

Catalog of the invertebrate type specimens hosted at the Pontificia Universidad Católica del Ecuador and Escuela Politécnica Nacional natural history collections

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Abstract

This work updates the invertebrate type specimen catalog published by Donoso et al. (2009). The catalog is increased by 2281 type specimens (from 454 species or subspecies) to a total of 4180 type specimens (from 770 species or subspecies) hosted at the Pontificia Universidad Católica del Ecuador and Escuela Politécnica Nacional natural history collections. The new material adds 307 holotypes, 1910 paratypes, and 64 allotypes. It provides original information from four phyla (Arthropoda, Mollusca, Nemata, and Platyhelminthes), eight classes, 21 orders, 73 families, and 156 genera. This updated catalog includes a map showing the type localities in the country, a list of the 71 new type specimens (from 23 species or subspecies) from other countries hosted at both museums, corrections to the previous catalog published by Donoso et al. (2009), and label information from each new specimen.

Key words: Arthropods, biodiversity, Cajanuma, conservation, insects, Otonga, type localities

Introduction

In 2009, we published the first catalog of invertebrate type specimens in the collection at Pontificia Universidad Católica del Ecuador (QCAZI), the largest in Ecuador (Donoso et al. 2009). The catalog provided information on type specimens in the collection up to the year 2008 and explored general patterns of collection biases associated with this type material. Donoso et al. (2009) found that invertebrate type material was associated with roads near Quito (i.e., the country's capital city with the major international airport). Furthermore, these type specimens were biased towards a few localities not incorporated in the national system of protected areas. Since then, several hundred specimens have accumulated in the QCAZI collection.

The museum at Escuela Politécnica Nacional (MEPN), in Quito, Ecuador, was created in 1946 by the naturalist Gustavo Orcés and manages invertebrate, mammal, amphibian, reptile, and fish collections (Carrera et al. 2020). After QCAZI, the MEPN museum likely holds the second most important invertebrate collection in the country. The MEPN invertebrate collection preserves more than 10 million invertebrates in collection jars. It is well represented by



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canopy fogging and aquatic invertebrate samples but there is no catalog. Thus, an analysis of the updated QCAZI and the new MEPN catalogs provide us with important insights into the development of the study of invertebrates in Ecuador in the last decade.

Materials and methods

In this work, we update the 2008 dataset to include the new type specimens deposited at the Pontificia Universidad Católica del Ecuador (**QCAZI**) museum after 2008 and up to 2020 and, for the first-time, list the type specimens stored in the Museum at Escuela Politécnica Nacional (**MEPN**), in Quito. Type specimens from other countries hosted in both museums have also been included. Errors of type designation that were included in the 2008 dataset have been excluded from the list in this update. Finally, type names misspelled in the 2008 dataset have been corrected.

We compiled specimens for this list by gathering all recent entries of type specimens: holotype, paratypes, and allotypes (i.e., paratypes of the sex opposite to that of the holotype) in the QCAZI and MEPN collections. We also searched all cabinets at both museums for invertebrate type specimens. Additionally, we searched for invertebrate type specimens in the primary literature using online search engines. Coordinates to the localities were extracted; localities with no coordinates or with incorrect information were georeferenced using the Google Earth Engine and the locality database from the QCAZI Museum hosted at Bioweb (Pontificia Universidad Católica del Ecuador 2021).

Results

The new list of type material includes 2281 type specimens from 307 holotypes, 1910 paratypes, and 64 allotypes (Table 1). The specimens belong to four phyla, eight classes, 21 orders, 73 families, 156 genera, and 454 species or subspecies. A species accumulation curve of the complete datasets (2008 and 2020) shows a continuing increase in the number of Ecuadorian species described since 1978 (Fig. 1); for example, in the last five years, type specimens of 182 new invertebrate species were deposited at these two museums. We provide verbatim label information for all new type material in the Suppl. material 1.

A map of type localities (Fig. 2) shows an increase of collection points compared to the ones published in Donoso et al. (2009). The new type specimens are distributed in all 24 provinces of Ecuador. Napo (96 spp.), Cotacachi (93 spp.), and Pichincha (63 spp.) are the provinces with the highest number of new registered types. However, there are several provinces where more studies are required; this is the case for Bolívar (1 sp.), Cañar (2 spp.), El Oro (1 sp.), and Guayas (3 spp.), among others. Table 2 provides information for 71 type specimens (from 23 species or subspecies) from countries other than Ecuador.

