. gen.

Type species: *Madgeaconcha gerlachi* n. sp.

Diagnosis

Shell minute, height to width ratio ~1.6. Whorls 4.5, regularly increasing, convex. Suture impressed. Base rounded and smooth, umbilicus narrow and simple. Aperture circular with simple outer lip. Columella rounded or relatively straight, slightly reflected outwards over umbilicus. Parietal area thickened or undifferentiated. Protoconch smooth; teleoconch with faint growth lines and fainter striae visible under 40× magnification. Operculum corneous paucispiral. Radula taenioglossate; central teeth with dentate dorsal edge.

Remarks

This is a new genus, endemic to Mauritius and Réunion. Its main distinguishing features are the tiny, simple, conical shell, corneous paucispiral operculum and dentate dorsal edge of the central teeth of the radula. The exact taxonomic position of *Madgeaconcha* is not clear. Ponder (personal communication 2004) stated that 'the radula is reminiscent of cyclophorids although the central tooth is unusual, especially the top edge'. It may be a diplommatinid but there are no representatives of this family in the south-west Indian Ocean region. As the Mascarenes appear to have produced other aberrant cyclophorids, it is here placed in the Cyclophoridae. The type species was collected alive in Réunion at only one locality in an area of very humid native forest.

Etymology

Named for the late Dr E. H. Madge in honour of his work on Mascarene non-marine molluscs.

Madgeaconcha gerlachi n. sp.

(Figs 1, 2*E*, 3*B*)

Type material

Holotype. SE Réunion, 1 km west along Sentier Forestier du Tremblet along Ravine Pont Rouge, 55°47′48′′E 21°17′S, 300 m, in native forest with *Pandanus*, coll. J. Gerlach & O. G., 21 Jan. 1992 (AMS C204767).

Paratypes. Three adult and two juvenile shells from the type locality (AMS C204768).

Description

Shell minute, solid, elongate. Spire outline straight. Whorls ~4.5, including the protoconch, regularly increasing, very convex. No differentiation between the protoconch and the teleoconch. Suture simple, deeply impressed. Base narrow, rounded, smooth, umbilicus narrow and simple. Aperture circular, simple, not thickened with simple outer lip. Columella relatively straight, slightly reflected outwards over umbilicus. Parietal area slightly thickened. Protoconch smooth; teleoconch with sculpture of faint growth lines and even fainter spiral striae only visible under high magnification (40×).

Radula. Taenioglossate; central teeth with five lateral cusps and row of small ridges along dorsal margin. Lateral teeth with 4–5 cusps including one large cusp. Inner marginal teeth with 6–7 cusps; outer marginal teeth with six cusps (Fig. 1*C,D*).

Operculum. Pale yellow, paucispiral with eccentric nucleus; inner side with ridge towards base (Fig. 1*A*,*B*).

Dimensions of holotype

Height 1.62 mm; diameter 1.00 mm; aperture height 0.57 mm.

Remarks

This species is known from only one locality in Réunion where it still survives and occurs on the underside of dead lily fronds in the leaf litter. This locality is gradually being invaded and degraded by invasive alien plants. Thus, using the Categories and Criteria (version 3.1) of the IUCN Red List of Threatened Species (IUCN 2001), the species is critically endangered (CR B1a + biii).

Etymology

Named for its co-discoverer, Dr Justin Gerlach, Scientific Co-ordinator, The Nature Protection Trust of Seychelles.

Madgeaconcha sevathiani n. sp.

(Figs 2*D*, 3*C*)

Type material

Holotype. Mauritius, 900 m west of Quinze Cantons, Vacoas, 20°18´00´´S 57°27´30´´E, 340 m, dead adult buried in deposits at the base of cliff on upper scarps of Rivière du Rempart valley in nearly pure alien secondary vegetation, coll. Cláudia Baider & V. F., 11 Sep. 2000 (AMS C204769).

Paratype. One adult shell from the type locality (AMS C205039).

Description

Shell minute, solid and elongate, with spire outline slightly convex. Whorls ~4.5 regularly increasing, suture impressed. Base rounded and smooth, umbilicus simple and narrow. Aperture circular, thickened internally, with simple outer lip. Columella rounded, only slightly reflected over umbilicus. Parietal area undifferentiated. Protoconch smooth; teleoconch with sculpture of faint growth lines and fainter spiral striae visible under high magnification (40×).

Dimensions of holotype

Height 1.15 mm; diameter 0.70 mm; aperture height 0.37 mm.

