

ALCADIA (*MICROALCADIA*) IN COLOMBIA (GASTROPODA: HELICINIDAE)

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Abstract Four new *Alcadia* (*Microalcadia*) species (*Gastropoda: Helicinidae*) are described from the Cordillera Oriental in the Departamentos Cundinamarca and Boyacá in Colombia.

Key words *Alcadia, Helicinidae, systematics, distribution, Colombia*

INTRODUCTION

Alcadia (*Microalcadia*) has been described only recently by Richling (2004). So far, only two ground-dwelling species from Costa Rica have been included in *Microalcadia*. During a land snail survey by the author and staff of the Facultad de Ciencias of the Universidad Militar Nueva Granada in Colombia, several new *Microalcadia* species were found in litter in Andean forests in the Cordillera Oriental in the Departamentos Cundinamarca and Boyacá and will be described in the following.

MATERIAL AND METHODS

Most of the material was extracted from dried litter samples. The counting of the shell whorls (exactness 0.25) follows Kerney & Cameron (1979: 13). Shells were photographed without coating in a variable pressure scanning electron microscope (Leo 1455VP). The material on which this study is based is kept in the Instituto de Ciencias Naturales of the Universidad Nacional de Colombia, Santafé de Bogotá (UNAL); and in the Zoologisches Museum der Universität Hamburg (ZMH).

Additional abbreviations: D = shell diameter; H = shell height; leg. = collected by.

TAXONOMIC DESCRIPTIONS

Helicinidae Latreille, 1825

Alcadia (*Microalcadia*) Richling, 2004

Remarks According to Richling (2004), *Alcadia* Gray, 1840 is characterized conchologically by more or less strong oblique grooves and coarse, irregularly spaced radial threads on the embryonic shell. *Microalcadia* is characterized by small, fragile shells with spiral striations and periostracal hairs and by the simple, not thickened lip.

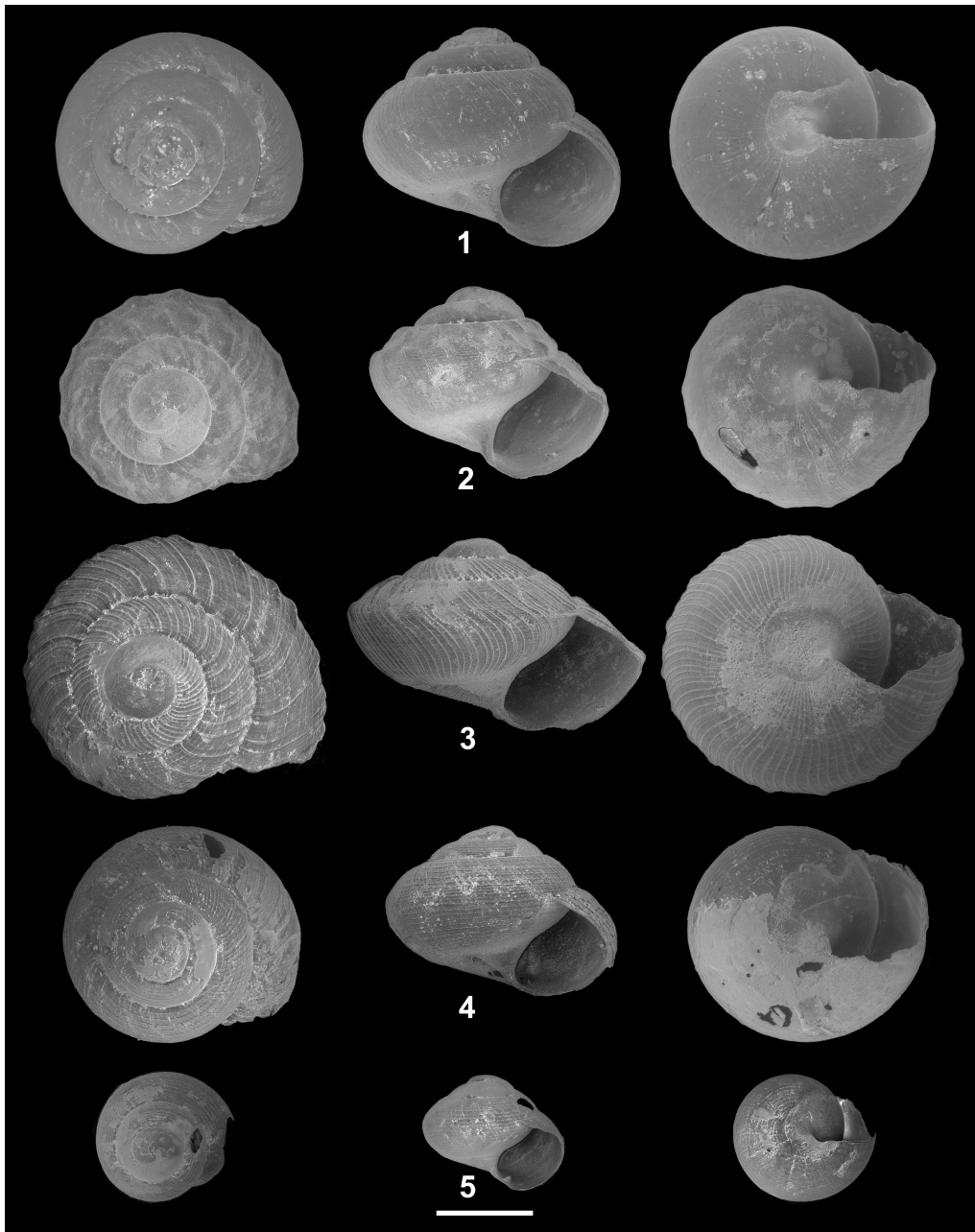
Alcadia (*Microalcadia*) *novogranadensis* n. sp.

