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A Preliminary Checklist, Classification, and Four New Country Records
for the Elateridae (Coleoptera) of Ecuador

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Abstract. A checklist and classification of the species of Elateridae reported from mainland Ecuador are given. *Anchastus boulandi* Chassain, *Cardiorhinus apicalis* Golbach, *Physorhinus marginatus* Candèze, and *P. sexnotatus* Steinheil are reported from Ecuador for the first time. The recorded elaterid fauna of Ecuador is now represented by 140 species, 38 genera, and 9 subfamilies, which are low taxon richness numbers when compared to those of neighboring countries.

Key words: Coleoptera, distribution, new country records, classification, checklist.

Resumen. Se les da una lista de verificación y clasificación de las especies de Elateridae reportados desde el Ecuador continental. *Anchastus boulandi* Chassain, *Cardiorhinus apicalis* Golbach, *Physorhinus marginatus* Candèze, y *P. sexnotatus* Steinheil se informó desde Ecuador por primera vez. La fauna elaterid registrados de Ecuador está actualmente representados por 140 especies, 38 géneros y 9 subfamilias, baja si se compara con la de los países vecinos debido a un muestreo inadecuado de especies informativos ambientalmente no llamativos.

Palabras clave: Coleóptera, distribución, nuevos registros, clasificación, listado de especies.

Introduction

The Elateridae of Ecuador are a very poorly studied faunal fragment based on political boundaries. Here, we provide a checklist of the genera and species of click beetles recorded in the literature from mainland Ecuador and report four species not previously known. This study was stimulated by the results of a recent limited study of canopy-occurring elaterids from sampling by T. Erwin, Smithsonian Institution, between January 1994 and July 1996, at Yasuni National Park in Departamento de Orellana (Aguirre-Tapiero 2013). The elaterids of the Galapagos Islands are not included as this small fauna is being treated separately. Information provided here demonstrates an opportunity for naturalists, taxonomists, ecologists, and students to add considerably and fruitfully to the body of knowledge on the biodiversity of Andean countries, at least with regard to the ninth most speciose family of Coleoptera. This information is presented with the anticipation that it will assist improved documentation of Ecuadorian elaterids.

Materials and Methods

Itemization of the Ecuadorian Elateridae was done from an unpublished digital catalogue of the species from the entire Americas, compiled and maintained by the second author. This database is founded

on the catalogues of (Schenkling 1925, 1927) and checklist of Blackwelder (1944, 1956), with taxonomic corrections and additions through Zoological Record, and the original and more recent literature.

New records reported here are from Aguirre-Tapiera (2013), a study conducted in the Yasuní National Park in Ecuador, Department of Orellana. The samples were obtained using canopy fogging as described by Erwin (1989), all samples and determined specimens are deposited in the National Museum of Natural History (USNM) in Washington, D.C., USA, with duplicates held in trust for the National Polytechnic University, Quito, Ecuador.

Locality data are presented as for materials from the Yasuní National Park canopy inventory. The classification follows Johnson (2002) as modified for South American taxa.

New Country Records

Anchastus LeConte, 1853

Candèze (1859) and Champion (1895) provided the most recent synopses of *Anchastus* LeConte for South and Mesoamerica, respectively. Neither author reported any species from Ecuador, nor did Blackwelder (1944). Here, we provide the first Ecuadorian record for any species of the genus.

Anchastus boulandi Chassain, 2010

(Figure 1)

Chassain (2010) described *A. boulandi* from Montagne des Chevaux, French Guiana. However, this species is apparently widespread through northern South America and southern Central America (unpubl. data). This species is easily confused with *A. moratus* Candèze with yellow elytral apices, but can be immediately separated by the black apex of each elytron. Specimens examined (1): ECUADOR, Department Orellana., Trans. Ent. 1 Km S. Gare Onkone Camp, Waorani Ethnic Reserve, Onkone Gare Camp, 216.3m, Date: 21-Jun-96/00 ° 39'25.7 "S, 076 ° 27' 10.8" W, TL Erwin et al., Transect 3 Season 9, Capture Method: Fogging, Elat 041 male.

