

# THE *ABBOTTELLA MORELETIANA* COMPLEX IN HISPANIOLA: DISTRIBUTIONAL NOTES, A NEW SPECIES, AND THE RECOGNITION OF A NEW SUBFAMILY (ANNULARIIDAE: ABBOTTELLINAE)

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*Abstract* The Hispaniolan *Abbottella moreletiana* complex is reviewed. A new species, *Abbottella crataegus* sp. nov., is described. Based on phylogenetic evidence, shell morphology, and radular characteristics, *Abbottella* and its associated genera *Leiabbottella*, *Lagopoma*, and *Rolleia* are placed in a new subfamily of the Annulariidae, the Abbottellinae.

*Key words* Hispaniola, Gastropoda, Annulariidae, Annulariinae, *Abbottella crataegus* sp. nov.

## INTRODUCTION

*Abbottella* and its relatives evolved on Hispaniola exclusive of the Tiburon and Barahona Peninsulas, which have different geologic histories from the remainder of the island. As pointed out by Watters (2013), a single species occurs in Cuba, *A. decolorata* (Pfeiffer, 1859). However, that species occurs in Guantánamo, the eastern-most point on Cuba, less than 90km away from the western-most point of northern Haiti at Bombardopolis, where the closely related *A. bompardopolensis* Bartsch, 1946, occurs. In all likelihood *A. decolorata* was the result of rafting across this strait from Haiti.

Members of this group, like most Annulariidae, are extreme calciphiles, never being found far from limestone outcrops. They are often associated with mesic habitats. Most species occupy very narrow ranges, some occurring in fewer than 20km of outcrops, some known only from the type locality. Although portions of their ranges have been clear cut for coffee groves, a surprisingly large amount of their habitat now lies in national parks and reserves. Individuals may be locally abundant.

Watters (2013) recognized five species complexes within *Abbottella* based on shell characteristics. One of those complexes was the *A. moreletiana* group, discussed here.

## MATERIAL AND METHODS

The material used in this study was largely derived from the extensive collections made

by Dr. Fred Thompson in Hispaniola now contained in the collection of the Florida Museum of Natural History. Descriptions and measurements were based on shells oriented with the spire up and the aperture facing the viewer. Length was measured from the tip of the protoconch to the opposite anterior-most extension of the outer lip. Width was measured from the left edge of the adult whorl to the opposite maximum right extension of the outer lip. Subsets of the largest and smallest adult specimens were selected by eye from all available specimens and measured to determine the minimum and maximum lengths. The number of whorls was determined using the 1 D method of Van Osselaer (1999). This method uses the beginning suture of the protoconch as the starting point, orienting the shell by a tangent to this point. The end point is the last point on the teleoconch suture. Numbers in ( ) after catalog numbers are the total number of specimens in the lot.

Collection abbreviations: ANSP – Academy of Natural Sciences, Philadelphia, PA, USA; GTW – Collection of the author; UF – Florida State Museum of Natural History, Gainesville, FL, USA; USNM – U.S. National Museum of Natural History, Washington D.C., USA.

## SYSTEMATICS

Family Annulariidae Henderson & Bartsch, 1920

Abbottellinae new subfamily

Type genus: *Abbottella* Henderson & Bartsch, 1920

*Description* Adult shell small (ca. 5mm width for *Abbottella diadema* Watters, 2013, to ca. 15mm width for *Abbottella domingoensis* Bartsch, 1946), turbinoid to planispiral, never normally decoliate. Shell sculpture varies from nearly smooth (*Leiabbottella*), to having predominately axial lamellae (*Rolleia*), to having both axial lamellae and spiral cords, often resulting in a prickly or serrate surface (*Abbottella*, *Lagopoma*). Aperture circular, outer lip usually extensively expanded and fimbriated. Animal with eyes at base of tentacles, snout bifid, ending in a pair of small secondary tentacles, foot longitudinally furrowed, motion ditaxic. Taenioglossate radula composed of seven teeth per row in the pattern 2+1+R+1+2 (figure 28). A unicuspid central or rhachidian tooth is flanked by one pair of unicuspid laterals and two pairs of marginals. Inner marginal with a large, triangular cusp with a single, much smaller, basal tooth on the outer side. Outer marginal distally divided into numerous thin teeth. Operculum with a proteinaceous “chondroid” base upon which is attached an erect multispiral calcareous lamella; this lamella may be curved outward at its distal margin.