Holotype Colombia, Departamento Boyacá: Villa de Leiva, Cañon de Mamaramo near Carrizal in Vereda La Capilla II, entrance to Santuario de Flora y Fauna Iguaque, Andean forest, 2920 m altitude, 05°42'24"N 73°27'27"W (ZMH 4439, leg. B. Hausdorf 16. March 2000, measurements: D = 2.7 mm, H = 2.3 mm).

Paratypes Colombia, Departamento Boyacá: Villa de Leiva, Cañon de Mamaramo near Carrizal in Vereda La Capilla II, entrance to Santuario de Flora y Fauna Iguaque, Andean forest, 2920 m altitude, 05°42'24"N 73°27'27"W (UNAL; ZMH 4221); Barbosa 5 km towards Arcabuco, forest near quarry El Cairo in Vereda Pueblo Viejo, 1840 m altitude, 05°53'55"N 73°35'08"W (ZMH 4173).

Type locality Colombia, Departamento Boyacá: Villa de Leiva, Cañon de Mamaramo near Carrizal in Vereda La Capilla II, entrance to Santuario de Flora y Fauna Iguaque, Andean forest, 2920 m altitude, 05°42'24"N 73°27'27"W.

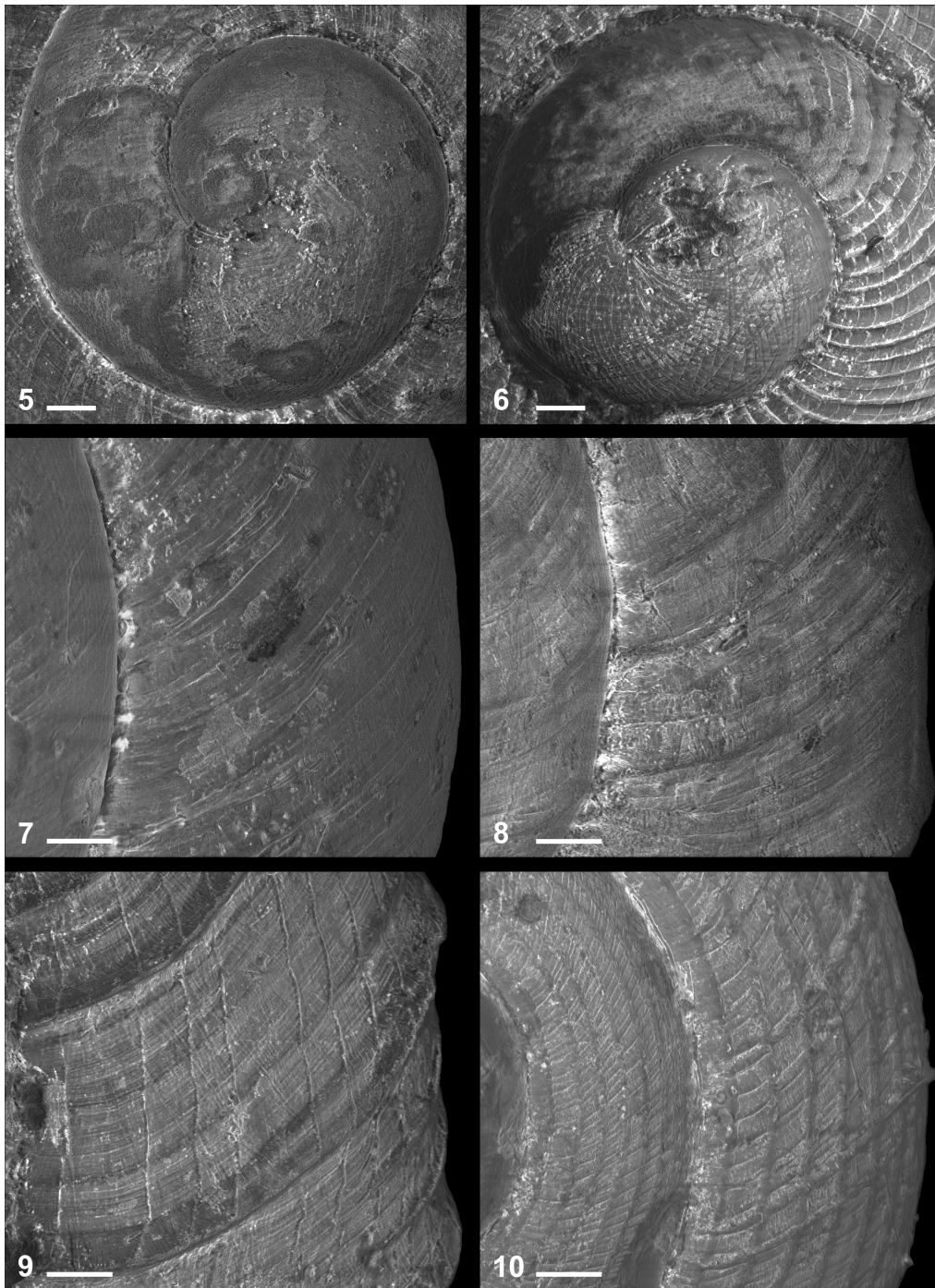
Diagnosis *A. novogranadensis* is characterized by a depressed conical-globular shell with distinct spiral striae and a rounded body whorl.



Figs 1-5 Colombian *Alcadia* (*Microalcadia*) species. Scale bar = 1 mm. **1** *Alcadia* (*Microalcadia*) *novogranadensis* n. sp., Departamento Boyacá: Villa de Leiva, Cañon de Mamaramo, entrance to Santuario de Flora y Fauna Iguaque (holotype ZMH 4439). **2** *Alcadia* (*Microalcadia*) *nodulosa* n. sp., Departamento Boyacá: Villa de Leiva, Cañon de Mamaramo, entrance to Santuario de Flora y Fauna Iguaque (holotype ZMH 4222). **3** *Alcadia* (*Microalcadia*) *deussata* n. sp., Departamento Cundinamarca: Cachipay 5.5 km towards Zipacón (holotype ZMH 4291). **4** *Alcadia* (*Microalcadia*) *bullula* n. sp., Departamento Cundinamarca: Cachipay 5.5 km towards Zipacón (holotype ZMH 4292). **5** *Alcadia* (*Microalcadia*) n. sp., Departamento Boyacá: Moniquira 16.7 km towards Arcabuco (ZMH 4119).

Shell (Fig. 1, 8) depressed conical-globular; with 3.25-3.75 convex whorls; teleoconch with fine growth-striae and distinct spiral striae; brownish; body whorl rounded; aperture almost circular; upper insertion of the peristome not descend-

ing; peristome neither expanded nor thickened; the columellar edge of the peristome passes into the umbilical callus; opposite to the columellar edge the base is somewhat excavated around the umbilical callus.