With the new additions, 29% of described species of invertebrates were collected in five localities: Reserva Integral Otonga (116 spp.), Pasochoa (35 spp.), Estación Científica Yasuni (25 spp.), Cajanuma (23 spp.), and Las Pampas (20 spp.) (Fig. 3). Most type-rich localities were all found near the

Table 1. New type specimens of Ecuadorian species deposited at the QCAZI and MEPN museums. The species are organized by phylum, class, order, family, genus, species, and authority. All the species are preserved at the QCAZI except those with the acronym MEPN with type status as follows: H = holotype, P = paratype, and A = allotype; the bibliographic reference where the type was designated is in parentheses.

Phylum Arthropoda
Class Arachnida
Order Araneae
Family Anapidae
<i>Anapis anabelleae</i> Dupérré & Tapia, 2018; H, P; (Dupérré and Tapia 2018)
<i>Anapis carmencita</i> Dupérré & Tapia, 2018; H; (Dupérré and Tapia 2018)
<i>Anapis churu</i> Dupérré & Tapia, 2018; H, P; (Dupérré and Tapia 2018)
<i>Anapis mariebertheae</i> Dupérré & Tapia, 2018; H, P; (Dupérré and Tapia 2018)
<i>Anapis naranja</i> Dupérré & Tapia, 2018; H, P; (Dupérré and Tapia 2018)
<i>Anapis nawchi</i> Dupérré & Tapia, 2018; H, P; (Dupérré and Tapia 2018)
<i>Anapis shina</i> Dupérré & Tapia, 2018; H, P; (Dupérré and Tapia 2018)
Family Anyphaenidae
<i>Katissa guayasamini</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Katissa kurusiki</i> Dupérré & Tapia, 2016; H; P; (Dupérré and Tapia 2016)
<i>Katissa puyu</i> Dupérré & Tapia, 2016; H; P; (Dupérré and Tapia 2016)
<i>Katissa tamya</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Katissa yaya</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Patrera hatunkiru</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Patrera philipi</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Patrera shida</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Patrera suni</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Patrera witsu</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Shuyushka achachay</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Shuyushka moscai</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
<i>Shuyushka wachi</i> Dupérré & Tapia, 2016; H; (Dupérré and Tapia 2016)
Family Caponiidae
<i>Nops cesari</i> Dupérré, 2014; H, P; (Dupérré 2014)
<i>Nops quito</i> Dupérré, 2014; H; (Dupérré 2014)
<i>Nyetenops juchuy</i> Dupérré, 2014; H; (Dupérré 2014)
Family Ctenidae
<i>Chococtenus cappuccino</i> Dupérré, 2015; H, P; (Dupérré 2015a)
<i>Chococtenus cuchilla</i> Dupérré, 2015; H, P; (Dupérré 2015a)
<i>Chococtenus duendecito</i> Dupérré, 2015; H; (Dupérré 2015a)
<i>Chococtenus fantasma</i> Dupérré, 2015; H, P; (Dupérré 2015a)
<i>Chococtenus kashkara</i> Dupérré, 2015; H, P; (Dupérré 2015a)
<i>Chococtenus lasdamas</i> Dupérré, 2015; H, P; (Dupérré 2015a)
<i>Chococtenus luchoi</i> Dupérré, 2015; H; (Dupérré 2015a)
<i>Chococtenus neblina</i> Dupérré, 2015; H, P; (Dupérré 2015a)
<i>Chococtenus otonga</i> Dupérré, 2015; H, P; (Dupérré 2015a)
<i>Chococtenus otongachi</i> Dupérré, 2015; H, P; (Dupérré 2015a)