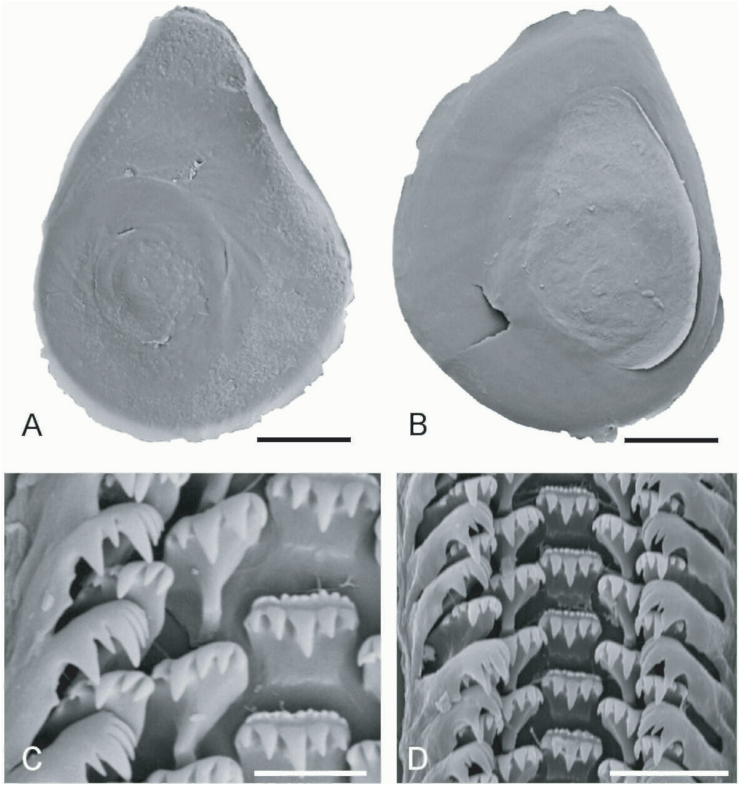

Fig. 1. *Madgeaconcha gerlachi* operculum, showing outer (*A*) and inner (*B*) sides. *Madgeaconcha gerlachi* radula showing half (*C*) and full (*D*) rows. (*A*,*B*) Scale bar = 150 μm; (*C*) scale bar = 5 μm; (*D*) scale bar = 10 μm.

Remarks

This species is the smallest snail yet found in the Mascarenes. It has a thicker shell and slightly less rounded whorl periphery than *M. gerlachi* n. sp. and the sutures are not as deeply impressed. It is 30% smaller in size. Despite considerable survey effort in a wide variety of habitats, it is only known from three old dead shells found deep in one subfossil deposit together with a large number of extinct endemic species. It is thus considered likely to be extinct.

Etymology

Named after Mr Jean-Claude Sevathian in recognition of his significant contribution to botany and native plant conservation in Mauritius.

Naggsiaconcha n. gen.

Type species: *Naggsiaconcha mauritianus* n. sp.

Diagnosis

Shell small, very elongate. Whorls ~11.5, regularly increasing, slightly convex. Suture deeply impressed, channeled. Base slightly angulated. Umbilicus very narrow, almost

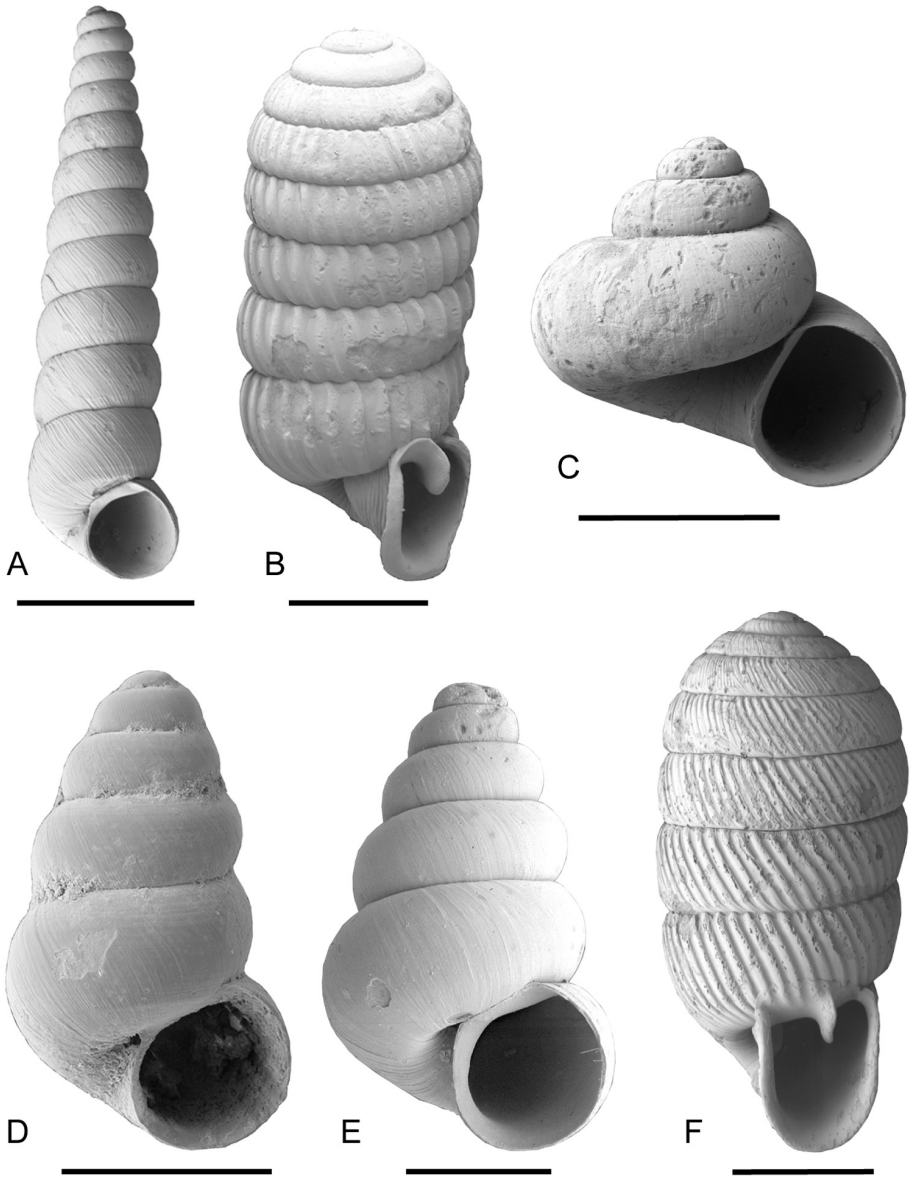

Fig. 2. (*A*) *Naggsiaconcha mauritianus* n. sp., holotype; (*B*) *Microstrophia baideri* n. sp., holotype; (*C*) *Omphalotropis bassinblancensis* n. sp., holotype; (*D*) *Madgeaconcha sevathiani* n. sp., holotype; (*E*) *Madgeaconcha gerlachi* n. sp., holotype; (*F*) *Microstrophia abnormala* n. sp., holotype. (*A–C*) Scale bar = 1 mm; (*D*,*E*) scale bar = 0.5 mm; (*F*) scale bar = 2 mm.

completely covered by the reflected columella. Aperture circular, simple. Outer lip simple. Protoconch ~1 whorl, malleated and bearing very faint radial lines. Teleoconch sculptured with fine irregular oblique radial ribs crossed by few very faint spiral lines.

