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First record of the genus *Bordoniola* Osella, 1987 in Ecuador with description of five new species (Coleoptera: Curculionidae, Raymondionyminae)

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Abstract

Five new species of the small blind weevil genus *Bordoniola* Osella, 1987 from Ecuador are described and illustrated: *B. ecuadorialis* **sp. n.**, *B. minima* **sp. n.**, *B. otongana* **sp. n.**, *B. relicta* **sp. n.**, *B. simillima* **sp. n.** Distributional and ecological data are provided for each of the new species. This is the first record of the genus outside Venezuela, from where only two species were known. A key to species and a checklist of all *Bordoniola* thus far known are given.

Key words: Coleoptera, Curculionidae, Raymondionyminae, *Bordoniola*, new species, Ecuador, blind weevils, soil fauna

Riassunto

Vengono descritte ed illustrate cinque nuove specie di *Bordoniola* Osella, 1987 dell'Ecuador: *B. ecuadorialis* **sp. n**., *B. minima* **sp. n.**, *B. otongana* **sp. n**., *B. relicta* **sp. n.**, *B. simillima* **sp. n.** Per ciascuna delle nuove specie vengono fornite informazioni sulla distribuzione e sulla ecologia. Questa è la prima segnalazione del genere fuori del Venezuela di dove erano finora note altre due sole specie. Una chiave dicotomica, le foto dell'habitus di tutte le specie conosciute del genere, e una checklist vengono anche fornite.

Introduction

The montane forests of the Ecuadorian Andes belong to the Tropical Andes, perhaps the most biodiverse area in the world (Rodríguez-Mahecha *et al.*, 2004). Since the rise of the Andean Cordillera is relatively recent and complex, a large amount of speciation events have taken place in this area, likely the result of numerous dispersals and vicariance events. One of the major consequences of this is that the fauna of Ecuador is particularly rich and interesting. Field research in this region always yields interesting results, not only with regard to taxonomy, but also with relation to evolution, speciation, biogeography and ecology (Buzzetti & Carotti, 2008). Entomological research in the Andean areas of Ecuador, organized or supported by the WBA (World Biodiversity Association) in 2002, 2004, 2006, 2008, collected abundant material, particularly of Staphylinoidea and Curculionoidea. The ongoing study of these specimens has already led to the discovery of several new taxa. The first results (Giachino, 2008) have unequivocally confirmed both the exceptional richness of the Andean fauna, and the urgent need to extend field studies to all of South America before habitat destruction destroys this unique natural heritage.

Material and methods

Study area. The research was carried out in the moist deciduous forests and montane forests of the Ecuadorian Andes of the Northern Sierra region from 1800 m to 4500 m a.s.l., particularly in the provinces of Cotopaxi and Pichincha.

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Sampling methods. Species of *Bordoniola* have so far been collected by sifting native forest leaf-litter in mountainous areas, not or only partially compromised by the presence of man, between 1400 m in Venezuela (*Bordoniola decui* Osella, 1987) and 3150 m in Ecuador (*Bordoniola ecuadorialis* sp. n.). Given their small size (1.00– 1.65 mm), the motionless or extreme slow movement of adults, and the apparent rarity of the specimens, actively searching for them in the soil is virtually impossible. It was therefore necessary to collect soil litter samples (from 5 to 15 cm deep), first sieved in a 1 cm mesh wire sieve to separate larger materials, and then in a second thinner sieve (0.3 to 0.5 cm), and to transport the litter to the laboratory in individual cotton bags. The samples thus obtained were placed directly in Winkler extractions, or "washed" in suitable containers, with subsequent removal of floating material with a sieve of 1 mm mesh then left to dry in Berlese funnels for at least 10–12 hours. In both cases specimens obtained were examined under a binocular microscope and the arthropods preserved in a mixture of alcohol and acetic acid until they were mounted dry for study. One hundred and eighty localities across Ecuador were sampled and only six of them, all in the Pichincha province, yielded specimens of *Bordoniola*.

The last two abdominal tergites, plus aedeagus, tegmen and spiculum gastrale of males, and ovipositor, spiculum ventrale and spermatheca of females were dissected and placed in DMHF (Dimethyl Hydantoin-Formaldehyde Resin). Pictures were taken with a Delta Pix Invenio 5S II digital camera connected to a Olympus SZH10 stereomicroscope, then elaborated with professional software (Insight). Measurements were made using an Olympus SZH10 stereomicroscope with an ocular grid as follows: total length from base of rostrum to tip of elytra; pronotal length from anterior margin to base in front of scutellum; pronotal width at the widest point; elytral length from an imaginary line connecting humeri to tip; and elytral width at the widest point.