<i>Chococtenus piemontana</i> Dupérré, 2015; H; (Dupérré 2015a)
<i>Chococtenus suffuscus</i> Dupérré, 2015; H, P; (Dupérré 2015a)
<i>Chococtenus waitti</i> Dupérré, 2015; H; (Dupérré 2015a)
Family Dipluridae
<i>Linothele pukachumpi</i> Dupérré & Tapia, 2015; H, P; (Dupérré and Tapia 2015a)
<i>Linothele quori</i> Dupérré & Tapia, 2015; H, P; (Dupérré and Tapia 2015a)
<i>Linothele tsachilas</i> Dupérré & Tapia, 2015; H, P; (Dupérré and Tapia 2015a)
<i>Linothele yanachanka</i> Dupérré & Tapia, 2015; H, P; (Dupérré and Tapia 2015a)
<i>Linothele zaia</i> Dupérré & Tapia, 2015; H; (Dupérré and Tapia 2015a)
Family Mysmenidae
<i>Mysmenopsis alvaro</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis amazonica</i> Dupérré & Tapia, 2020; H, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis angamarca</i> Dupérré & Tapia, 2020; H, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis awa</i> Dupérré & Tapia, 2020; H, A; (Dupérré and Tapia 2020a)
<i>Mysmenopsis baerti</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis bartolozzii</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis chiquita</i> Dupérré & Tapia, 2015; H, P; (Dupérré and Tapia 2015a)
<i>Mysmenopsis choco</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis corazon</i> Dupérré & Tapia, 2020; H; (Dupérré and Tapia 2020a)
<i>Mysmenopsis cube</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis fernandoi</i> Dupérré & Tapia, 2015; H, P; (Dupérré and Tapia 2015a)
<i>Mysmenopsis guanza</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis guayaca</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis hunachi</i> Dupérré & Tapia, 2020; H; (Dupérré and Tapia 2020a)
<i>Mysmenopsis junin</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis lasrocas</i> Dupérré & Tapia, 2020; H, A; (Dupérré and Tapia 2020a)
<i>Mysmenopsis lloa</i> Dupérré & Tapia, 2020; H; (Dupérré and Tapia 2020a)
<i>Mysmenopsis onorei</i> Dupérré & Tapia, 2015; H, P; (Dupérré and Tapia 2015a)
<i>Mysmenopsis otokiki</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis otonga</i> Dupérré & Tapia, 2015; H, P; (Dupérré and Tapia 2015a)
<i>Mysmenopsis pululahua</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis salazarae</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis shushufindi</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020a)
<i>Mysmenopsis tepuy</i> Dupérré & Tapia, 2020; H; (Dupérré and Tapia 2020a)
<i>Mysmenopsis tungurahua</i> Dupérré & Tapia, 2020; H; (Dupérré and Tapia 2020a)
Family Ochyroceratidae
<i>Ochyrocera callaina</i> Dupérré, 2015; H, P; (Dupérré 2015c)
<i>Ochyrocera cashcatotoras</i> Dupérré, 2015; H; (Dupérré 2015c)
<i>Ochyrocera italo</i> Dupérré, 2015; H; (Dupérré 2015c)
<i>Ochyrocera losrios</i> Dupérré, 2015; H; (Dupérré 2015c)
<i>Ochyrocera minotaure</i> Dupérré, 2015; H; (Dupérré 2015c)
<i>Ochyrocera otonga</i> Dupérré, 2015; H; (Dupérré 2015c)
<i>Ochyrocera rinocerotos</i> Dupérré, 2015; H, P; (Dupérré 2015c)