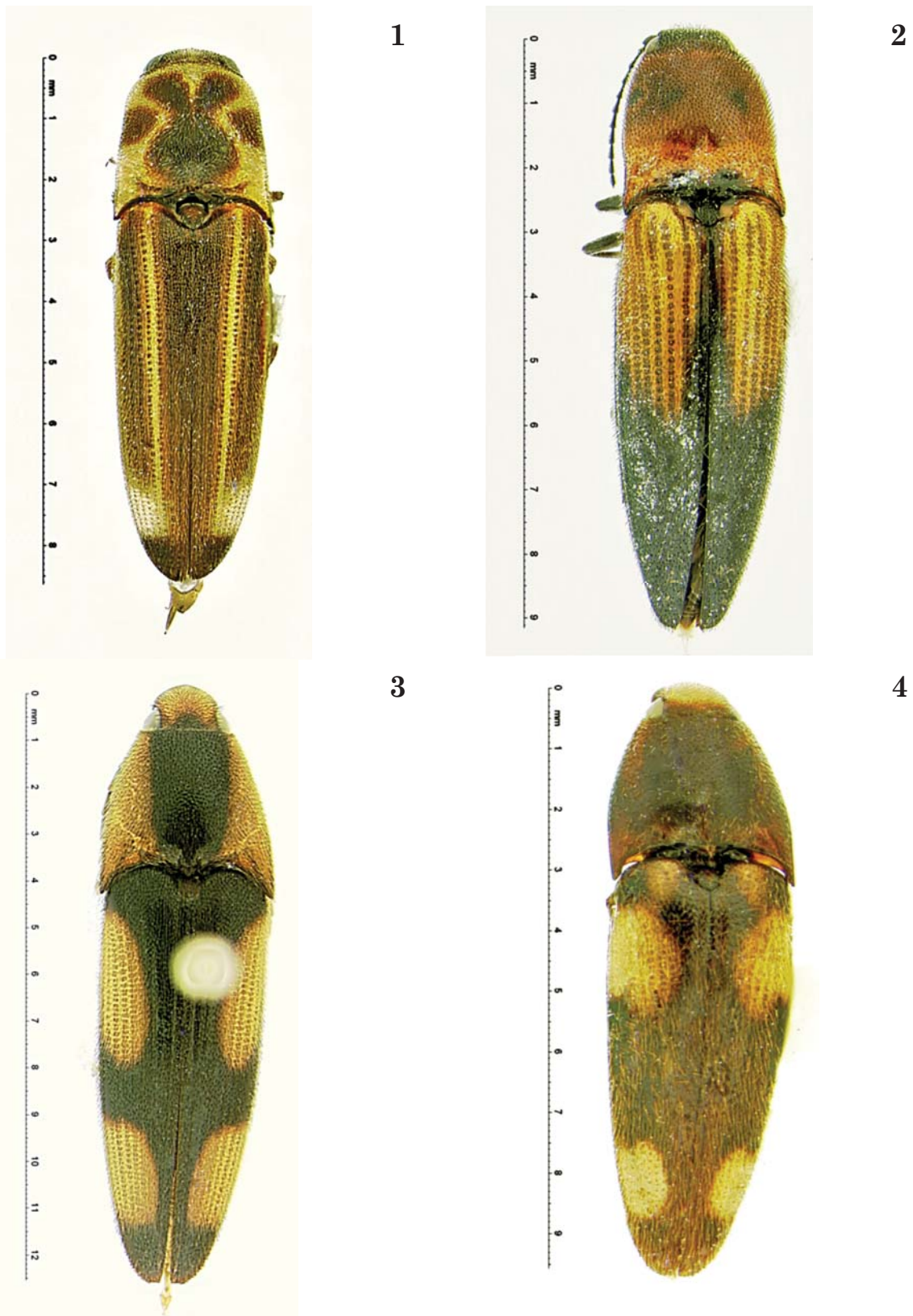
Cardiorhinus Eschscholtz, 1829

Golbach (1983) provided a synopsis of *Cardiorhinus* Eschscholtz in a summary of his revision of the genus through a series of papers, but did not report any species from Ecuador. Previously, Schwarz (1902) described *C. bimaculatus* from Archidona, Ecuador, and Fleutiaux (1940) described *C. politus* from an unspecified Ecuadorian locality. Here, we provide an Ecuadorian record for a third species of the genus.

Cardiorhinus apicalis Golbach, 1979

(Figure 2)

Golbach (1979) described *C. apicalis* from Nigrillani, Nor Yungas, Bolivia. The records below are the first for Ecuador and outside of Bolivia. The combination of distinct basal sulci on the posterior margin of the pronotum and the mesosternal sides at an inclined angle associate this species with *C. frenatus* and *C. piciventris* in his "Group 2" within the genus. *Cardiorhinus apicalis* is immediately distinguished within this group by having the pronotum infuscate and bimaculate or a bivittate pronotal disc, elytra black in the apical half, antennomeres 3 and 4 similar, and the third elytral interstria not elevated. Specimens examined (6): ECUADOR. Department Orellana., Transect Ent. 1 km S. Gare Onkone Camp, Waorani Ethnic Reserve, Onkone Gare Camp, 216.3m, Date: 08-Oct-95/00 ° 39'25 .7 "S, 076 ° 27 '10.8" W, TL Erwin et al., Transect 9 - Season 2, Method of collection: Fogging, Habitat: Forest land, Lot # 1252; same , 01-Oct-96/ Transect 3 - Season 9, Lot # 1689; same, 02-Oct-96/ Transect 6 - station 10, Lot # 1720; same, 08-Oct-95, Transect 9 – Season 2, Habitat: Bosque terra firme, Lot # 1252.; same, 01-Oct-96, Transect 3 – season 9, Habitat: Bosque terra firme, Lot # 1689; same, 02-Oct-96, Transect 6 – season 10, Habitat: Bosque terra firme, Lot # 1720.