Terminology of some parts of the rostrum follows Dönges (1954), and that of the genitalia follows Pierotti & Bellò (2000).

Holotypes of all new species will be preserved in the Giuseppe Osella collection, with the others of the same genus. They will subsequently be stored in a museum of natural history which already contains Curculionoidea from neotropical environments. Acronyms of the collections where the studied specimens are preserved are: BAV = Cosimo Baviera, Messina, Italy; BEL = Cesare Bellò, Castelfranco Veneto, Italy; OSL = Giuseppe Osella, Verona, Italy.

Bordoniola Osella, 1987

Bordoniola Osella, 1987: 201, 204; Howden, 1992: 4–10; Alonso Zarazaga & Lyal, 1999: 72; Morrone *et al.*, 2001: 381, 382; Grebennikov, 2010: 346–349.

The genus *Bordoniola* was established (Osella, 1987) for two Venezuelan species collected by Vasile Decu of the Academy of Sciences of Bucharest in the Andean forests: *B. decui* Osella, 1987 from Parque Nacional Rancho Grande (Fig. 1), and *B. minutissima* Osella, 1987 from Trujillo-Bocono (Figs 2, 2A). This genus is characterized by: size 1.06–1.65 mm; protibia externally granulate or granulate-toothed; rostrum between the head and antennae smooth and shiny or slightly punctuate-striate; scrobes fused together back under the rostrum, pronotum subcylindrical, 1.6–2.1 times longer than wide, variously punctuate; second and third elytral intervals more or less raised, the remaining intervals flat, more or less shining, first and second elytral striae with round punctures on the disc, evanescent towards the declivity; procoxae raised, separated at the base; sternites III–IV wide (III larger than IV). Aedeagus short and broad.

Type species: *Bordoniola minutissima* Osella, 1987 (Venezuela).

Bordoniola ecuadorialis sp. n.

(Figs.3, 3A, 4, 4A)

Type locality. Ecuador, Pichincha, San Josè de Minas.

Diagnosis. Small body size (1.30–1.55 mm), elongate, reddish-brown, shiny. Rostrum dorsally finely punctuate, apex smooth and shiny. Pronotum with dense, round punctures. Protibia with external teeth. Elytra with second and third intervals raised above first and second striae, each with 8 to 10 round punctures, not always aligned, between the base and declivity.

Type series. Holotype male (OSL) with the following labels: [transparent label with genitalia in DHMF]; " Ecu, Pichincha, San Josè de Minas, Cerro Blanco 3.150 m" [white, printed]; "N 00° 12. 624'–W 78° 21. 050', vaglio subparamo, 14 VIII '08" [white, printed]; "Ecuador 2008, legg. Baviera, Bellò, Osella & Pogliano" [white, printed]; "coll. Cesare Bellò" [green, printed]; "*Bordoniola ecuadorialis* sp. n., Holotypus, det. Osella 2011" [red, printed]; "foto Bellò 2011" [yellow, hand-written]. Paratypes: 4 males and 4 females , Ecu, Pichincha, San Josè de Minas, Cerro Blanco 3.150 m, N 00° 12' 624''– W 078° 21' 050', vaglio subparamo, 14 VIII '08, Ecuador 2008, legg. Baviera, Bellò, Osella & Pogliano (BAV, BEL, OSL). Types are 9 (5 males and 4 females), genitalia of 4 (2 males and 2 females) were studied.

Holotype male: Length: 1.50 mm. Body sub-cylindrical, dark brown, elytra with sparse very prominent bristles, long, erect, placed mainly at the sides. Gently curved rostrum, sub-parallel after the middle, bright, striped-rough between head and antennae. Antennae rather long, scape gradually thickened; funicle with first article about twice longer than wide and more robust than the remaining sub- spherical articles (second to sixth), seventh slightly larger than sixth, club very large, oval-elongate, bristly, long last about the same as the five articles of the funicle. Head sub-spherical, partially covered by pronotum, separated from rostrum by small constriction. Pronotum sub-cylindrical, longer (0.40 mm) than wide (0.33 mm) with maximum width in the middle, narrowed before, with punctures separated by smooth spaces the distance between which are equal to or greater than the diameter of the same punctures. Scutellum absent. Elytra twice as long (0.8 mm) as wide (0.4 mm) with rounded humeri, suture evident, convex, intervals two and three flat and smooth, striae two and three with 9 punctures well delineated on disc, evanescent to declivity. Legs short and robust, femora enlarged, slightly hollowed on inner side, protibia slightly serrate on the outer side to form a single edge often encrusted with soil. Claws free. Procoxae separated at the base; sternites III–IV wide (III larger than IV), sternite VII smooth and flat. Aedeagus as in Figure 3A.