Remarks

This new genus is endemic to Mauritius. Its main distinguishing features are its very elongate shell with a large number of whorls (11.5), circular aperture and tiny size. The exact taxonomic position of the type species has prompted some debate. Dr F. Naggs (BMNH (British Museum of Natural History, London), personal communication 1998) considered that it may be a subulinid or possibly a coellaxinid but subsequently rejected the latter. Ponder (personal communication 2000) considered the species as an aberrant cyclophorid based on the general shell form and circular aperture, which is followed here. This tiny species could not be placed in any known genus. The type specimen comes from a deposit dated at 2500–1000 years BP (Goodfriend, personal communication 1992).

Etymology

Named for Dr Fred Naggs of the Natural History Museum, London, for assisting the authors in their work over many years.

Naggsiaconcha mauritianus n. sp.

(Figs 2*A*, 3*A*)

Type material

Holotype. Mauritius, Snail Rock, 2 km S of Port Louis, 20°11´24´´S 57°30´40´´E, 400 m, dead adult buried in subfossil deposits under rock overhang, in degraded native forest, coll. O. G., Jun. 1990 (AMS C204760).

Paratypes. Four juvenile, two subadult and three adult shells from the type locality (AMS C204761); two adult shells, Mauritius, just below summit of Le Pouce Mt., 20°11´44´´S 57°31´20´´E, 650 m, from leaf litter in native forest, coll. O. G., 20 Jun. 1990 (AMS C204762).

Description

Shell small, thin, very elongate, spire outline straight. Protoconch ~1 whorl; teleoconch ~10.5 whorls, regularly increasing. Apical whorls more convex than subsequent whorls. Suture deeply impressed, channeled, slightly crenulated. Base slightly angulated, with angulation disappearing on last whorl. Umbilicus very narrow, almost completely covered by reflected columella. Aperture circular, simple, base sloping backwards with respect to vertical axis of shell (prosocline). Columella slanted, narrow, slightly reflected. Parietal area thickened, slightly raised from previous whorl. Outer lip simple, not reflected. Protoconch malleated and bearing very faint radial lines (Fig. 3*A*). Teleoconch sculptured with fine irregular oblique radial ribs crossed by few very faint spiral lines.

Dimensions of holotype

Height 3.55 mm; diameter 0.87 mm; aperture height 0.60 mm.

Remarks

Although no live individuals have been seen, this species possibly survives in remnants of native forests on Le Pouce Mountain near Port Louis where it has been collected dead in the leaf litter. Given that invasive alien weeds are currently degrading this forest, the species must be considered as critically endangered (CR B1a + biii) (IUCN 2001). Recent surveys at Bassin Blanc and Rivière du Rempart yielded additional subfossil specimens belonging to the same genus (V. Florens personal collection). Bassin Blanc specimens are two and a half times smaller and appear smoother; specimens from Rivière du Rempart are also smaller, and possess both peripheral and umbilical keels, which are absent on the presently described species. These possibly represent two additional species of *Naggsiaconcha*.

These will be described in a subsequent paper pending additional fieldwork to find more specimens in better condition.

Etymology

Named after Mauritius, the country of origin.

Superorder **CAENOGASTROPODA**

Order **SORBEOCONCHA**

Superfamily **RISSOOIDEA**

Family **ASSIMINEIDAE**

Subfamily **Omphalotropinae**

This subfamily is confined to Southeast Asia, the south-west Pacific and islands of the Indian Ocean. In the Mascarenes it is represented by two genera, *Omphaloptropis* (Germain 1921) and *Ditropisena* (Griffiths and Florens unpublished data).

Omphalotropis Pfeiffer, 1851

Type species: *Bulimus hieroglyphicus* Potiez & Michaud, 1838.

This genus, as currently recognised, has the same distribution as the subfamily. In the Mascarenes the genus comprises 20 species (Griffiths and Florens unpublished data), which are all Mascarene endemics, excluding those described below.

This genus of small terrestrial snails is characterised by having conical to elongate shells, with smooth to complex sculpture. Gills are greatly reduced and eyes are situated at the outer bases of relatively short tentacles. The operculum is corneous. The shell of the type species (from Mauritius) is small, thin, slender with tall spire and widely umbilicate. The whorls are weakly convex with a shallow suture (Fukuda and Ponder 2003).

Omphalotropis bassinblancensis n. sp.

(Figs 2*C*, 3*F*)

Type material

Holotype. Mauritius, 200 m south of Bassin Blanc crater lake, 20°27´10´´S 57°28´10´´E, 480 m, in remnants of native montane forest, dead adult buried in deposits under rock overhang at base of cliff in valley, coll. V. F., 3 Feb. 1998 (AMS C204765).

Paratypes. Two adult shells from the type locality (AMS C204766).