Figures 1–4. Dorsal aspects of adults of four species of Elateridae new to Ecuador. 1) *Anchastus boulandi* Chassain from Ecuador. 2) *Cardiorhinus apicalis* Golbach. 3) *Physorhinus marginatus* Candèze. 4) *Physorhinus sexnotatus* Steinheil.

***Physorhinus* Eschscholtz, 1829**

Schaaf (1970, 1971) revised *Physorhinus* Eschscholtz and reported *P. distigma* Candèze, *P. erythrocephalus* (Fabricius), and *P. stellatus* Candèze from Ecuador. We report two additional species.

***Physorhinus marginatus* Candèze, 1859**

(Figure 3)

Physorhinus marginatus is separated from other species by the yellow-orange side margins of the pronotum. This species closely resembles *P. erythrocephalus* Eschscholtz by the presence of four orange yellow maculae on the elytra, but these are subequal, and the basal maculae are distinctly larger in *P. erythrocephalus*. Specimens examined: ECUADOR. Department Orellana., Transect Ent. 1 Km S. Gare Onkone Camp, Waorani Ethnic Reserve, 216.3m, Date: 04-Oct-96, 00 ° 39 '25.7 "S, 076 ° 27' 10.8" W, TL Erwin et al., Transect 10 - Season 3, Method of collection: Fogging, Lot # 1753, Elat, 112.

Distribution: *Physorhinus marginatus* was previously known only from French Guiana and Brazil (Schaaf 1971).

***Physorhinus sexnotatus* Steinheil, 1875**

(Figure 4)

Physorhinus sexnotatus is immediately recognized by the four yellow, discrete oval and two vague maculae on the elytral bases. Specimens examined (10): ECUADOR. Department Orellana., Transect Ent. 1 km S. Gare Onkone Camp, Waorani Ethnic Reserve, 216.3m, Date: 16-Jan-94, 00 ° 39 '25.7 "S, 76 ° 27' 10.8" W, TL Erwin et al., Transect 4 - Season 8, Method of collection: Fogging, Lot # 587; same, 20-Jun-94, Transect 2 - Station 8, Lot # 687; same, 6-Oct-94, Transect 9 - Season 1, Lot # 870; same, 5-Feb-96, Transect 4 - Season 7, Lot # 1437; same, 21-Jun-96, Transect 4 - Season 7, Lot # 1557.; same, 21-Jun-96, Transect 4 - Season 8, Lot # 1558.; same, 22-Jun-96, Transect 6 - Season 3, Lot # 1573.; same, 22-Jun-96, Transect 6 - Season 4, Lot # 1574; same, 26-Jun-96, Transect 8 - Season 6, Lot # 1596; same, 23-Jun-96, Transect 9 - Season 3, Lot # 1603.

Distribution: This species is widely distributed, being reported in Central America from Costa Rica and Panama, and South America from Colombia, French Guiana, Brazil, Peru, and Bolivia (Schaaf 1971). The present discovery expands its distribution to Ecuador.

A Preliminary Checklist of the Species of Elateridae of Ecuador

Species	Recorded Distribution
<i>Achrestus onorei</i> Golbach, 1988	Ecuador; Venezuela
<i>Achrestus ruficollis</i> Fleutiaux, 1902	Brazil; Ecuador; French Guiana
<i>Aeolus aequinoctialis</i> Candèze, 1859	Ecuador; Brazil
<i>Agelasinus aeneus</i> Fleutiaux, 1920	Ecuador
<i>Alampoides submaculatus</i> (Schwarz, 1902)	Ecuador
<i>Alampoides tessellatus</i> (Candèze, 1863)	Peru; Ecuador
<i>Anaissus anandra</i> Calder, 1978	Ecuador
<i>Anaissus franciscoloi</i> Reise, 2007	Ecuador
<i>Anaissus fuscipes</i> Calder, 1978	Ecuador
<i>Anaissus marialuisae</i> Reise, 2007	Ecuador
<i>Anaissus porioni</i> Reise, 2007	Ecuador
<i>Anaissus tarsalis</i> Candèze, 1857	Ecuador; Peru; Colombia; Bolivia; Brazil
<i>Anchastus bouldardi</i> Chassain, 2010	Ecuador; French Guiana
<i>Anoplischius diplotrichus</i> Schwarz, 1902	Ecuador
<i>Anoplischius laticollis</i> (Eschscholtz, 1829)	Panama; Colombia; French Guiana; Brazil; Ecuador