Paratypes: Type series variability is minimal, only pronotum and first and second elytra strial punctures were quite different. In females, the protibia are more regularly expanded, externally toothed. Spermatheca as in Figure 4A.

Other material. A single female, labeled "Ecu, Pichincha, San Josè de Minas, Cerro Blanco 3.150 m, N 00° 12. 624'–W 78° 21. 050', vaglio subparamo, 14 VIII '08, Ecuador 2008, legg. Baviera, Bellò, Osella & Pogliano" (OSL) is characterized by clear red teguments (immature?), finely punctured rostrum, pronotal punctures smaller, elytral intervals two and three flat (slightly raised in other species) with elytra dorsally convex. This may prove to be a separate species that we did not describe due to the absence of more mature specimens.

Distribution. Known only from the type locality.

Etymology. The species take its name from the nation of Ecuador.

Comparative notes. The closest species is *B. otongana* **sp. n**. from which B. *ecuadorialis* **sp. n.** differs in the characters shown in the table.

Ecology. Specimens of this species were collected screening subparamo deep litter at the base of the bushy tree line area (slope S–O).

***Bordoniola minima* sp. n.**
(Figs. 5, 5A, 6, 6A)

Type locality. Ecuador, Pichincha, Nanegalito. (Fig. 10)

Diagnosis. Small size body (1.05–1.10 mm), elongate, light-brown, shiny. Rostrum dorsally smooth throughout. Pronotum with spaced, round punctures. Protibia with external teeth. Elytra with second and third intervals not or just slightly more raised than striae.

Type series. Holotype male (OSL) with the following labels: [transparent label with genitalia in DHMF]; "♂" [white, printed]; " Ecu, Pichincha, Nanegalito 2220 m", 11 VIII '08" [white, printed]; " N 00° 00. 207'–W 078° 35. 450' " [white, printed]; "Ecuador 2008, legg. Baviera, Bellò, Osella & Pogliano" [white, printed]; "coll. Cesare Bellò" [green, printed]; "*Bordoniola minima* sp. n., Holotypus, det. Osella 2011" [red, printed]; "foto Bellò 2011"[yellow, hand-written]. Paratypes: 2 males and 6 females , " Ecu, Pichincha, Nanegalito 2220 m, 11 VIII '08 , N 00° 00' 2 07"–W 078° 35' 450", legg. Baviera, Bellò, Osella & Pogliano (BAV, BEL, OSL). Types are 9 (2 males and 7 females), genitalia of 3 (2 males and 1 female) were studied.

Holotype male: Length: 1.05 mm. Body sub-cylindrical with shining tegument (especially the rostrum), light brown, with sparse inconspicuous short, erect, bristles placed mainly at the sides. Rostrum sub-parallel, smooth dorsally, not separated from head, slightly curved beyond midlength, shining between head and antennae. Anten-

nae rather long, scape gradually thickened; funicle with first article about twice longer than wide and more robust than the remaining articles, articles two to six sub-spherical, seventh slightly larger than sixth, club large, oval, bristly, about the same as the last four articles of the funicle. Head conical, shining. Pronotum, subcylindrical, longer (0.30 mm) than wide (0.22 mm), with the greatest width at about midlength, narrowed at both ends, with round punctures irregularly arranged. Scutellum absent. Elytra sub-parallel along the sides, almost twice as long (0.52 mm) as wide (0.28 mm), with humeri present, elytral suture visible, slightly convex, intervals two and three flat (or third interval just perceptibly more elevated) with round spots on the disk, back vanished. Legs short and sturdy, profemora widened, notched on the outer edge, hollow on the inside, protibia slightly serrate on the outer side to form a single ridge often encrusted with soil. Claws free. Procoxae separated at the base; sternites III–IV wide (III larger than IV), sternite VII smooth and flat. Aedeagus as in Figure 5A.