Figs 6-11 Colombian *Alcadia* (*Microalcadia*) sp. Scale bar = 0.1 mm. **6-7** Protoconch. **6** *Alcadia* (*Microalcadia*) *nodulosa* n. sp., Departamento Boyacá: Villa de Leiva, Cañón de Mamaramo, entrance to Santuario de Flora y Fauna Iguaque (holotype ZMH 4222). **7** *Alcadia* (*Microalcadia*) *decussata* n. sp., Departamento Cundinamarca: Cachipay 5.5 km towards Zipacón (holotype ZMH 4291). **8-11** Sculpture of the body whorl. **8** *Alcadia* (*Microalcadia*) *novogranadensis* n. sp., Departamento Boyacá: Villa de Leiva, Cañón de Mamaramo, entrance to Santuario de Flora y Fauna Iguaque (holotype ZMH 4439). **9** *Alcadia* (*Microalcadia*) *nodulosa* n. sp., Departamento Boyacá: Villa de Leiva, Cañón de Mamaramo, entrance to Santuario de Flora y Fauna Iguaque (holotype ZMH 4222). **10** *Alcadia* (*Microalcadia*) *decussata* n. sp., Departamento Cundinamarca: Cachipay 5.5 km towards Zipacón (holotype ZMH 4291). **11** *Alcadia* (*Microalcadia*) *bullula* n. sp., Departamento Cundinamarca: Cachipay 5.5 km towards Zipacón (holotype ZMH 4292).