<i>Aptopus pichincae</i> Candèze, 1889	Ecuador
<i>Atractosomus oertzeni</i> Schwarz, 1902	Ecuador
<i>Cardiorhinus apicalis</i> Golbach, 1979	Bolivia; Ecuador
<i>Cardiorhinus bimaculatus</i> Schwarz, 1902	Ecuador
<i>Cardiorhinus politus</i> Fleutiaux, 1940	Ecuador
<i>Chalcolepidius albisetosus</i> Casari, 2002	Ecuador
<i>Chalcolepidius aurulentus</i> Candèze, 1874	Brazil; Colombia; Venezuela; French Guyana; Suriname; French Guiana; Ecuador; Peru; Bolivia; Argentina; Paraguay; Costa Rica
<i>Chalcolepidius chalcantheus</i> Candèze, 1857	Colombia; Brazil; Argentina; Guatemala; Panama; Venezuela; Ecuador; Peru
<i>Chalcolepidius erythroloma</i> Candèze, 1857	Ecuador; Chile; Peru; USA: Hawaii
<i>Chalcolepidius fabricii</i> Erichson, 1841	Colombia; Venezuela; Ecuador
<i>Chalcolepidius ferratuwittatus</i> Casari, 2002	Colombia; Ecuador
<i>Chalcolepidius gossipiatius</i> Guérin-Ménéville, 1844	Guatemala; Costa Rica; Panama; Venezuela; Colombia; Brazil; Ecuador
<i>Chalcolepidius jansonii</i> Candèze, 1874	Nicaragua; Costa Rica; Panama; Colombia; Ecuador; Peru
<i>Chalcolepidius limbatus</i> Eschscholtz, 1829	Mexico; Honduras; Colombia; Venezuela; Brazil; Uruguay; Argentina; Virgin Islands; Trinidad; Peru; Ecuador; French Guiana; Guyana; Bolivia; Paraguay; Uruguay
<i>Chalcolepidius porcatus</i> (Linnaeus, 1787)	Venezuela; Colombia; Guyana; Suriname; French Guiana; Brazil; Guadeloupe; Grenada; Ecuador; Peru
<i>Chalcolepidius villei</i> Candèze, 1878	Ecuador
<i>Chalcolepidius virens</i> Fabricius, 1787	Brazil; Barbados; Grenada; Trinidad; Tobago; Venezuela; Colombia; Guyana; Suriname; Ecuador; Peru; Bolivia
<i>Chalcolepidius zonatus</i> Eschscholtz, 1829	Colombia; French Guiana; Ecuador; Brazil; Bolivia; Argentina
<i>Chalcolepis luczoti</i> Candèze, 1857	Mexico; Guatemala; Honduras; Nicaragua; Costa Rica; Panama; Colombia; Trinidad; Ecuador; French Guiana
<i>Chalcolepis similis</i> Casari, 1999	Costa Rica; Panama; Trinidad; Venezuela; Colombia; Ecuador; Peru; French Guiana; Brazil
<i>Conoderus abbreviatus</i> Germar, 1839	Brazil; Ecuador; Bolivia; Argentina
<i>Conoderus apiatius</i> (Erichson, 1847)	Panama; Costa Rica; Colombia; Venezuela; Ecuador; Peru; Bolivia
<i>Conoderus difformis</i> Fleutiaux, 1920	Ecuador
<i>Conoderus laterarius</i> (Schwarz, 1902)	Ecuador
<i>Conoderus nocturnus</i> (Candèze, 1859)	Mexico; Guatemala; Costa Rica; Panama; Colombia; Ecuador
<i>Conoderus nubeculosus</i> (Candèze, 1889)	Ecuador
<i>Conoderus opacus</i> (Schwarz, 1902)	Ecuador
<i>Conoderus pilati</i> (Candèze, 1859)	Mexico; Guatemala; Nicaragua; Costa Rica; Panama; Ecuador
<i>Conoderus submaculatus</i> (Schwarz, 1902)	Ecuador
<i>Conoderus vagemaculatus</i> (Schwarz, 1907)	Ecuador; Argentina
<i>Cosmesus nigerrimus</i> Schwarz, 1902	Ecuador
<i>Cosmesus nigrans</i> Candèze, 1889	Ecuador
<i>Cosmesus punctum</i> Candèze, 1889	Ecuador
<i>Crepidius cuneiformis</i> Candèze, 1859	French Guiana; Ecuador