Paratypes: The paratypes are almost indistinguishable from the type and variability is limited to more or less evidence of sutures and punctuation of the third elytral interval. In some specimens, the punctures of the rostrum are not entirely absent, and the spaces between the punctures of the pronotum are not always perfectly smooth. Spermatheca as in Figure 6A.

Distribution. Known only from the type locality.

Etymology. The proposed name relates to the particularly small size of this species.

Comparative notes. Based upon the round punctures of the pronotum, the species is close to *B. relicta* **n. sp.** and *B. simillima* **n. sp.**, from which it differs by its smaller size, the pronotum with more widely spaced punctures, the rostrum dorsally smooth throughout its length, the elytra with intervals not, or just, more elevated than striae two and three, the smaller punctures and the shorter bristles. A number of similarities are shared with *B. simillima* **n. sp.**, (see discussion of this species), from which it differs in the characters shown in the table.

Ecology. Specimens of this species were collected by screening the litter, in a partially deforested area at the north edges of the "Bosque Nublado". Specimens were collected in conjunction with many specimens of humid forest soil Coleoptera (e.g., Staphilinidae, Scydmaenidae, Curculionidae).

***Bordoniola otongana* sp. n.**
(Figs. 9, 9A)

Type locality. Ecuador, Pichincha, Otonga. (Fig. 11).

Diagnosis. Small size body (1.65 mm), elongate, red-brown, shiny. Rostrum dorsally striate-punctuate. Pronotum sub-cylindrical, narrower at the base than towards the head, punctate. Elytra sub-cylindrical with first and second striae heavily punctured, second interval more elevated than first.

Type series. Holotype female (OSL) with the following labels: [transparent label with genitalia in DHMF]; "♀" [white, printed]; "Ecuador, Cotopaxi (recte Pichincha!), Otonga, S 00° 25., W 79° 00., 2000 m., 1 III 2003, M. Mora "[white, hand-written]; "Otonga, 1 3 2003, Berlese "[white, hand-written];
"*Bordoniola otongana* sp. n., Holotypus, det. Osella 2011" [red, printed]; "foto Bellò 2011"[yellow, hand-written].

Holotype female: Length: 1.65 mm. Body sub-cylindrical, tegument red-shiny brown, with semi-erect long bristles sparse but evident. Rostrum sub-parallel (to the insertion of the antenna), then expanded, slightly ridged (between head and scrobe), gently curved apically. Antennae rather long, with sinuous, slightly thickened, quite slender scape; funicle with first article more than two times longer than wide and more robust than the remaining third to sixth articles sub-spherical, seventh slightly larger than the preceding; club large, oval-oblong, bristly, long, last about the same as the five articles of the funicle. Head sub-conical, smooth, separated from rostrum by a small constriction. Pronotum sub-cylindrical, longer (0.40 mm) than wide (0.32 mm), with maximum width in posterior third, very narrow, with slight narrowing anteriorly, with punctures of irregular size, separated by smooth spaces smaller than the diameter of punctures. Scutellum absent. Elytra nearly twice as long (0.84 mm) than wide (0.44 mm), sub-cylindrical, with humeri absent and visible elytral suture convex, intervals two and three slightly more elevated than other striae, with 10 to 12 evident punctures between the base and declivity, with lateral bristles raised.

Legs with femora enlarged, slightly hollowed on the inside, protibia slightly hollowed on the inside just expanded on the outside and slightly serrated to form a ridge encrusted with soil. Claws free. Procoxae separated at base; sternites III–IV wide (III larger than IV), sternite VII smooth and flat.

Spermatheca as in Figure 9A.

Distribution. Known only from the type locality.

Etymology. The name is based on Otonga, type locality of this species.

Comparative notes. With the rostrum striate-punctuate at the base and the punctuation of the pronotum, *B. otongana* **n. sp.** is close to *B. ecuadorialis* **n. sp.** from which it differs by: the slightly larger size (1.65 mm against 1.50 mm), the elytra appreciably more elongate-cylindrical (medially more expanded in *B. ecuadorialis* **n. sp.**), the first antennal article longer, the second article as long as wide (slightly transverse in *B. ecuadorialis* **n. sp.**), the denser punctures of the pronotum, first and second striae with stronger punctures (first interval with 8–10 punctures well marked on the elytra disc and 4 more superficial posteriorly, second interval with 11–12 punctures discernible, 1–2 effaced posteriorly), remaining striae with punctures reduced but still evident on the disc; elytral bristles, long, recumbent at 60°.