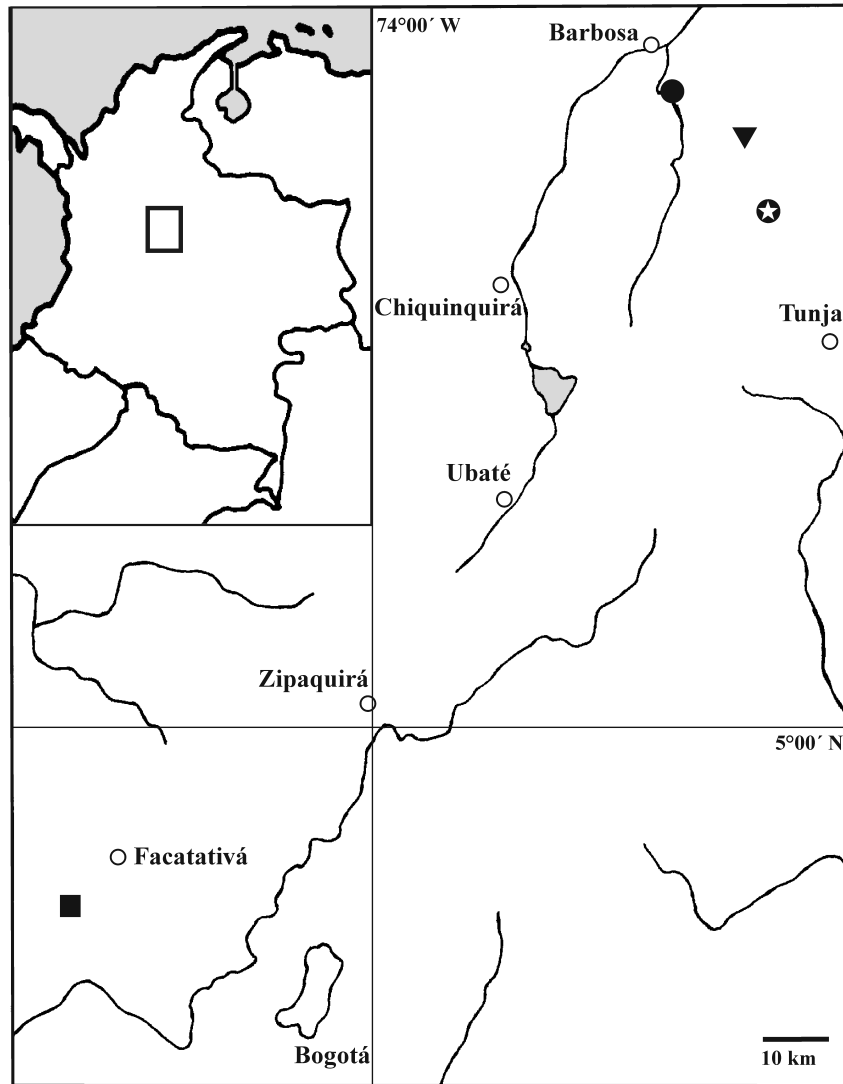


Fig. 12 Distribution of the *Alcadia* (*Microalcadia*) species in central Colombia (2'-squares). Inset: position of the study area in Colombia. • *Alcadia* (*Microalcadia*) *novogranadensis* n. sp., ☆ *Alcadia* (*Microalcadia*) *nodulosa* n. sp., ■ *Alcadia* (*Microalcadia*) *decussata* n. sp. and ■ *Alcadia* (*Microalcadia*) *bullula* n. sp., ▼ *Alcadia* (*Microalcadia*) n. sp.

Measurements Villa de Leiva, Cañon de Mamaramo, entrance to Santuario de Flora y Fauna Iguaque (n = 10): D: 2.4-2.8 mm, ϕ = 2.6 mm; H: 2.1-2.5 mm, ϕ = 2.2 mm; D/H: 1.120-1.238, ϕ = 1.181.

Distribution (Fig. 12) So far, *A. novogranadensis* is known only from Andean forests in the Departamento Boyacá in Colombia.

Derivation of name The specific epithet is derived from New Granada, which is the former name of Colombia as well as the name of the university which organized the excursions during which

this species has been discovered, the Universidad Militar Nueva Granada in Santafé de Bogotá.

Alcadia (*Microalcadia*) *nodulosa* n. sp.

Holotype Colombia, Departamento Boyacá: Villa de Leiva, Cañon de Mamaramo near Carrizal in Vereda La Capilla II, entrance to Santuario de Flora y Fauna Iguaque, Andean forest, 2920 m altitude, 05°42'24"N 73°27'27"W (ZMH 4222, leg. B. Hausdorf 16. March 2000).

Type locality Colombia, Departamento Boyacá:

Villa de Leiva, Cañon de Mamaramo near Carrizal in Vereda La Capilla II, entrance to Santuario de Flora y Fauna Iguaque, Andean forest, 2920 m altitude, 05°42'24"N 73°27'27"W.

Diagnosis *A. nodulosa* is characterized by a depressed conical shell with two rows of strong radial nodes above the periphery, distinct spiral striae and an angular body whorl.