*Remarks* The subfamily is defined by the combination of shell form and sculpture, the operculum, and the radular type. This combination does not occur in any other annulariid group. In addition to *Abbottella* I include the genera *Leiabbottella* Watters, 2013, *Lagopoma* Bartsch, 1946, and *Rolleia* Crosse, 1891, in this subfamily as well. Zoogeographically the subfamily is known only from non-Tiburón Peninsula Hispaniola (with the single Cuban exception noted above).

The radulae of all species in the subfamily have triangular inner marginals, each bearing a smaller basal tooth. Of the 111 species and 37 genera for which I have examined annulariid radulae, this dentition occurs very rarely outside of this subfamily and may be convergent, but is only consistently found here.

The subfamily also is united in having a small, turbinoid to planispiral shell bearing well-developed sculpture, a circular aperture, and a multispiral operculum with an erect lamella. These features are reminiscent of *Annularia* Schumacher, 1817, and *Megannularia* Watters, 2006, of Jamaica, but species of those genera are much larger and have a different radular type with multidentate inner marginal teeth.

The recognition of this subfamily is supported by the phylogenetic study of (Skomrock, 2014), which included 91 species and 37 genera of Annulariidae. That study indicated that *Abbottella* forms a distinct, well-supported basal clade lying between the Pomatiidae and the remaining Annulariidae.

Genus *Abbottella* Henderson & Bartsch, 1920

Type species: *Choanopoma moreletiana* Crosse, 1873, by original designation.

*Abbottella moreletiana* Complex

*Description* Watters (2013) recognized five species complexes based on shell characteristics. One of those complexes was the *A. moreletiana* group. This is a small group of species having pronounced sculpture, usually prickly or thorny, and a nearly planispiral shell with a flaring outer lip.

*Note* *Abbottella moreletiana kriegeri* Bartsch, 1946, was described from the northern coast of the Samaná Peninsula. It appears to be more closely related, both conchologically and geographically, to the *A. rosaliae* complex as defined by Watters (2013) and is not included in this study.

#### *Abbottella moreletiana* (Crosse, 1873)

(Figs 1–8, 29)

*Choanopoma moreletiana* Crosse, 1873: 354 – Crosse, 1874: 85, pl. 3, figs. 3, 3a. – Pilsbry, 1933: 130. – Watters, 2006: 361.

*Choanopoma moreletianum* Crosse, 1873 – Pfeiffer, 1876: 160–161. – Kobelt, 1880: 277. – Crosse, 1891: 168.

*Tudorae* [sic] *moreletianae* [sic] (Crosse, 1873) – Arango, 1884: 211.

*Abbottella moreletiana* (Crosse, 1873) – Henderson & Bartsch, 1920: 75. – Thiele, 1931: 134. – Abbott, 1989: 53.

*Choanopoma* (*Abbotella* [sic]) *moreletianum* Crosse, 1873 – Clench & Aguayo, 1937: 67.

*Chondropoma moreletianum* (Crosse, 1874) – Bartsch, 1946: 143.

*Abbottella moreletiana moreletiana* (Crosse, 1873) – Bartsch, 1946: 147, pl. 25, figs. 10–12.

*Abbottella* (*Abbottella*) *moreletiana moreletiana* (Crosse, 1873) – Watters, 2006: 361–362.

*Holotype* ANSP 14166.



**Figures 1–28** 1–8 *Abbottella moreletiana*. 1–3 UF 216190, W=12.3mm; 4 UF 216190, W=11.7mm; 5 UF 158838, W=11.0mm; 6 UF 158838, W=11.4mm; 7 UF 158838, W=11.1mm; 8 UF 158838, W=7.7mm. 9–16 *Abbottella dominicensis*. 9–11 UF 216133, W=15.2mm; 12 UF 216133, W=13.2mm; 13 UF 158838, W=10.7mm; 14 UF 216130, W=11.4mm; 15 UF 216126, W=12.9mm; 16 GTW 7071f, W=10.9mm. 17–24 *Abbottella crataegus*. 17–19 Holotype, UF 216138, W=12.0mm; 20 UF 216199, W=10.0mm; 21 Paratype 4, UF 216138, W=10.6mm; 22 Paratype 5, UF 216138, W=10.6mm; 23 UF 216142, W=13.2mm; 24 UF 216142, W=12.3mm. 25–27 *Abbottella* sp. GTW 7071d, W=12.6. 28 Radula, *Abbottella rosaliae* (Pfeiffer, 1858). IM=inner marginal. Scale bar=100 $\mu$ .



*Type locality* "In regione Dominicanum insulae Haïti, Antillarum." Restricted here to Sabana de la Mar, Hato Major Province, Dominican Republic.