Ecology. The holotype of this species was collected by screening litter in a residual limb of a primary "cloud" forest at Otonga (at approximately 2000 m elevation) during the rainy season. Repeated, subsequent sampling carried out in the same area in July–August (2002, 2004, 2006) with the traditional methods of investigation (without Winkler or Berlese extractors) were unsuccessful.

***Bordoniola relicta* sp. n.**
(Figs. 7, 7A)

Type locality. Ecuador, Pichincha, Chiriboga (Figs. 12–13).

Diagnosis. Small size body (1.30 mm), elongate, light brown, shiny. Pronotum and elytra with dense surface punctures. Second elytral stria impressed, pronotum and elytra slightly flattened dorsally, antenna with evident bristles at the apex of the scape, club more elongate.

Type series. Holotype female (OSL) with the following labels: [transparent label (2) with genitalia in DHMF]; "♀" [white, printed]; “Ecuador, Pichincha, Chiriboga 1600 m, 29 VII 2008 [white, printed]; vaglio bosque nublado [white, printed]; “Ecuador 2008, legg. Baviera, Bellò, Osella & Pogliano” [white, printed]; "coll. Cesare Bellò" [green, printed]; "*Bordoniola relicta* sp. n., Holotypus, det. Osella 2011" [red, printed]; “foto Bellò 2011”[yellow, hand-written].

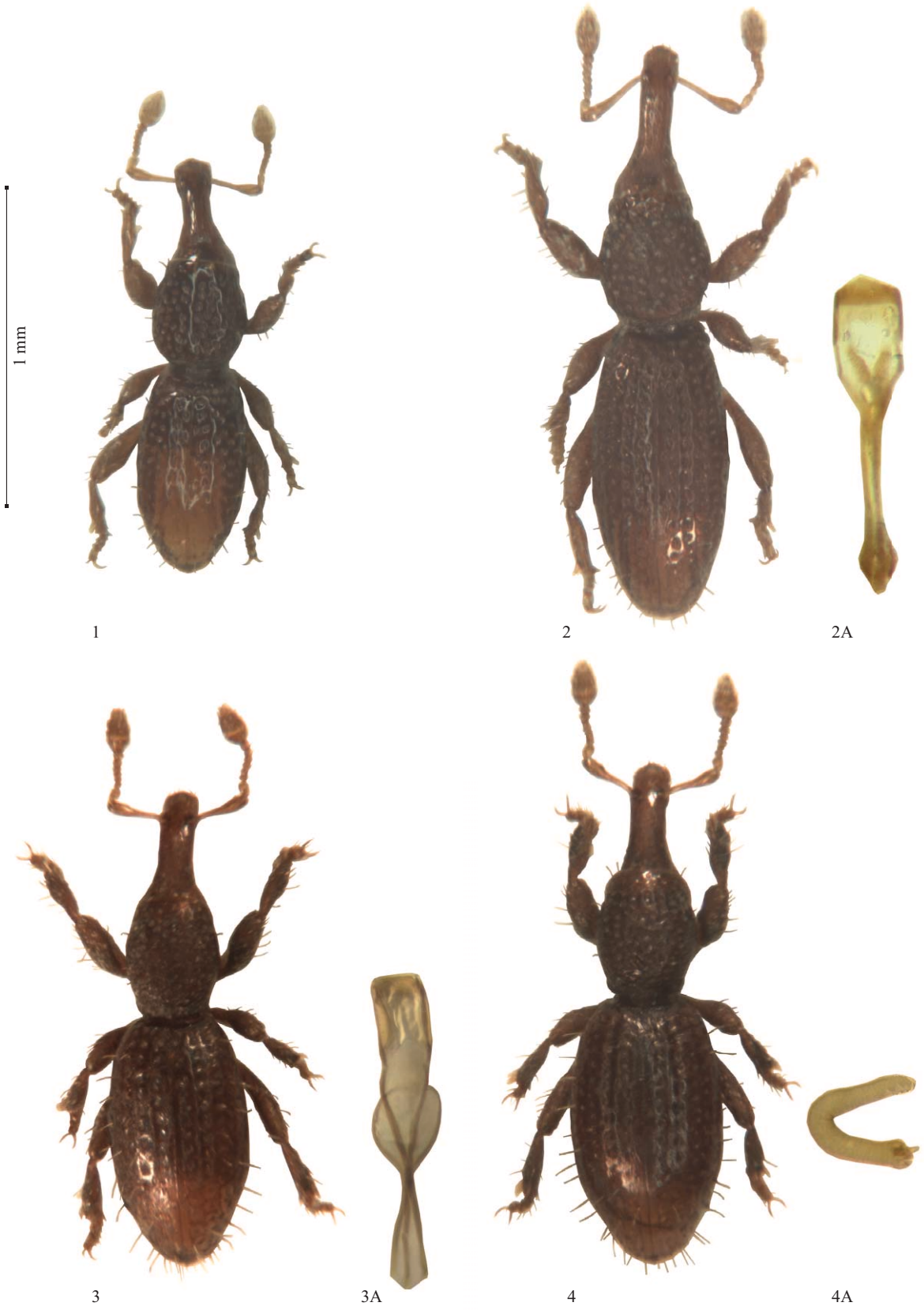
Holotype female: Length: 1.30 mm. Body sub-cylindrical with particularly bright brown tegument, some short, erect, bristles inserted mostly on the sides. Rostrum robust, bright, expanded in the second half, smooth dorsally, slightly curved distally. Antennae rather long, scape with evident bristles, gradually enlarged from base to apex, funiculus with first article about twice longer than wide and slightly more robust than the remaining articles, articles two to six sub-spherical, seventh more robust; club large (larger than in *B. minima* **n. sp.** and *B. simillima* **n. sp.**), elongate, bristly, length about the same as the last five articles of the funicle. Head conical, bright. Pronotum sub-cylindrical, longer (0.30 mm) than wide (0.26 mm), with punctures round, small, scattered, regularly arranged. Scutellum absent. Elytra sub-parallel, almost twice longer (0.66 mm) than wide (0.34 mm), with rounded humerus, elytral suture visible, dorsally slightly flattened, intervals two and three flat (or third interval slightly more elevated), with round punctures on the disc. Legs robust, profemora enlarged, apparently without serration on the outer margin, slightly hollowed on the inner margin; protibiae weakly serrate externally to form a ridge encrusted with soil, claws free. Procoxae separated at the base; sternites III–IV wide (III larger than IV), sternite VII smooth and flat.