<i>Ochyrocera zabaleta</i> Dupérré, 2015; H, P; (Dupérré 2015c)
<i>Psiloochyrocera tortilis</i> Dupérré, 2015; H; (Dupérré 2015c)
<i>Speocera bioforestae</i> Dupérré, 2015; H, P; (Dupérré 2015c)
<i>Speocera musgo</i> Dupérré, 2015; H, P; (Dupérré 2015c)
<i>Speocera violacea</i> Dupérré, 2015; H; (Dupérré 2015c)
Family Oonopidae
<i>Bipoonops lansa</i> Dupérré & Tapia, 2017; H; (Dupérré and Tapia 2017a)
<i>Bipoonops pilan</i> Dupérré & Tapia, 2017; H; (Dupérré and Tapia 2017a)
<i>Neotrops platnicki</i> Grismado & Ramírez, 2013; H; (Grismado and Ramírez 2013)
<i>Niarchos normani</i> Dupérré & Tapia, 2017; H; (Dupérré and Tapia 2017a)
<i>Reductoonops berun</i> Dupérré & Tapia, 2017; H, A, P; (Dupérré and Tapia 2017a)
<i>Scaphidysderina chirin</i> Dupérré & Tapia, 2017; H, A; (Dupérré and Tapia 2017a)
<i>Scaphidysderina lubanako</i> Dupérré & Tapia, 2017; H, A; (Dupérré and Tapia 2017a)
<i>Scaphidysderina tsaran</i> Dupérré & Tapia, 2017; H, A; (Dupérré and Tapia 2017a)
Family Paratropididae
<i>Paratropis eliciei</i> Dupérré, 2015; H, P; (Dupérré 2015b)
<i>Paratropis otonga</i> Dupérré & Tapia, 2020; H, P; (Dupérré and Tapia 2020b)
<i>Paratropis pristirana</i> Dupérré & Tapia, 2020; H, A, P; (Dupérré and Tapia 2020b)
Family Sparassidae
<i>Anaptomecus paru</i> Guala, Labarque & Rheims, 2012; H; (Guala et al. 2012)
Family Symphytognathidae
<i>Anapistula equatoriana</i> Dupérré & Tapia, 2017; H, P; (Dupérré and Tapia 2017b)
<i>Symphytognatha cabezota</i> Dupérré & Tapia, 2017; H, P; (Dupérré and Tapia 2017b)
Family Telemidae
<i>Kinku turumanya</i> Dupérré & Tapia, 2015; H, P; (Dupérré and Tapia 2015b)
Family Theridiosomatidae
<i>Chthonos kuyllur</i> Dupérré & Tapia, 2017; H, P; (Dupérré and Tapia 2017b)
<i>Naatlo mayzana</i> Dupérré & Tapia, 2017; H; (Dupérré and Tapia 2017b)
<i>Ogulnius laranka</i> Dupérré & Tapia, 2017; H, A; (Dupérré and Tapia 2017b)
<i>Ogulnius paku</i> Dupérré & Tapia, 2017; H, P; (Dupérré and Tapia 2017b)
<i>Theridiosoma ankas</i> Dupérré & Tapia, 2017; H; (Dupérré and Tapia 2017b)
<i>Theridiosoma esmeraldas</i> Dupérré & Tapia, 2017; H; (Dupérré and Tapia 2017b)
<i>Theridiosoma kullki</i> Dupérré & Tapia, 2017; H, P; (Dupérré and Tapia 2017b)
<i>Theridiosoma sacha</i> Dupérré & Tapia, 2017; H, P; (Dupérré and Tapia 2017b)
Order Opiliones
Family Neogoveidae
<i>Metagovea ligiae</i> Giupponi & Kury, 2015; H, P; (Giupponi and Kury 2015)
Family Cranaidae
<i>Zannicranus monoclonius</i> Kury, 2012; H, A; (Kury 2012)
<i>Zannicranus morlaucus</i> Kury, 2012; H; (Kury 2012)
Order Pseudoscorpiones
Family Withiidae
<i>Cystowithius smithersi</i> Harvey, 2004; P; (Harvey 2004)