Shell (Fig. 2, 6, 9) depressed conical; with 2.75 weakly convex whorls; protoconch with irregular oblique striae; teleoconch with fine growth-striae, interrupted ribs forming two rows of strong radial nodes above the periphery (16 ribs on the last whorl) and with distinct spiral striae; brownish; body whorl angular; aperture rounded rhomboid; upper insertion of the peristome not descending; peristome neither expanded nor thickened; the columellar edge of the peristome passes into the umbilical callus; opposite to the columellar edge the base is somewhat excavated around the umbilical callus.

Measurements holotype: D: 2.7 mm; H: 2.1 mm; D/H: 1.29.

Distribution (Fig. 12) So far, *A. nodulosa* is known only from an Andean forest in the Departamento Boyacá in Colombia.

Derivation of name The species is named after its sculpture: lat. nodulosus = with small nodes.

Alcacia (Microalcacia) decussata n. sp.

Holotype Colombia, Departamento Cundinamarca: Cachipay 5.5 km towards Zipacón, small brook in Andean forest with sandstone boulders, 2200 m altitude, 04°44'53"N 74°24'06"W (ZMH 4291, leg. B. Hausdorf 20. March 2000).

Type locality Colombia, Departamento Cundinamarca: Cachipay 5.5 km towards Zipacón, small brook in Andean forest with sandstone boulders, 2200 m altitude, 04°44'53"N 74°24'06"W.

Diagnosis *A. decussata* is characterized by a

strongly depressed conical shell with irregular ribs, strong spiral striae and an angular body whorl.

Shell (Fig. 3, 7, 10) strongly depressed conical; with 3 weakly convex whorls; protoconch with coarse irregular oblique incised striae; teleoconch with irregular growth-striae, irregular ribs which are most accentuated near the periphery and near the suture (about 19 ribs on the last whorl) and with strong spiral striae; brownish; body whorl angular; aperture rounded rhomboid; upper insertion of the peristome not descending; peristome neither expanded nor thickened; the columellar edge of the peristome passes into the umbilical callus; opposite to the columellar edge the base is somewhat excavated around the umbilical callus.