*Material examined* (817 specimens) UF 119149 (17), San Lorenzo Bay, Hato Major Province; UF 119150(7), San Lorenzo Bay, Hato Major Province; UF 158838(20), San Lorenzo Bay, Hato Major Province; GTW 7071a(2), Boca del Infierno, Hato Major Province; OSUM 14167(450), Boca del Infierno, Hato Major Province; UF 31326(200), Boca del Infierno, Hato Major Province; UF 216148(50), 8km W of Sabana de la Mar, Hato Major Province; UF 216190(71), 12km W of Sabana de la Mar, Hato Major Province.

*Redescription* Maximum size seen: 13.1mm W×7.4mm H. Minimum size seen: 7.8mm W×5.9mm H. Protoconch of 1.5 minute, microscopically pustulose whorls, finely demarcated from teleoconch whorls, white. 2.5 to just over 3 teleoconch whorls. Shell nearly planispiral but low spire evident. Last 1/8 of final whorl deflected downward and narrowly detached from the previous whorl. Umbilicus wide, open to protoconch. Suture deep and narrow. Axial sculpture of ca. 40–50/whorl regularly spaced, very fine, narrow, low 1° lamellae between which are 3–10 slightly smaller 2° lamellae. Spiral sculpture of ca. 8–10 low cords between the suture and the umbilicus; ca. 6–9 much narrower cords in the umbilicus. Intersections of 1° axials and spiral cords produced into short, hollow spines that are elongated along the axial lamellae; cords in umbilicus lack these spines. 2° axial lamellae lack spines. Demarcation between umbilicus and remainder of whorl well-defined. Inner lip round, smooth, barely exerted. Outer lip wide, flaring, fimbriated, narrowest facing umbilicus, with wide, prominent adapical auricle; auricle widely attached to previous whorl. Outer lip slightly reflected abaperturally anteriorly, concave adaperturally posterior. Spiral cords continue onto back of outer lip but are spineless. Base color white, occasionally with base of earlier whorls smeared with dark brown. Some specimens with broken brown bands or spots between the spiral cords. Bands continue onto both sides of outer lip. Inner lip spotted with brown. Most specimens, even if otherwise white, have a brown spot on the outer lip where it is attached with the

previous whorl. Spines white. Operculum with single erect, white calcareous lamella, recurved at the distal edge but often broken off.

*Etymology* Pierre Marie Arthur Morelet (26 August 1809–9 October 1892), French naturalist and malacologist working in Central America, Africa, and Europe.

*Distribution* Bartsch (1946) correctly identified Crosse's species as the one living on the southern side of Samaná Bay, including the nearshore Lower and Upper Orange keys. It appears to have a narrow range on the southwestern side of the bay from approximately Boca del Infierno to Sabana de la Mar in Samaná and Hato Major provinces in the Los Haitises Limestone. Much of the range occurs within the Parc National Los Haitises. This species occurs in mesic forests in association with karst hills and limestone ledges. Locally abundant.

*Differential diagnosis* This species differs from *A. domingoensis* in having fewer 1° axial lamellae (40–50/whorl in *A. moreletiana*, 40–80/whorl in *A. domingoensis*), which are more distinct from the 2° lamellae than in *A. domingoensis*. The sculptural differences between the umbilicus and the remainder of the shell are not as well-defined in *A. domingoensis* and the shell is more planispiral. The sculpture is more spinose in *A. moreletiana* and more lamellate in *A. domingoensis*.

From *A. crataegus*, *A. moreletiana* differs in being less planispiral, having more 1° axial lamellae (30–40 in *A. crataegus*), and in having a more erect opercular lamella.

***Abbottella domingoensis* Bartsch, 1946**  
(Figs 9–16, 30)

*Abbottella moreletiana domingoensis* Bartsch, 1946: 147, pl. 25, figs. 1–3. – Watters, 2006: 361–362.

*Abbottella moreletiana gabrieli* Bartsch, 1946: 148, pl. 25, figs. 4–6. – Watters, 2006: 362.

*Abbottella (Abbottella) moreletiana domingoensis* (Crosse, 1873). – Watters, 2006: 362.

*Abbottella (Abbottella) moreletiana gabrieli* (Crosse, 1873). – Watters, 2006: 362.

*Holotype* *Abbottella moreletiana domingoensis* Bartsch, 1946: USNM 504117. *Abbottella moreletiana gabrieli* Bartsch, 1946: USNM 504124.