<i>Cyathodera lanugicollis</i> Candèze, 1859	Nicaragua; Costa Rica; Panama; French Guiana; Brazil; Ecuador
<i>Dilobitarsus subsulcatus</i> Candèze, 1874	Ecuador
<i>Dipropus fulvicollis</i> (Schwarz, 1902)	Ecuador
<i>Dipropus fulvus</i> (Fleutiaux, 1920)	Ecuador
<i>Esthesopus morio</i> Candèze, 1878	Ecuador; Argentina
<i>Horistonotus riveti</i> Fleutiaux, 1920	Ecuador
<i>Lacon palliatus</i> (Latreille, 1811)	Mexico; Nicaragua; Colombia; Peru; Ecuador
<i>Lissomus gibbosus</i> Cobos, 1972	Ecuador, Brasil
<i>Lygелater fulgidus</i> (Germar, 1841)	Colombia; Costa Rica; Panama; Venezuela; Suriname; French Guiana; Ecuador
<i>Lygелater indicus</i> (Herbst, 1783)	Colombia; French Guiana; Ecuador; Peru
<i>Lygелater piceus</i> Schwarz, 1902	Ecuador
<i>Madadicus quadrinotatus</i> Steinheil, 1875	Colombia; Bolivia; Argentina; Ecuador
<i>Octinodes riveti</i> Fleutiaux, 1920	Ecuador
<i>Octinodes ruficollis</i> (Schwarz, 1902)	Ecuador
<i>Oistus riveti</i> Fleutiaux, 1920	Ecuador
<i>Oistus subaeneus</i> Fleutiaux, 1920	Ecuador
<i>Physorhinus distigma</i> Candèze, 1859	USA: Texas; Mexico; Belize; Honduras; Guatemala; Nicaragua; Costa Rica; Panama; Colombia; Peru; Ecuador; Brazil; Paraguay; Argentina; Antigua; St. Eustatius
<i>Physorhinus erythrocephalus</i> (Fabricius, 1801)	Costa Rica; Panama; Colombia; Venezuela; Guyana; French Guiana; Ecuador; Brazil; Bolivia; Argentina; Paraguay; Mustique; Grenada; Trinidad
<i>Physorhinus marginatus</i> Candèze, 1859	French Guiana; Brazil, Ecuador;
<i>Physorhinus sexnotatus</i> Steinheil, 1875	Colombia, French Guiana; Brazil; Peru; Bolivia; Costa Rica; Panama; Ecuador
<i>Physorhinus stellatus</i> Candèze, 1859	Costa Rica; Panama; Colombia; Ecuador
<i>Platycrepidius castus</i> (Janson, 1882)	Ecuador
<i>Platycrepidius prodigus</i> (Janson, 1882)	Ecuador
<i>Pomachilius filiformis</i> Candèze, 1889	Ecuador
<i>Pomachilius flavus</i> (Fleutiaux, 1920)	Ecuador
<i>Pomachilius marginicollis</i> Schwarz, 1903	Ecuador
<i>Pomachilius pullus</i> Schwarz, 1900	Ecuador
<i>Pomachilius pusillus</i> Schwarz, 1900	Ecuador
<i>Probothrium crinitum</i> Candèze, 1878	Ecuador
<i>Propalaus haroldi</i> (Candèze, 1878)	Colombia; Venezuela; Peru; Ecuador
<i>Psiloniscus apicalis</i> (Chevrolat, 1835)	Mexico; Guatemala; Panama; Ecuador
<i>Pyrearinus basalis</i> (Schwarz, 1902)	Ecuador; French Guiana
<i>Pyrearinus vesculus</i> Costa, 1978	French Guiana; Ecuador; Brazil
<i>Pyrischius biplagiatus</i> (Janson, 1882)	Ecuador
<i>Pyrophorus angustus</i> Blanchard, 1843	Ecuador; Peru; Bolivia
<i>Pyrophorus clarus</i> Germar, 1841	Costa Rica; Panama; Colombia; Venezuela; Ecuador; Bolivia
<i>Pyrophorus dulcifer</i> Costa, 1972	Ecuador; Peru
<i>Pyrophorus luscus</i> Candèze, 1889	Mexico; Guatemala; Nicaragua; Honduras; Belize; Costa Rica; Panama; Colombia; Venezuela; Ecuador
<i>Pyrophorus magnus</i> Costa, 1972	Ecuador
<i>Pyrophorus noctilucus</i> (Linnaeus, 1758)	Mexico; Belize; Guatemala; Nicaragua; Costa Rica; Panama; Colombia; French Guiana; Ecuador; Brazil; Guadeloupe; Jamaica;