Order Ricinulei
Family Ricinoididae
<i>Cryptocellus chiruisla</i> Botero & Flórez, 2017; H, P; (Botero and Flórez 2017)
Order Sarcoptiformes
Family Lohmanniidae
<i>Lohmannia vulcania</i> Schatz, 1993; P; (Schatz 1993)
<i>Torpacarus remotus</i> Schatz, 1994; P; (Schatz 1994)
Order Schizomida
Family Hubbardiidae
<i>Surazomus kitu</i> Villarreal, Silva & Giupponi, 2016; H; (Villarreal et al. 2016)
<i>Surazomus palenque</i> Villarreal, Silva & Giupponi, 2016; H, P; (Villarreal et al. 2016)
Order Scorpiones
Family Chactidae
<i>Teuthraustes kuryi</i> Ythier & Lourenço, 2017; H; (Ythier and Lourenço 2017)
Class Chilopoda
Order Geophilomorpha
Family Ballophilidae
<i>Ityphilus grismadoi</i> Pereira, 2018; H; (Pereira 2018b)
Family Schendylidae
<i>Pectiniunguis aequatorialis</i> Pereira, 2018; H; (Pereira 2018a)
Class Copepoda
Order Siphonostomatoida
Family Caligidae
<i>Pupulina mantensis</i> Cruz, Caña, Suárez & Santana, 2018; H, A, P; (Cruz et al. 2018)
Class Diplopoda
Order Polydesmida
Family Platyrrhacidae
<i>Barydesmus nangaritza</i> Recuero & Sánchez, 2018; H; (Recuero and Sánchez 2018)
Class Insecta
Order Coleoptera
Family Cantharidae
<i>Maronius papallactae</i> Constantin, 2007; P; (Constantin 2007)
<i>Plectonotum crassicorne</i> Constantin, 2008; P; (Constantin 2008a)
<i>Plectonotum glaber</i> Constantin, 2008; P; (Constantin 2008a)
<i>Plectonotum latithorax</i> Constantin, 2008; P; (Constantin 2008a)
<i>Plectonotum macaraense</i> Constantin, 2010; P; (Constantin 2010)
<i>Plectonotum moreti</i> Constantin, 2008; P; (Constantin 2008a)
<i>Plectonotum nigricorne</i> Constantin, 2008; P; (Constantin 2008a)
<i>Plectonotum onorei</i> Constantin, 2008; P; (Constantin 2008a)
<i>Plectonotum puncticollis</i> Constantin, 2008; P; (Constantin 2008a)
<i>Plectonotum zanjarajunoense</i> Constantin, 2010; P; (Constantin 2010)
<i>Silis barragani</i> Constantin, 2010; H; (Constantin 2010)
<i>Silis elongatipennis</i> Constantin, 2009; P; (Constantin 2009)

<i>Silis gilletti</i> Constantin, 2009; P; (Constantin 2009).
<i>Silis otongae</i> Constantin, 2009; H, P; (Constantin 2009)
Family Carabidae
<i>Balligratus brevis</i> Moret & Ortuño, 2017; P; (Moret and Ortuño 2017)
<i>Balligratus humerangulus</i> Moret & Ortuño, 2017; P; (Moret and Ortuño 2017)
<i>Bembidion ricei</i> Maddison & Toledano, 2012; H; (Maddison and Toledano 2012)
<i>Blennidus amaluzanus</i> Moret, 2005; P; (Moret 2005)
<i>Calleida desenderi</i> Casale, 2011; H; (Casale 2011)
<i>Chlaenius walterrossii</i> Giachino & Allegro, 2018; P; (Giachino and Allegro 2018)
<i>Diploharpus curtulus</i> Moret, 2008; P; (Moret 2008)
<i>Dyscolus aquator</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus arauzae</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus barragani</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus crespoae</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus donosoii</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus eleonora</i> Moret & Murienne, 2020; H, P; (Moret and Murienne 2020)
<i>Dyscolus famelicus</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus giselae</i> Moret & Murienne, 2020; H, P; (Moret and Murienne 2020)
<i>Dyscolus gobbii</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus incommunis</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus marini</i> Moret & Murienne, 2020; H, P; (Moret and Murienne 2020)
<i>Dyscolus piscator</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus placitus</i> Moret & Murienne, 2020; P; (Moret and Murienne 2020)
<i>Dyscolus ravidus</i> Moret & Murienne, 2020; H, P; (Moret and Murienne 2020)
<i>Dyscolus rivinus</i> Moret & Murienne, 2020; H, P; (Moret and Murienne 2020)
<i>Dyscolus rugitarsis</i> Moret & Murienne, 2020; H, P; (Moret and Murienne 2020)
<i>Dyscolus ruizi</i> Moret & Murienne, 2020; H, P; (Moret and Murienne 2020)
<i>Dyscolus silvestris</i> Moret & Murienne, 2020; H, P; (Moret and Murienne 2020)
<i>Dyscolus sulcipedis</i> Moret & Murienne, 2020; H; (Moret and Murienne 2020)
<i>Dyscolus velox</i> Moret, 2005; P; (Moret 2005).
<i>Hyboptera tiputini</i> Erwin & Henry, 2017; P; MEPN; (Erwin and Henry 2017)
<i>Hyboptera vestiverdis</i> Erwin & Henry, 2017; P; MEPN; (Erwin and Henry 2017)
<i>Loxandrus semperfidelis</i> Will, 2008; P; (Will 2008)
<i>Moriosomus loebli</i> Allegro, Giachino & Picciau, 2018; P; (Allegro et al. 2018)
<i>Tetracha onorei</i> Naviaux 2007; A; (Naviaux 2007)
<i>Trechisibus barragani</i> Deuve & Moret, 2017; H; (Deuve and Moret 2017)
<i>Trechisibus emiliae</i> Deuve & Moret, 2017; H; (Deuve and Moret 2017)
<i>Trechisibus pubescens</i> Deuve & Moret, 2017; H, P; (Deuve and Moret 2017)
Family Chrysomelidae
<i>Beltia awapita</i> Flowers, 2018; H; (Flowers 2018)
<i>Beltia ledesmae</i> Flowers, 2018; H, A, P; (Flowers 2018)
<i>Beltia napoensis</i> Flowers, 2018; P; (Flowers 2018)
<i>Beltia talaga</i> Flowers, 2018; H; (Flowers 2018)
<i>Elytromena constantini</i> Daccordi, 2008; P; (Daccordi 2008)