Description

Shell small, thin and low conical. Protoconch one whorl; teleoconch three whorls, regularly increasing, very convex. Last whorl comprising two thirds of shell, slightly detached from previous whorl. Suture on protoconch slightly impressed, becoming more impressed in subsequent whorls. Base very rounded. Umbilicus wide and deep. Aperture almost 'D' shaped. Columella simple, slanted, almost straight and slightly reflected. No differentiation between columella and parietal area. Outer lip simple. Protoconch and upper 2.5 teleoconch whorls faintly malleated; subsequent teleoconch whorls smooth except for faint irregular growth lines visible only under high magnification (40×).

Dimensions of holotype

Height 1.87 mm; diameter 1.85 mm; aperture height 0.84 mm.

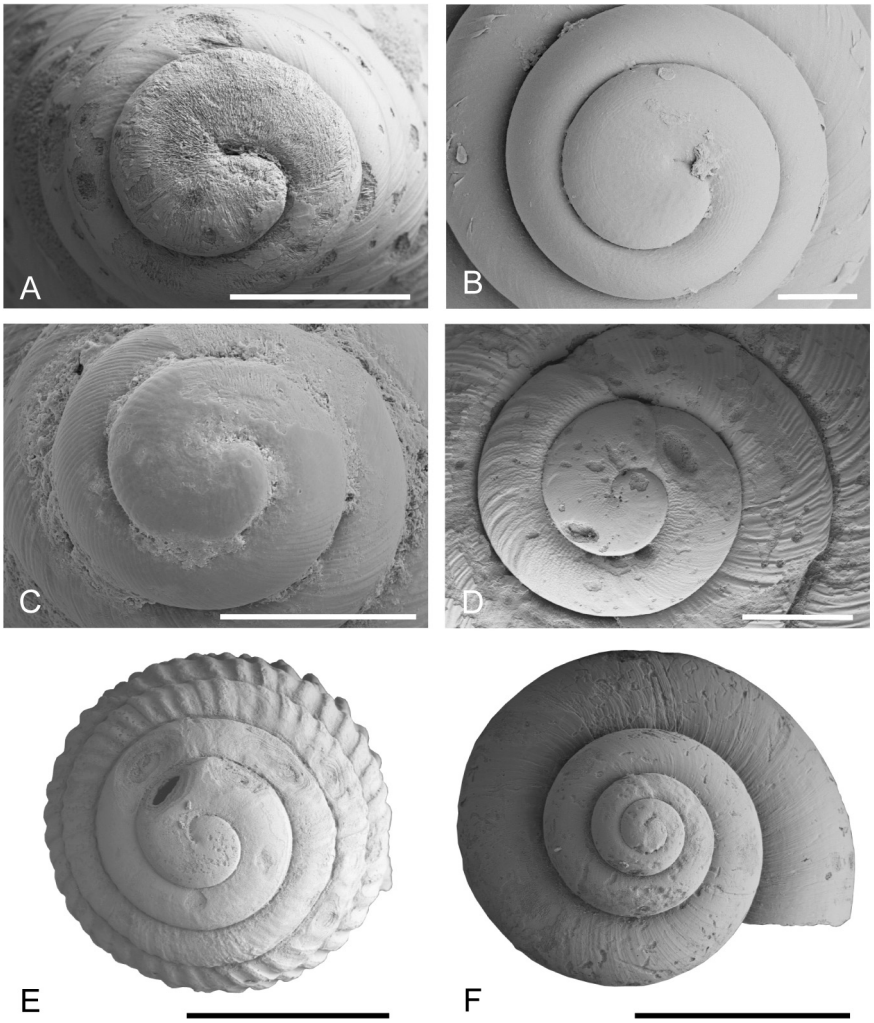

Fig. 3. (*A*) *Naggsiaconcha mauritianus* n. sp., protoconch, holotype; (*B*) *Madgeaconcha gerlachi* n. sp., protoconch, holotype; (*C*) *Madgeaconcha sevathiani* n. sp., protoconch, holotype; (*D*) *Microstrophia abnormala* n. sp., protoconch, holotype; (*E*) *Microstrophia baideri*, n. sp., protoconch, holotype; (*F*) *Omphalotropis bassinblancensis* n. sp., protoconch, holotype. (*A*,*C*) Scale bar = 0.2 mm; (*B*) scale bar = 0.1 mm; (*D*) scale bar = 0.5 mm; (*E*) scale bar = 1 mm; (*F*) scale bar = 1 mm.

Remarks

This species is the smallest of the genus in the Mascarenes. The only species of comparable size, albeit slightly larger, are *O. antelmei* Madge, 1946, *O. stevanovitchi* Griffiths, 2000 and *O. vacoasensis* n. sp., which differ from *O. bassinblancensis* in lacking the wide umbilicus as well as in having shells substantially higher than wide. Indeed *O. bassinblancensis* has a virtually equidimensional shell, a feature unique in Mascarene *Omphalotropis*. It is possible that this species belongs to a different genus but pending a comprehensive review and the eventual collection of better material we suggest its placement in *Omphalotropis*. Despite considerable survey efforts in its type locality and