*Type locality* *Abbottella moreletiana domingoensis* Bartsch, 1946: "Santo Domingo." The type, collected by "Dr. Lagai," was noted only as coming from "Santo Domingo," which Bartsch (1946: 147) suggested was "probably Santo Domingo City." See Remarks below. *Abbottella moreletiana gabrieli* Bartsch, 1946: San Gabriel Isle, Samaná Bay.

*Material examined* (258 specimens) UF 216190(6), 12km W of Sabana de la Mar, Hato Major Province; UF 216126(48), 185m, 10km SW of Trinidad, Monte Plata Province; UF 216185(31), 180m, 4km SSE of Hidalgo, Monte Plata Province; OSUM 22089(1), Bayaguana, Monte Plata Province; UF 216133(38), 185m, 1km NW of Arenoso, Duarte Province; UF 217117(9), 75m, 9km N of Majagual, Duarte Province; UF 216140(41), 100m, W side of Rio Payabo, ca. 10km NE of Cervicos, Duarte Province; UF 216130(82), 60m, Batero, Sánchez Ramírez Province; GTW 7071f(2), 21m, vacant lot under debris and rubble, Barrio de Monte Adentro, Boca Chica, Santo Domingo Province.

*Redescription* Maximum size seen: 14.8mm W×10.0mm H. Minimum size seen: 8.3mm W×6.1mm H. Protoconch of 1.5 minute, microscopically pustulose whorls, finely demarcated from teleoconch whorls, tip white, remainder tan or brown. 2.5 to just over 3 teleoconch whorls. Shell turbinate with low spire. Last 1/8 of final whorl deflected downward and narrowly detached from the previous whorl. Umbilicus wide, open to protoconch. Suture deep and narrow. Axial sculpture of ca. 40–80/whorl irregularly spaced, very fine, narrow, low 1° lamellae between which are 0–5 slightly smaller 2° lamellae, but the difference between the two is often negligible. 1° axials often arranged in groups. Spiral sculpture of ca. 17 low cords between the suture and the umbilicus, some smaller in width than others; ca. 10 much narrower, very faint cords in the umbilicus. Intersections of 1° axials and spiral cords produced into blade-like or scalloped extensions aligned with the axial lamellae; cords in umbilicus lack these extensions. 2° axial lamellae lack extensions. Demarcation between umbilicus and remainder of whorl not well-defined. Inner lip round, smooth, barely to moderately exerted. Outer lip wide, flaring, fimbriated, narrowest facing umbilicus, with wide, prominent adapical auricle; auricle widely

attached to previous whorl. Outer lip slightly reflected abaperturally anteriorly, concave adaperturally posterior. Spiral cords continue onto back of outer lip but lack scalloped extensions. Base color white or brown. Most specimens with broken brown bands or spots between the spiral cords. Bands continue onto both sides of outer lip, which is always white. Inner lip spotted with brown. Extensions white. Operculum with single erect, white calcareous lamella, recurved at the distal edge but often broken off.

*Etymology* *Abbottella moreletiana domingoensis* Bartsch, 1946: from Santo Domingo. *Abbottella moreletiana gabrieli* Bartsch, 1946: from San Gabriel Isle.

*Distribution* Lowlands below 200m around the eastern end of the Cordillera Septentrional and the northern Cordillera Oriental in the Rio Yuna valley and its tributaries, from Duarte and Sánchez Ramírez to Hato Major provinces. Also from the series of low hills of the Los Ranchos Formation (under 200m) in Monte Plata Province running from the Cordillera Central in the west to the Cordillera Oriental in the east, sometimes called the Sierra de El Seibo. Largely in the Los Haitises Limestone. This species has been found under rocks and rubble on karst limestone ridges. Also found in the Santo Domingo region at Boca Chica under debris and rubble. Locally common.

*Differential diagnosis* See under *A. moreletiana*. This species differs from *A. crataegus* in having more numerous but less developed 1° spiral cords (ca. 17 in *A. domingoensis*, 5–13 in *A. crataegus*) and in having a turbinate rather than planispiral shell.

*Remarks* Bartsch (1946) suggested that this species originated from the region of Santo Domingo city on the south coast. In the course of this study specimens matching Bartsch's type were recorded from the northern half of Hispaniola from several sites and often in abundance. This suggested that the type locality of "Santo Domingo" referred not to the city but to the country in general, which historically was known by that name. However, in June 2015 specimens were found under debris in a vacant lot in Barrio de Monte Adentro in Boca Chica, only 30km east of Santo Domingo on the southern coast (fig. 16). Dead shells were found with abundant individuals of *Abbottella urbana*

Watters, 2012, described from Santo Domingo, as well as several exotic snails. This species also has been found at the Parque Zoológico Nacional in Santo Domingo city (A. Gettleman, pers. comm., 24 July 2015). Despite the general trend of *Abbottella* species having very narrow ranges (Watters, 2013), I can discern no differences between the northern and southern populations. This species seems to have a much broader distribution than other congeners.