<i>Pyrophorus pisticus</i> Costa, 1972	San Domingo; Cuba
<i>Pyrophorus validus</i> Costa, 1972	Ecuador
<i>Semiotus acutus</i> Candèze, 1874	Ecuador
<i>Semiotus aeneovittatus</i> Kirsch, 1884	Ecuador; Bolivia; Colombia; Peru
<i>Semiotus affinis</i> Guérin-Méneville, 1855	Ecuador
<i>Semiotus antennalis</i> Candèze, 1895	Ecuador; Argentina; Bolivia; Brazil; Colombia
<i>Semiotus antennatus</i> Schwarz, 1900	Bolivia; Brazil; Ecuador; Peru; French Guiana
<i>Semiotus bilineatus</i> Candèze, 1857	Colombia; Ecuador
<i>Semiotus bispinus</i> Candèze, 1874	Colombia; Ecuador;
<i>Semiotus borrei</i> Candèze, 1878	Ecuador; Peru
<i>Semiotus buckleyi</i> Candèze, 1874	Ecuador
<i>Semiotus carus</i> Janson, 1882	Ecuador
<i>Semiotus colombianus</i> Wells, 2007	Ecuador; Peru
<i>Semiotus convexicollis</i> Blanchard, 1843	Colombia; Ecuador
<i>Semiotus cuspidatus splendidus</i> Candèze, 1881	Peru; Bolivia; Paraguay; Guyana; Ecuador;
	Colombia; Brazil; French Guiana
	Brazil; Costa Rica; Honduras; Panama; Peru;
	Colombia; Ecuador
<i>Semiotus diptychus</i> Candèze, 1874	Ecuador
<i>Semiotus formosus</i> Janson, 1882	Ecuador
<i>Semiotus fryi</i> Candèze, 1874	Ecuador
<i>Semiotus fulvicollis</i> Blanchard, 1843	Bolivia; Brazil; Ecuador; French Guiana; Panama;
	Peru
<i>Semiotus furcatus</i> (Fabricius, 1792)	French Guiana; Suriname; Brazil; Peru; Ecuador;
	Colombia; Bolivia; Guyana; Panama
<i>Semiotus girardi</i> Chassain, 2002	Ecuador
<i>Semiotus illigeri</i> Guérin-Méneville, 1844	Colombia; Venezuela; Ecuador; Peru; Costa Rica;
	Panama
<i>Semiotus imperialis</i> (Guérin-Méneville, 1844)	Colombia; Venezuela; Peru; Argentina; Brazil;
	Bolivia; Ecuador; Guyana; Venezuela
<i>Semiotus insignis</i> Candèze, 1857	Mexico; Guatemala; Nicaragua; Costa Rica;
	Panama; Belize; Colombia; Ecuador; Guatemala;
	Honduras; Venezuela
<i>Semiotus intermedius</i> (Herbst, 1806)	Brazil; Mexico; Ecuador; Colombia; Guatemala;
	Nicaragua; Costa Rica; Panama; Argentina;
	Paraguay
<i>Semiotus jansoni</i> Candèze, 1874	Ecuador; Peru
<i>Semiotus ligatus</i> Candèze, 1889	Colombia; Ecuador
<i>Semiotus ligneus</i> (Linnaeus, 1767)	Mexico; Nicaragua; Panama; Colombia;
	Venezuela; Suriname; French Guiana; Brazil;
	Argentina; Bolivia; Costa Rica; Ecuador;
	Guatemala; Guyana; Honduras; Paraguay; Peru;
	Suriname; Trinidad
<i>Semiotus linnei</i> Guérin-Méneville, 1844	Colombia; Ecuador; Venezuela
<i>Semiotus matilei</i> Chassain, 2001	Ecuador
<i>Semiotus nigriceps</i> Candèze, 1857	Brazil; Argentina; Ecuador; Paraguay; Peru
<i>Semiotus perangustus</i> Wells, 2007	Bolivia; Ecuador
<i>Semiotus pilosus</i> Wells, 2007	Ecuador
<i>Semiotus punctatostratus</i> Candèze, 1857	Mexico; Colombia; Ecuador; Venezuela
<i>Semiotus regalis</i> Guérin-Méneville, 1844	Colombia; Ecuador; Peru
<i>Semiotus ruber</i> Pjatakova, 1941	Ecuador
<i>Semiotus rubricollis</i> Wells, 2007	Ecuador
<i>Semiotus schaumii</i> Guérin-Méneville, 1844	Colombia; Ecuador; Peru
<i>Semiotus scitulus</i> Candèze, 1864	Ecuador

<i>Semiotus singularis</i> Kirsch, 1884	Ecuador
<i>Semiotus spinosus</i> Wells, 2007	Costa Rica; Ecuador; Panama
<i>Semiotus splendidus</i> Candèze, 1881	Nicaragua; Costa Rica; Panama; Ecuador
<i>Semiotus staudingeri</i> Pjatakowa, 1941	Ecuador
<i>Semiotus subvirescens</i> Schwarz, 1904	Ecuador
<i>Semiotus superbus</i> Kirsch, 1866	Costa Rica; Panama; Colombia; Ecuador; Peru
<i>Semiotus taeniatus</i> Erichson, 1847	Peru; Bolivia; Ecuador; Paraguay
<i>Semiotus vicinus</i> Fleutiaux, 1920	Ecuador
<i>Semiotus virgatus</i> Erichson, 1847	Colombia; Ecuador; Peru; Bolivia
<i>Semiotus zonatus</i> Candèze, 1874	Ecuador
<i>Thylacosternus nigrolimbatus</i> (Schwarz, 1902)	Brazil; Ecuador
<i>Tomicephalus substriatus</i> Candèze, 1863	Mexico; Nicaragua; Costa Rica; Panama; Colombia; Venezuela; Brazil; Ecuador