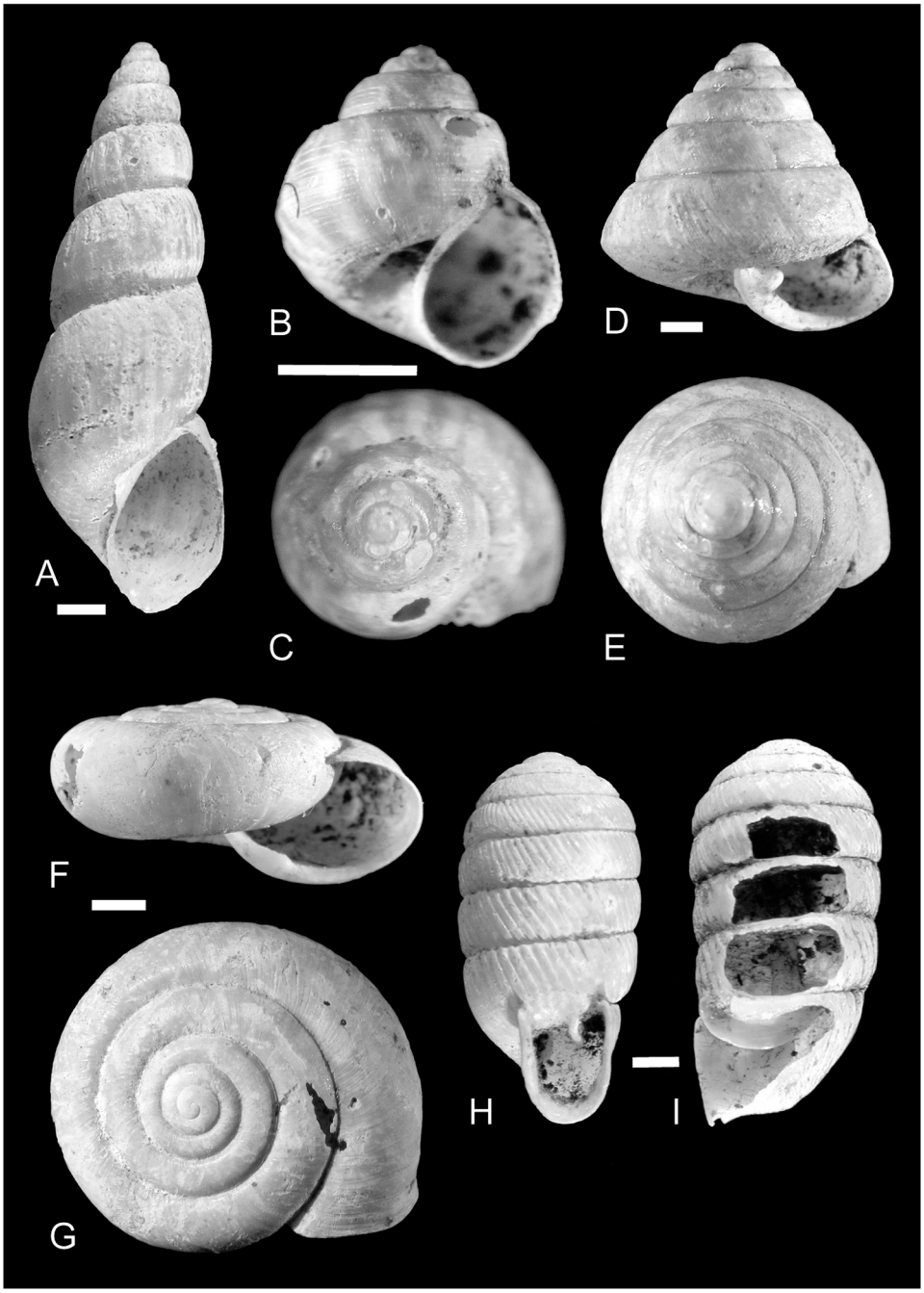

Fig. 4. (*A*) *Omphalotropis quittorensis* n. sp. holotype; (*B*,*C*) *Ompholotropis vacoasensis* n. sp., holotype; (*D*,*E*) *Erepta pyramidalis* n. sp., holotype; (*F*,*G*) *Erepta chloritiformis* n. sp., holotype; *H*, *Microstrophia abnormala* n. sp., holotype; (*I*) *Microstrophia abnormala* n. sp., paratype. (*A*,*B*,*D*,*H*,*I*) Scale bar = 1 mm; (*F*) scale bar = 2 mm.

elsewhere in Mauritius, only old dead specimens from subfossil deposits have been found. It is thus considered likely to be extinct.

Etymology

Named for its type locality.

Omphalotropis vacoasensis n. sp.

(Fig. 4*B,C*)

Type material

Holotype. Mauritius, 900 m west of Quinze Cantons, Vacoas, 20°18´00´´S 57°27´30´´E, 340 m, dead adult buried in deposits at the base of cliff on upper scarps of Rivière du Rempart valley in nearly pure alien secondary vegetation, coll. Cláudia Baider & V. F., 11 Sep. 2000 (AMS C204753).

Paratype. One adult shell from the type locality (AMS C204754).

Description

Shell small, thin and turbinate. Protoconch of one whorl; teleoconch three whorls, regularly increasing, convex and slightly shouldered; suture strongly impressed, slightly channeled. Base rounded. Umbilicus narrow, deep. Aperture ovate-lunate to pear shaped. Outer lip simple, not reflected. Columella slanted, slightly reflected outwards, partially closing umbilicus. Columella merges into parietal area. Protoconch smooth, teleoconch whorls with fine regular growth lines crossed by fine spiral lines above shoulder and coarser spiral ribs below; spiral rib around periphery of last whorl slightly more pronounced than others. Spiral ribs below periphery less pronounced. Shell with more or less radial streaks of brown most pronounced on last whorl.

Dimensions of holotype

Height 2.32 mm; diameter 2.11 mm; aperture height 1.24 mm.

Remarks

This species is readily distinguished from the three other known small Mascarene *Omphalotropis*, namely: *O. bassinblancensis* n. sp., *O. antelmei*, which lacks the distinctive sculpture of spiral ribs crossed by growth lines, and *O. stevanovitchi*, which, although having comparable sculpture, is relatively more elongate and lacks the striking radial brown streaks of *O. vacoasensis*. Despite considerable survey efforts over the whole island, it has only ever been found in the type locality, where two deeply buried old dead specimens have been uncovered from a subfossil deposit among several extinct endemic species. It is thus considered likely to be extinct.