Spermatheca as in Fig.7.

Distribution. Known only from the type locality.

Etymology. The name “relictus” is derived from occurrence of the species in a residual limb of a primary "cloud" forest used as pasture for cattle.

Comparative notes. Based on the small size and the denser punctuation of the pronotum and elytra *B. relictus* is near *B. simillima* **n. sp.** and *B. minima* **n. sp.**. It differs in having the second stria more deeply impressed, by the brighter body, by pronotum and elytra dorsally slightly flattened (slightly convex in *B. simillima* **n. sp.** and *B. minima* **n. sp.**), by the finer and more closely spaced punctation and by the setae present on the apical part of the scape. This species also resembles *B. ecuadorialis* **n. sp.**, from which it differs by the more elongate body, the fine punctation and shorter elytral bristles.



FIGURES 1–4. 1—*B. decui* Osella, 1987 paratype ♂ from Parque Nacional Rancho Grande, Venezuela—Habitus; 2—*B. minutissima* Osella, 1987 paratype ♂ from Trujillo, Bocono, Venezuela—Habitus, 2A—Aedeagus; 3—*B. ecuadorialis* **sp. n.** holotype ♂ from Ecuador, Pichincha, San Josè de Minas—Habitus, 3A—Aedeagus; 4—*B. ecuadorialis* **sp. n.** paratype ♀ from Ecuador, Pichincha, San Josè de Minas—Habitus, 4A—Spermatheca.

FIGURES 5–8. 5—*B. minima* **sp. n.** holotype ♂ from Ecuador, Pichincha, Nanegalito—Habitus; 5A—Aedeagus; 6—*B. minima* **sp. n.** paratype ♀ from Ecuador, Pichincha, Nanegalito: 4—Habitus, 4A—Spermatheca; 7—*B. relicta* **sp.n.** holotype ♀ from Ecuador, Pichincha, Chiriboga—Habitus, 7A—Spermatheca ; 8—*B. simillima* **sp.n.** holotype ♀; from Ecuador, Pichincha, near Nono—Habitus, 8A—Spermatheca.

9

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FIGURES 9–11. 9—*B. otongana* **sp. n.** holotype ♀ from Ecuador, Pichincha, Otonga—Habitus, 9A—Spermatheca; 10—Ecuador, Pichincha, Otonga, type locality of *B. otongana* **sp. n.**; 11—Ecuador, Pichincha, Nanegalito, type locality of *B. minima* **sp. n.**.