A Classification of the Genera of Elateridae Recorded from Ecuador

Agrypninae	Dendrometrinae	Pomachiliina
Agrypnini	Oxynopterini	<i>Cosmesus</i>
<i>Dilobitarsus</i>	Pectocerina	<i>Pomachilius</i>
<i>Lacon</i>	<i>Oistus</i>	<i>Psiloniscus</i>
Hemirhipini	Negastrinae	Ampedini
<i>Chalcolepidius</i>	<i>Madadicus</i>	Ampedina
<i>Chalcolepis</i>	Lissominae	<i>Agelasinus</i>
<i>Propalaus</i>	<i>Lissomus</i>	Dicrepidina
Oophorini	Semiotinae	<i>Achrestus</i>
<i>Aeolus</i>	<i>Semiotus</i>	<i>Anoplischius</i>
<i>Conoderus</i>	Cardiophorinae	<i>Atractosomus</i>
Pyrophorini	<i>Aptopus</i>	<i>Crepidius</i>
Anaissina	<i>Esthesopus</i>	<i>Cyathodera</i>
<i>Anaissus</i>	<i>Horistonotus</i>	<i>Dipropus</i>
<i>Alampoides</i>	Elaterinae	Physorhinini
Pyrophorina	Elaterini	<i>Anchastus</i>
<i>Lygelater</i>	<i>Probothrium</i>	<i>Physorhinus</i>
<i>Pyrearinus</i>	<i>Tomicephalus</i>	Cebriioninae
<i>Pyrichius</i>	Agriotini	Aplastini
<i>Pyrophorus</i>	Agriotina	<i>Octinodes</i>
Platycrepidiini	<i>Cardiorhinus</i>	Thylacosterninae
<i>Platycrepidius</i>		<i>Thylacosternus</i>

Discussion

The most recent published regional checklist that included historical country records for Ecuador was published almost 70 years ago (Blackwelder 1944, 1956). The low faunal number, 140 species, in the checklist above demonstrates inadequate documentation of the elaterid fauna in Ecuador. Even with corrections and updates the present list for the country is a mere 3% of the nearly 3600 described species for the Americas, and 5% of the approximately 2400 species recorded from South America. Neighboring Colombia and Peru share comparable montane and Amazonian transition ecozones, yet have more documented elaterid species, showing clearly that extensive opportunities exist for biotic documentation in Ecuador.

A comparison from neighboring and other South American countries is illustrated in Table 1. Notably, as a reflection of historical effort and possibly geographic area in bordering countries, Brazil has 799 species and the numbers are quickly increasing (e.g., Casari 2012a–b, 2013), Colombia with 327

species (Aguirre-Tapiero 2009; unpubl. data), and Peru with 157 species (unpubl. data). An examination of the checklist reveals a distinct proportional absence of small, dull-colored, and potentially habitat-restricted and ecologically informative species that dominate click beetle diversity. For example, the present checklist includes 47 species of *Semiotus*, representing 33% of the reported species! Given the dominance in favor of large and conspicuous elaterids in the checklist, such as *Chalcolepidius* Eschscholtz, *Pyrophorus* Billberg, and *Semiotus* Eschscholtz species, it can be hoped that attention will turn toward the greater numbers of undocumented 'small brown' click beetles as part of the charismatic microfauna that dominates biodiversity. Many undescribed species from Ecuador and neighboring countries are known to us, thus many study opportunities exist to enlarge the species list through documentation. And, taxonomic revisions are needed, especially for several rather large and probably polyphyletic genera such as *Aeolus* Eschscholtz, *Anoplischius* Candèze and *Dipropus* Eschscholtz.

Most Ecuadorian click beetles are reported from Amazonian lowlands or adjacent transition ecozones, likely due to the popularity of and modern development threats to lowland rainforest environments. The montane and western upland regions are not well represented in the click beetle fauna despite these being areas of historically high anthropogenic occupation and perturbation. As with many other organisms, satisfactory biodiversity documentation and reference specimen collections essential to working with Neotropical click beetles are lacking in Andean countries. This lack of resources tangibly impacts research methods, target taxa selected, analysis of environmental correlations, ecological habits, and conservation planning as demonstrated by Erwin et al. (2005). For example, we suggest that mosaics of occurrence due to habitat history and vegetation associations are reflected in the floral visitation and invertebrate predation preferences by adult click beetles, and microhabitat adaptation by the largely predatory larvae, such as those in aged decadent and decaying wood, bromeliad leaf axils, epiphyte root zones, or riparian communities.

Sixty-five (65) species, or 48% of the fauna, are recorded solely from Ecuador to date. However, assertions of endemism are premature as with the other taxa there is a general pattern of Ecuadorian species of elaterids demonstrating broader distributions throughout Andean and Amazonian transition ecozones. The species reported only from Ecuador are members of genera that are mostly from Amazonian lowland ecozones that are shared with other Andean countries. Specialized or narrow habitats have not been adequately explored in Ecuador and may yield endemic species.