Etymology

Named for the type locality.

'Omphalotropis' quittorensis n. sp.

(Fig. 4*A*)

Type material

Holotype. Rodrigues, Caverne Bambara, east side of Anse Quittor reserve just north of eastern end of airport runway, Plaine Corail, 19°45´22´´S 63°21´59´´E, 30 m, dead adult in limestone scree, coll. Carl G. Jones & O. G., Dec. 1997 (AMS C204755).

Paratypes. Four adult shells from the type locality (AMS C204756); six adult shells, Rodrigues, Caverne L'Affouche, east of Anse Quittor reserve, Plaine Corail, 19°45´24´´S 63°22´07´´E, 40 m, coll. Carl G. Jones & O. G., Dec. 1997 (AMS C204757).

Description

Shell fusiform, thick, elongate, spire outline straight to slightly convex. Protoconch 2.5 whorls; teleoconch ~7.5 whorls, convex, with slight sub-peripheral angulation, regularly increasing, but with each whorl descending below peripheral angle, producing deep, wide suture. Umbilical chink present, umbilical keel very faint. Aperture compressed, narrowly suboval, slightly pointed at upper extremity, pointed and flared at base. Outer lip thin, simple, not reflected. Columella strongly slanted, slightly reflected outwards, covering umbilicus in upper part. Parietal area narrow, undifferentiated. Protoconch faintly malleated and glossy, teleoconch with more eroded appearance and bearing very faint irregular growth lines crossed by less faint spiral lines visible only under 25× magnification. Last four whorls bearing orange-brown radial streaks separated by white bands.

Dimensions of holotype

Height 12.36 mm; diameter 4.15 mm; aperture height 4.04 mm.

Remarks

The exact taxonomic position of this species is not certain. Dr F. Naggs (BMNH, personal communication 1998) suggested that it could be a peculiar subulinid but its heavy shell, continuous peristome and slight sub-peripheral angulation with markedly grooved sutures lead him to conclude that it is a 'prosobranch', possibly an unknown thiarid. The markedly grooved suture is consistent on most shells examined. Ponder (AMS, personal communication 2000) considered this to be an *Omphalotropis* 'in the broad sense'. The subfossil deposits that yielded this species are exclusively terrestrial. Furthermore the Mascarenes have produced very elongate *Omphalotropis*. Thus Ponder's suggestion is followed here.

This species attains the greatest height among all the Mascarene members of the genus. Only two Mascarene *Omphalotropis* species, *O. clavula* (Morelet, 1866) and *O. hieroglyphica* (Potiez & Michaud, 1838), share the elongate shape of *O. quittorensis*. Both are, however, substantially smaller reaching at most three quarters of the latter's height. Further differences are the notching of the anterior end of the aperture by the umbilical keel in *O. hieroglyphica* and the presence of radial ribs in the last whorls in *O. clavula*. Despite considerable survey effort in Rodrigues, only old dead specimens have ever been collected in subfossil deposits. It is thus considered likely to be extinct.

Etymology

Named for the type locality.

Order **STYLOMMATOPHORA**

Superfamily **HELICARIONOIDEA**

Family **HELICARIONIDAE**

Subfamily **Ereptinae**

This subfamily is endemic to the Mascarenes and Madagascar, where it is represented by nine genera.

Erepta Albers, 1850

Type species: *Helix stylodon* Pfeiffer, 1842.

This genus is endemic to Mauritius and Réunion, where there are five species (Griffiths 2000) in addition to those described below. It is characterised by small to medium-sized, depressed to conic shaped shells, all having a distinct callus on the inner peristome near the umbilicus.

Erepta chloritiformis n. sp.

(Fig. 4*F,G*)

Type material

Holotype. Mauritius, 900 m west of Quinze Cantons, Vacoas, 20°18´00´´S 57°27´30´´E, 340 m, dead adult buried in deposits at the base of upper scarps of Rivière du Rempart valley in nearly pure alien secondary vegetation, coll. Cláudia Baider & V. F., 11 Sep. 2000 (AMS C204750).

Paratypes. Two juvenile shells from the type locality (AMS C204751).

Description

Shell thin, depressed, almost planispiral, glossy, pale brown above, off-white below. Protoconch, white, ~1 whorl, not clearly differentiated from the teleoconch. Teleoconch whorls four, regularly increasing, convex. Suture deeply impressed, channeled. Umbilicus wide, deep, cavernous, diameter ~14% of shell diameter. Aperture lunate, slightly depressed. Outer lip thin, slightly reflected, sinuous at base. Columella thickened and reflected outwards. Distinct callus on inner peristome near umbilicus. Parietal area slightly thickened, glazed. Protoconch almost smooth, with very faint spiral lines. Teleoconch with fine closely spaced oblique radial lines cut by fine spiral lines giving shell, particularly spire, decussate appearance under magnification. Base flattened, bearing prominent irregular ridges radiating from umbilicus and gradually attenuating into radial lines towards periphery where slight decussate sculpture discernible.

Dimensions of holotype

Height 6.92 mm; diameter 14.05 mm; aperture height 5.60 mm; umbilicus width 2 mm.