12

13

FIGURES 12–13. 12—Ecuador, Pichincha, Chiriboga 1600m type locality of *B. relicta* **sp. n.**. 13—Ecuador, Pichincha, Chiriboga 1600 m the residual limb of a primary "cloud" forest, use as pasture for cattle, type locality of *B. relicta* **sp. n.**.

Ecology. The holotype of this species was collected by screening leaf litter in a residual limb of a primary "cloud" forest used as pasture for cattle on the sides of the road to Chiriboga in a small valley located on the north-east side.

***Bordoniola simillima* sp. n.**
(Figs. 8, 8A)

Type locality. Ecuador, Pichincha, Nono.

Diagnosis. Small size body (1.12 mm), elongate, light brown, shiny. Pronotum sub-cylindrical with small round punctures separated by smooth spaces. Second and third elytral intervals flat. Body with very short setae.

Type series. Holotype female (OSL) with the following labels: [transparent label with genitalia in DHMF]; "♀" [white, printed]; " Ecu, Pichincha, dint. Nono 3120 m", 6 VIII '08 "[white, printed]; "S 00° 05. 849'–W 78° 33. 404', vaglio sub-paramo" [white, printed]; "Ecuador 2008, legg. Baviera, Bellò, Osella & Pogliano" [white, printed]; "coll. Cesare Bellò" [green, printed]; "*Bordoniola simillima* sp. n., Holotypus, det. Osella 2011" [red, printed]; "foto Bellò 2011"[yellow, hand-written].

Holotype female: Length: 1.10 mm. Body sub-cylindrical with bright tegument (especially the rostrum), light brown, bristles sparse, very short, erect, placed mainly at the elytral sides. Rostrum wider in the second half separated from the head by a small impression, dorsally smooth, slightly curved beyond midlength, shining between the head and antennae. Antennae rather long, scape slightly thickened from base to apex, funiculus with first article about twice longer than wide and more robust than the others, articles two to six sub-spherical, seventh more robust than previous, club large (a little larger than in *B. minima*), oval-oblong, bristly, length about the same as the five articles of the funiculus. Head conical, bright. Pronotum subcylindrical, longer (0.28 mm) than wide (0.22 mm), with round, small, irregularly arranged punctures. Scutellum absent. Elytra sub-oval at the sides, almost twice as long (0.56 mm) as wide (0.30 mm) with humeri absent and elytral suture visible, slightly convex dorsally, intervals two and three flat (or third interval very slightly more elevated) with round punctures on the disc, absent posteriorly. Legs robust, with enlarged profemora, serrate on the outer margin, hollow on the inside; protibia slightly serrate on the outside. Claws free. Procoxae separated at the base; sternites III–IV wide (III larger than IV), sternite VII smooth and flat. Spermatheca as in Figure 8A.

Distribution. Known only from the type locality.

Etymology. The name "*simillima"* is related to the close similarity between this species and *B. minima* n. sp.

Comparative notes. This species is very close to *B. minima* in size, form of rostrum, pronotum with well-separated round punctures, elytral intervals two and three flat. It is distinguishable by the sub-cylindrical pronotum (medially expanded in *B. minima* **n. sp.**) with smaller punctures interspersed with smooth flat spaces (punctures slightly larger in *B. minima* **n. sp.**), and by very short indistinct bristles.

Ecology. The holotype of this species was collected by screening leaf litter in a residual limb of a primary forest

Checklist of species of *Bordoniola* Osella, 1987

Species	Country	Locality
B. decui Osella, 1987	Venezuela	P. N. Rancho Grande, 1400 m
B. minutissima Osella, 1987	Venezuela	Trujillo, Bocono, 2500 m
B. ecuadorialis **sp.n.**	Ecuador	Pichincha, San Josè de Minas, 3150 m
B. minima **sp.n.**	Ecuador	Pichincha, Nanegalito, 2220 m
B. otongana **sp.n.**	Ecuador	Pichincha, Otonga, 2000 m
B. relicta **sp.n.**	Ecuador	Pichincha, Chiriboga, 1600 m
B. simillima **sp.n.**	Ecuador	Pichincha, Nono, 3120 m

Key for the determination of species of *Bordoniola* Osella, 1987

1. Protibia toothed on the inner margin, not toothed on the outer margin, pronotum with midline without punctures, elytral intervals flat, with long bristles arranged perpendicularly at angle of about 90°. Length (with rostrum) 1.50–1.60 mm Venezuela 2