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Literature Cited

- Aguirre-Tapiero, M. P. 2009.** Key to the genera known and expected Elateridae Leach (Coleoptera: Elateroidea) in Colombia. Boletín del Museo de Entomología, Universidad del Valle 10(2): 25–35.
- Aguirre-Tapiero, M. P. 2013.** Elateridos de dosel (Coleoptera: Elateridae) de la Cuenca Amazónica Ecuatoriana: Descripción y Registros de Nuevas Especies y Evaluación de la Diversidad Espacial y Temporal. M.S. tesis, Universidad del Valle, Cali. 110p.
- Blackwelder, R. E. 1944.** Checklist of Coleopterous Insects of Mexico, Central America, the West Indies, and South America. United States National Museum Bulletin 185(Part 2): 189–341.

- Blackwelder, R.E. 1956.** Checklist of Coleopterous Insects of Mexico, Central America, the West Indies, and South America. United States Natural Museum Bulletin 185(Part 6): vii+927–1492.
- Candèze E. 1859.** Monographie des Élatérides. Memoires de la Société Royale des Sciences de Liège 14: 1–543, 7 pls.
- Casari, S. A. 2012a.** New genera of Dicrepidiina from the Neotropical Region (Coleoptera, Elateridae, Elaterinae, Ampedini). Zootaxa 3721(2): 143–156.
- Casari, S. A. 2012b.** A new species and redescription of three species of *Atractosomus* Lacordaire from Brazil (Elateridae, Elaterinae). Revista Brasileira de Entomologia 56(4): 419–430.
- Casari, S. 2013.** New genera of Dicrepidiina from the Neotropical Region (Coleoptera, Elateridae, Elaterinae, Ampedini). Zootaxa 3721(2): 143–156.
- Champion, G. C. 1894–1896.** Fam. Elateridae, pp. 258–556, pl. 11–24. *In*: Godman, F.D. and O. Salvin (Eds.), Biologia Centrali-Americana, Insecta, Coleoptera, vol. 3, part 1, Serricornia. R.H. Porter, London.
- Chassain, J. 2010.** Les *Anchastus* Le Conte, 1853 de Guyane (Coleoptera, Elateridae, Physorhininae). Le Coléopteriste 13(1): 43–53.
- Erwin, T.L. 1989.** Canopy arthropod biodiversity: a chronology of sampling techniques and results. Revista Peruana de Entomología 32: 71–77.
- Erwin, T.L., M.C. Pimienta, O.E. Murillo, and V. Aschero 2005.** Mapping patterns of β -diversity for beetles across the western Amazon Basin: A preliminary case for improving inventory methods and conservation strategies. Proceedings of the California Academy of Sciences 56(7)(Supplement 1): 72–85.
- Fleutiaux, E. 1940.** Élatérides nouveaux. Annales de la Société Entomologique de Belgique 80: 89–104.
- Golbach, R. 1979.** Las especies de *Cardiorhinus* (Col. Elat.) con más de una franja longitudinal oscura en el pronoto. Acta Zoologica Lilloana 33(2): 75–86.
- Golbach, R. 1983.** Historia del género *Cardiorhinus* Esch 1829 (Col. Elateridae). Acta Zoologica Lilloana 37(1): 35–54.
- Johnson, P. J. 2002a.** Lectotype designations for Elateridae (Coleoptera) described by George C. Champion in the Biologia Centrali-Americana. Dugesiana 9(1): 15–46.
- Schaaf, D. 1970.** Revision of the genus *Physorhinus* (Coleoptera, Elateridae) in North, Central, and South America, Part I: Introduction and key to the species. Entomological News 81: 225–232.
- Schaaf, D. 1971.** Revision of the genus *Physorhinus* (Coleoptera, Elateridae) in North, Central, and South America, Part II: Descriptions. Entomological News 82: 57–84.
- Schenkling, S. 1925.** Elateridae I, pp. 1–263. Coleopterorum Catalogus auspiciis et auxilio W. Junk. Pars 80. W. Junk; Berlin.
- Schenkling, S. 1927.** Elateridae II, pp. 265–636. Coleopterorum Catalogus auspiciis et auxilio W. Junk. Pars 88. W. Junk; Berlin.

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Table 1. Selected South American Elateridae Taxa by Country.

Country	Species	Genera	Subfamilies
Argentina	376	89	10
Bolivia	123	41	8
Brazil	799	90	9
Chile	168	55	9
Colombia	328	59	8
Ecuador	140	38	9
French Guiana	183	56	7
Guyana	56	18	4
Paraguay	57	25	4
Peru	157	42	8
Suriname	22	11	3
Uruguay	41	23	7
Venezuela	149	41	8