*Abbottella moreletiana gabrieli* Bartsch, 1946, described from San Gabriel Isle, falls within the variation of *A. domingoensis* and is here considered a synonym of that species. Although *A. domingoensis* was described as a subspecies of *A. moreletiana*, the two are sympatric on the southern coast of the Samaná Peninsula and represent two distinct species-level taxa.

*Abbottella crataegus* sp. nov.  
(Figs 17–24, 29)

*Holotype* UF 216138.

*Paratypes* UF 216138(5), from type locality.

*Type locality* 5km W of Majagual, Monte Plata Province, Dominican Republic. F.G. Thompson & R. Franz! 28 Jan. 1977.

*Material examined* (71 specimens) UF 216197(4), 105m, 7km W of Majagual, Monte Plata Province; UF 216142(9), 5km W of Majagual, Monte Plata Province; UF 216138(58), UF 216199(1), 200m, 1km W of Majagual, Monte Plata Province.

*Measurements* Holotype, 12.0mm W×4.9mm H; paratype 1, 9.7mm W×4.8mm H; paratype 2, 11.6 W×7.0 H; paratype 3, 10.9mm W×5.6mm H; paratype 4, 10.6mm W×5.6mm H; paratype 5, 10.6mm W×6.5mm H.

*Description* Maximum size seen: 13.2mm W×6.3mm H. Minimum size seen: 9.7mm W×4.8mm H. Protoconch of 1.5 minute, microscopically pustulose whorls, finely demarcated from teleoconch whorls, white, tan, or dark brown. 2.5 to just over 3 teleoconch whorls. Shell planispiral, protoconch protruding above coiling plane. Last 1/8 of final whorl deflected downward, attached or narrowly detached from the previous whorl. Umbilicus wide, open to protoconch. Suture deep and narrow. Axial sculpture



**Figures 29–30** Distribution of *Abbottella* species within the eastern portion of the Dominican Republic **29** *Abbottella moreletiana* (▼); *Abbottella crataegus* sp. nov. (●); *Abbottella* sp. (◆). **30** *Abbottella domingoensis* (●). Maps from Google™ Earth Pro. Image Landsat. © 2015 Google. Data: SIO, NOAA, US Navy, NGA, GEBCO.

of ca. 30–40/whorl irregularly spaced, very fine, narrow, low 1° lamellae between which are ca. 2–7 slightly smaller 2° lamellae. 1° lamellae arranged in irregular groups. Spiral sculpture of ca. 5–13 low cords between the suture and the umbilicus; ca. 6–9 much narrower cords in the umbilicus. Demarcation between umbilicus and remainder of whorl well-defined. Intersections of 1° axials and spiral cords produced into short, hollow spines that are elongated along the axial lamellae; several smaller 1° cords lack spines; cords in umbilicus have much finer spines. 2° axial lamellae lack spines. Inner lip round, smooth, barely exerted. Outer lip wide, flaring, fimbriated, narrowest facing umbilicus, with wide, prominent adapical auricle; auricle widely attached to previous whorl. Outer lip slightly reflected abaperturally anteriorly, concave adaperturally



posterior. Spiral cords continue onto back of outer lip and there is usually a single series or two of small spines on the back of the lip. Base color white, tan, or greenish. Some specimens with broken brown bands or spots between the spiral cords. Bands continue onto both sides of outer lip, which may be brown or white. Inner lip spotted with brown. Spines white. Operculum with single white calcareous lamella, which lies nearly parallel to the base.

*Etymology* *L. crataegus*, a flowering thorny plant, a masculine noun in apposition.

*Distribution* Known only from the valley through which the Autopista Juan Pablo II (RD-7) passes between Majagual and Guaraguao in Monte Plata Province through the western end of the Cordillera Oriental in the Los Haitises Limestone. Found on low limestone knolls and under debris in karst depressions. Parts of its range are now coffee groves.

*Differential diagnosis* See under *A. moreletiana* and *A. domingoensis*.

***Abbottella* sp.**  
(Figs 25–27, 29)

A fourth, apparently undescribed species is known from San Pedro de Macorís, San Pedro de Macorís Province (GTW 7071d). Because it is known from a single specimen it is not described here.

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