Remarks

This species possesses the characteristic columellar callus and protoconch spiral sculpture of *Erepta*. Of the seven species comprising this genus, *E. chloritiformis* has the most depressed shell of all, being over two times as broad as high. Its broad umbilicus also differentiates it from *E. odontina* (Morelet, 1851), *E. stylodon* (Pfeiffer, 1842), *E. pyramidalis* n. sp. and *E. wendystrahmi* Griffiths, 2000. While the two remaining *Erepta*, namely *E. thiriouxi* (Germain, 1918) and *E. setiliris* (Benson, 1859), both have an umbilicus, neither has the decussate sculpture of *E. chloritiformis*. Furthermore, *E. thiriouxi* lacks the rounded periphery of *E. chloritiformis* and is 30% smaller in diameter while *E. setiliris* possesses prominent radial ridges on the upper side of the shell, which are absent in *E. chloritiformis*, and is about half the diameter of the latter. Despite considerable survey effort, this distinctive snail has only been found as old shells in a subfossil deposit at the type locality. An old shell fragment comprising the umbilical region (V. Florens personal collection) found in a subfossil deposit in a lava pit south of Mont Blanc may also belong to this species. The species is thus considered likely to be extinct.

Etymology

Named for the striking resemblance of this species to members of the camaenid genus *Chloritis*.

Erepta pyramidalis n. sp.

(Fig. 4*D,E*)

Type material

Holotype. Mauritius, 750 m S. of Mont Blanc, 20°28´35´´S 57°29´15´´E, 190 m, dead adult buried in deposits under rock overhang on upper scarps of lava pit, in nearly pure alien secondary vegetation, coll. V. F, 1 Nov. 1997 (AMS C204752).

Description

Shell solid, trochoidal conical and pale brown. Spire outline straight to slightly convex. Protoconch whorls 1.5. Teleoconch whorls ~4.75, slightly convex, regularly increasing, suture weakly impressed, last whorl with strongly angulated periphery. Base flat, umbilicus closed. Aperture compressed-lunate, lip thickened on inside. Columella strongly reflected outwards. Pronounced tooth-like callosity on inner side of peristome. Region where columella joins base of whorl broadly excavated. Parietal area indistinct. Protoconch with fine spiral lines; teleoconch with fine radial growth lines crossed by spiral ribs, giving shell decussate appearance under 40× magnification. Underside of shell bearing similar decussate sculpture, particularly near periphery.

Dimensions of holotype

Height 6.95 mm; diameter 6.95 mm; aperture height 2.29 mm; aperture width 2.78 mm.

Remarks

This species possesses the characteristic columellar callus and protoconch spiral sculpture of *Erepta*. It is readily distinguishable from all other species of *Erepta* in possessing a strong keel and a high spire that gives it its pyramidal shape. It is consequently equidimensional, a feature hitherto not observed in the genus and in stark contrast with the depressed shells of its sister species. Even though only one specimen was found, we believe it warrants species status given its strikingly distinguishing features. Several other species were represented at the same site by only one or two shells and no species of *Erepta* occurred there in numbers. Despite considerable survey efforts no living material or fresh shells could be found of this species and it is thus considered likely to be extinct.

Etymology

Named for its pyramidal shape that is unique for the genus.

Superfamily **STREPTAXOIDEA**

Family **STREPTAXIDAE**

This family has an Afro-Oriental-Neotropical distribution. In the Mascarenes there are seven native genera and one cryptogenic genus (Griffiths and Florens unpublished data). The extensive radiation of Streptaxidae in the Mascarenes is one of the major features of the fauna, with 41 native and one cryptogenic species already described (Griffiths and Florens unpublished data).

Microstrophia Mollendorf, 1887

Type species: *Pupa clavulata* Lamarck, 1822.

This genus occurs only on Mauritius, where it is represented by four species (Griffiths 2000) in addition to those described below. *Microstrophia* is considered by some authors (Zilch 1959) to be a subgenus of *Gonospira*. It is considered as a full genus here following Schileyko (2000). It is characterised by small elongate shells with narrow apertures containing strong apertural lamella and juvenile shells having a very wide umbilicus.

Microstrophia abnormala n. sp.

(Figs 2*F*, 3*D*, 4*H,I*)

Type material

Holotype. Mauritius, 900 m west of Quinze Cantons, Vacoas, 20°18´00´´S 57°27´30´´E, 340 m, dead adult buried in deposits at the base of cliff on upper scarps of Rivière du Rempart valley in nearly pure alien secondary vegetation, coll. Cláudia Baider & V. F., 11 Sep. 2000 (AMS C204758).

Paratypes. Four adult and subadult shells from the type locality (AMS C204759).

Description

Shell pupiform, white. Protoconch one whorl; teleoconch ~7.25 whorls, last half whorl slightly constricted at base. Suture shallow, crenulated. Base tapering. Umbilicus deep and slit like. Aperture narrowly ovate-lunate with three barriers: one strong parietal lamella extending from half-whorl deep inside aperture to plane of outer lip where it slants slightly to right; small low basal barrier commencing inside aperture at middle palatal level and extending short way further in; strong columellar plait deep inside aperture formed by internal projection of slit-like umbilicus. Outer lip thickened, reflected outwards with shallow constriction mid-way down. Columella thickened, slightly reflected outwards, almost straight. Parietal area broad and glazed. Protoconch with faint irregular radial lines imparting malleated appearance; teleoconch covered in strong oblique radial ribs perceptibly stronger at each succeeding whorl. Troughs between radial ribs spirally striate on either side of sutures, particularly on lower side, except on last whorl where spiral striae also occur further from suture.

Dimensions of holotype

Height 7.92 mm; diameter 3.88 mm; aperture height 2.26 mm.