Measurements holotype: D: 3.2 mm; H: 2.1 mm; D/H: 1.52.

Remarks *A. decussata* differs from *A. nodulosa* in the more depressed shell with stronger growth ridges and ribs which are not interrupted in the middle of the upside of the whorls, but are also most accentuated near the periphery and near the suture.

Distribution (Fig. 12) So far, *A. decussata* is known only from an Andean forest in the Departamento Cundinamarca in Colombia.

Derivation of name The species is named after its decussate (lat. decussatus) sculpture.

Alcacia (Microalcacia) bullula n. sp.

Holotype Colombia, Departamento Cundinamarca: Cachipay 5.5 km towards Zipacón, small brook in Andean forest with sandstone boulders, 2200 m altitude, 04°44'53"N 74°24'06"W (ZMH 4292, leg. B. Hausdorf 20. March 2000).

Type locality Colombia, Departamento Cundinamarca: Cachipay 5.5 km towards Zipacón, small brook in Andean forest with sandstone boulders, 2200 m altitude, 04°44'53"N 74°24'06"W.

Diagnosis *A. bullula* is characterized by a strongly depressed conical-globular shell with strong spiral striae and a rounded body whorl.

Shell (Fig. 4, 11) strongly depressed conical-globular; with 3.25 convex whorls; protoconch with irregular oblique striae; teleoconch with fine growth-striae and strong spiral striae (about 7 on the upside of the last but one whorl) and hairs (ca. 0.2 mm long; worn except one at the periphery); brownish; body whorl rounded; aperture kidney-shaped; upper insertion of the peristome not descending; peristome neither expanded nor thickened; the columellar edge of the peristome passes into the umbilical callus; opposite to the columellar edge the base is somewhat excavated around the umbilical callus.

Measurements holotype: D: 2.5 mm; H: 1.9 mm; D/H: 1.32.

Remarks *A. bullula* is most similar to *A. novogranadensis* from which it differs in the more depressed shell with strong spiral striae.

Distribution (Fig. 12) So far, *A. bullula* is known only from an Andean forest in the Departamento Cundinamarca in Colombia.

Derivation of name Lat. bullula = a small button (used as a noun in apposition).

Alcacia (Microalcacia) n. sp.

Remarks There is a juvenile specimen from the Departamento Boyacá, Moniquira 16.7 km towards Arcabuco, primary Andean forest, W slope, 2500 m altitude, 05°48'11"N 73°29'05"W (Fig. 5; ZMH 4119), that is similar to *A. bullula*, but differs from that species in the less depressed shell with more dense spiral striae. It probably represents an additional undescribed species.

CONCLUDING REMARKS

All new *Microalcacia* species were found in a land snail survey in 2000 during which litter samples were taken at 25 forest sites in the Cordillera Oriental in central Colombia (all within the area shown in Fig. 12). Most forests were more or less strongly degraded. *Microalcacia* species were

found in only four of the samples. Considering only these four samples, the highest total abundance of snails has been recorded in the sample from near Barbosa in which 119 specimens were found in 2 l of debris. Nevertheless, there was only a single *Microalcacia*. The highest *Microalcacia* abundance has been recorded in a 6 l sample from the entrance to Santuario de Flora y Fauna Iguaque which included 11 *A. novogranadensis* and 1 *A. nodulosa*. *Microalcacia* species are neither frequent nor abundant. It seems to be justified to establish new species on single specimens, because the species are very different and because it cannot be expected that much additional material of these species will become available in the next future. Hopefully, the knowledge of the existence of these species will promote conservation efforts for the endangered habitats of these snails.

The discovery of five new *Microalcacia* species during a single expedition in a rather small area near the capital of Colombia indicates that the actual number of *Microalcacia* species in Colombia might be one order of magnitude higher. Whereas the larger land snails of Colombia, especially the Orthalicidae, are comparatively well known, the highly diverse smaller groups are hardly explored (see also Hausdorf 2003, in press).

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