- Protibia expanded, serrate on outer margin, with inner side more or less straight; pronotum with variable punctuation without smooth midline, elytral intervals two and three flat, elytral bristles usually present, raised at angle less than 90°. Length (with rostrum): 1.05–1.65 mm. Ecuador 3

2. Punctation of pronotum with large areolas between points, neatly arranged, first and second elytral striae with punctures present anterior to declivity, absent posterior to declivity; rostrum with two rows of punctures between the head and antennae. Length: 1.60 mm. Venezuela (Trujllo, Bocono) . . . . . *B. minutissima* Osella, 1987

- Punctation of pronotum with areolas small and irregularly arranged, first elytral stria evanescent, punctation of second elytral stria regular up to the middle of disc. Length 1.50 mm. Venezuela (Parque Nacional Rancho Grande) . . . *B. decui* Osella, 1987

3. Rostrum between head and antennae, striped-rough, pronotum sub-cylindrical with dense, round punctures, elytral intervals two and three keel-like, striae two and three with well-defined punctures. 4

- Rostrum between head and antennae, smooth or with a hint of keels, pronotum cylindrical, elytral intervals two and three effaced 5

4. Rostrum more strongly striate, wrinkled, pronotum appreciably expanded-at midlength, with punctures separated; elytral intervals two and three visible, protibiae weakly serrate on the outer margin, elytra slightly expanded towards the middle, about 2.5 times longer than wide. Length 1.5 mm. Ecuador, San Jose de Minas (Pichincha) . . . . . *B. ecuadorialis* **n. sp.**

- Rostrum only partially striate, pronotum sub-cylindrical, medially barely wider than at both ends, with various punctation; elytra about 3 times longer than wide. Length 1.65 mm. Ecuador, Otonga (Pichincha) . . . . . *B. otongana* **n. sp.**

5. Elytral interval two impressed, body shining over entire surface, pronotum sub-parallel, elytra with short bristles. Length 1.30 mm. Chiriboga (Pichincha) . . . . . *B. relicta* **n. sp.**

- Elytral interval two not impressed, elytral bristles long 6

6 Pronotum almost sub-cylindrical, with fine punctuation, punctures separated by flat spaces, rostrum slightly expanded apically. Length 1.10 mm. Nono (Pichincha) . . . . . *B. simillima* **n.sp.**

- Pronotum medially slightly expanded with large punctures, elytral striae two and three with small punctures, third elytral interval imperceptibly longer than the second, profemora slightly serrated on the outer margin. Length 1.06 mm. Nanegalito (Pichincha) . . . . . *B. minima* **n. sp**.

Conclusions

The new species described confirm *Bordoniola* monophyly by: greatly reduced size; prosternum without sulcate ventral channel; sub-rectilinear tibiae, without external side tooth and noticeable setae; antennal funicle with seven antennomeres; robust and short aedeagus with large parameres; rostrum slightly spatulate; and procoxae separated. *Bordoniola* belongs to the subfamily Raymondioniminae and is related to *Alaocyba* Perris, 1869 from which differs, among other characters, in meso- and metatibiae enlarged, almost triangular in shape, funicle cylindrical with six antennomeres, different shaped scrobe, sub-contiguous procoxae, and reduced parameres of the aedeagus.

The discovery of *Bordoniola* in Ecuador is of particular interest, not only because it extends the distribution of this genus (and also of Raymondionyminae) to the Ecuadorian Andes, but also because it suggests a much broader distribution of the taxon in Central and South America. Raymondionyminae may prove to be widely distributed in Central (from Mexico to Panama) and South America (from Venezuela to Peru). While their presence in the Caribbean Islands (Lesser and Greater Antilles) is possible at present we find only specialized forest litter blind weevils from the subfamily Molytinae: *Pseudoalaocybites* Osella 1980, *Caecossonus* Gilbert 1955, *Pseudocaecocossonus* Osella 1977, *Decuanellus* Osella 1977 and *Kuschelaxius* Howden 1992 in the islands. It is unlikely that Raymondionyminae are present in the lowland forest of the Orinoco and the Amazon as they are subject to periodic and sustained flooding. In conclusion, this research suggests the presence of blind weevils, highly specialized to life in the soil, probably occur in all subtropical, tropical environments in the Americas (Central and South America, Caribbean).

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