Remarks

Young juveniles have a broad umbilicus that narrows progressively as the shell grows. This feature, together with the strong radial ribs and strong parietal lamella, justify placing this species in *Microstrophia*. It also shares the spiral striae present in other members of *Microstrophia* with the exception of *M. nana* Peile, 1936. Although it superficially most resembles *M. clavulata* (Lamarck, 1822), this species differs from the latter and all other *Microstrophia,* in several important ways, including possession of: (*1*) a parietal lamella that extends very deeply into the aperture; (*2*) a low blunt ridge seated deeply in the aperture in the middle palatal region; (*3*) a strong columellar plait resulting from a slight kink in the last half whorl; (*4*) radial ribs set more obliquely, reminiscent of *Gonospira*; and (*5*) a relatively wide aperture again more reminiscent of *Gonospira*. It is thus a species combining certain features of *Microstrophia* and *Gonospira* while also possessing unique features absent from these two genera. Subadults possess a roughly t-shaped aperture as a

result of the deep apertural ridges described above. Apart from the type locality, this species was also found at Bassin Blanc, in the south of Mont Blanc, and on Ile aux Aigrettes (V. Florens personal collection) together with shells that have been dated at 15000–5000 years BP (Goodfriend, personal communication 1992). Despite considerable survey effort this species has not been found other than in subfossil deposits and is thus considered likely to be extinct.

Etymology

Named for the possession of features hitherto unrecorded in *Microstrophia*.

Microstrophia baideri n. sp.

(Figs 2*B*, 3*E*)

Type material

Holotype. Mauritius, 900 m west of Quinze Cantons, Vacoas, 20°18´00´´S 57°27´30´´E, 340 m, dead adult buried in deposits at the base of cliff on upper scarps of Rivière du Rempart valley in nearly pure alien secondary vegetation, coll. Cláudia Baider & V. F., 11 Sep. 2000 (AMS C204763).

Paratypes. Two adult and one juvenile shell from the type locality (AMS C204764).

Description

Shell white, cylindrical-pupiform, spire outline straight except first four strongly domed whorls. Protoconch: one whorl, flat, smooth; teleoconch: seven whorls, regularly increasing, slightly convex. Suture shallow, crenulate. Base tapered. Umbilicus closed in adults, very narrow, almost circular in juveniles. Aperture elongate, compressed vertically, set distinctly to right of vertical axis of shell. Aperture edge thickened, reflected. A strong slightly sinuous parietal lamella extends one third of aperture length into aperture. Upper right part of aperture recessed back, forming sinus-like slit to right of parietal lamella. Columella thickened, reflected, almost straight. Parietal area thickened and raised forming continuous edge to left of parietal lamella. Teleoconch covered with regular, thick, prominent, radial ribs.

Dimensions of holotype

Height 4.22 mm; diameter 1.8 mm; aperture height 1.06 mm.

Remarks

This species possesses the type of sculpture and aperture characterising *Microstrophia*. However it is unique in that juvenile shells lack the broad umbilicus characteristic of all other species included in this genus. Its cylindrical shape and strong radial ribs are reminiscent of some *Cerion* species from Bahamas and distinguish it readily from the other five *Microstrophia* that possess relatively less strong ribs and various shapes different from the present. *M. baideri* is also the most elongate of the taxa included in *Microstrophia*, with a height to diameter ratio exceeding 2.3, as opposed to the other species that ranged from 1.65 to 2.0. This snail has only been found as shells in subfossil deposits at the type locality and at Bassin Blanc. Despite considerable survey efforts in these localities and elsewhere, no live or fresh specimens have been found and it is thus considered likely to be extinct.

Etymology

Named for Dr Cláudia Baider who co-discovered this species and several others.

Discussion

The fact that new taxa recently described from Mauritius and Rodrigues are overwhelmingly subfossil while new taxa from Réunion tend to be extant (Griffiths 2000; this study) seems to reflect the different degrees of deforestation between the three islands: original forested areas cover only ~5% of Mauritius (Safford 1997), < 1% of Rodrigues (Cheke 1987) and 30% of Réunion (Strasberg 1994). Consequently while just over a third of the native snail species of Mauritius and Rodrigues have already become extinct, only 12% of those from Réunion have disappeared (Florens and Griffiths 2000).

A feature of the Mascarenes that allows an understanding of their extinct snail fauna is the wealth of subfossil sites that occur there. These include limited limestone sites on Mauritius and Rodrigues, and large numbers of subfossil sites under large basalt boulders on all three islands. It is true to say that any collection of large basalt boulders in the Mascarenes, providing they have relatively dry overhangs and are orientated so as not to be scoured out by cyclonic rains, will yield subfossil snails ranging in age from the time of local forest clearance (approximately 200 years ago) to at least as old as sites such as at Snail Rock, south of the capital Port Louis, that have been dated at 2500–1000 years BP (Goodfriend, personal communication 1992). Such sites, while mostly yielding only snails, have on occasion yielded subfossil remains of other extinct fauna (Cowles 1987; Florens 2002).

These subfossil deposits continue to yield new snail species at a surprising rate. At least 19 new species were found between 1989 and 2000, representing a 13% addition to the hitherto known native terrestrial molluscs of the region. One trend in the discovery of these new species is that most come from the island of Mauritius. Fifteen (79%) of these new species occur on Mauritius as against three for Réunion and two for Rodrigues (the total exceeds 19 since one of the species occurs on two islands). Even accounting for the fact that Mauritius has a more diverse molluscan fauna, this trend in new species discoveries does seem to reflect the fact that the authors, who live on Mauritius, survey it far more extensively than the islands of Rodrigues and Réunion. It is thus probable that several new species await discovery once greater survey effort is made on these two latter islands, particularly on Réunion, which is larger and more diverse in habitat types.

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