Family Curculionidae

Akrobothrus ecuadoriensis Dole & Cognato, 2007; H, A; MEPN; (Dole and Cognato 2007)

Camptocerus lucwildi Smith & Cognato, 2017; P; (Smith and Cognato 2017)

Coptoborus ochromactonus Smith & Cognato, 2014; H, P; (Stilwell et al. 2014)

Coptonotus uteq Smith & Cognato, 2016; P; (Smith and Cognato 2016)

Howdeniola margheritae Belló & Osella, 2008; P; (Belló and Osella 2008)

Howdeniola onorei Belló & Osella, 2008; P; (Belló and Osella 2008)

Family Elateridae

Paradrapetes serratus Aranda, 1999; H; (Aranda 1999)

Family Elmidae

Cylloepus bartolozzii Monte & Mascagni, 2012; P; (Monte and Mascagni 2012)

Cylloepus cesari Monte & Mascagni, 2012; P; (Monte and Mascagni 2012)

Cylloepus fabianorum Monte & Mascagni, 2012; P; (Monte and Mascagni 2012)

Cylloepus francescae Monte & Mascagni, 2012; P; (Monte and Mascagni 2012)

Cylloepus mazzai Monte & Mascagni, 2012; P; (Monte and Mascagni 2012)

Cylloepus terzanii Monte & Mascagni, 2012; P; (Monte and Mascagni 2012)

Macrelmis eliciei Monte & Mascagni, 2012; P; (Monte and Mascagni 2012)

Family Hybosoridae

Germarostes otonga Ballerio & Gill, 2008; H, P; (Ballerio and Gill 2008)

Family Leiodidae

Adelopsis azuay Salgado, 2013; H, P; (Salgado 2013)

Adelopsis carolinae Salgado, 2008; P; (Salgado 2008)

Adelopspeleon acuminatum Salgado, 2012; P; (Salgado 2012)

Dissochaetus angustilis Salgado, 2010; P; (Salgado 2010a)

Eucatops tungurahuaensis Salgado, 2010; H; (Salgado 2010b)

Ptomaphagus cubensis Salgado, 2012; H, P; (Salgado 2012)

Family Lepiceridae

Lepicerus pichilingue Flowers, Shepard & Troya, 2010; H, P; (Flowers et al. 2010)

Family Lucanidae

Syndesus luki Onore, Bartolozzi & Zilioli, 2011; P; (Onore et al. 2011)

Family Melyridae

Astylus moreti Constantin, 2011; P; (Constantin 2011)

Melyrodes lojaensis Constantin, 2008; P; (Constantin 2008b)

Family Nitidulidae

Pocadius maquipucunensis Leschen & Carlton, 1994; P; (Leschen and Carlton 1994)

Family Phengodidae

Pseudophengodes onorei Wittmer, 1996; P; (Wittmer 1996)

Family Scarabaeidae

Amithao cotopaxicus Ratcliffe, 2017; P; (Ratcliffe 2017)

Chrysinia dzidorhum (Arnaud, 1994); P; (Arnaud 1994)

Cyclocephala guaguarum Dechambre & Endrödi, 1984; P; (Dechambre and Endrödi 1984)

Cyclocephala niguasa Dechambre & Endrödi, 1984; P; (Dechambre and Endrödi 1984)

Eurysternus contractus Génier, 2009; P; (Génier 2009)

<i>Eurysternus lanuginosus</i> Génier, 2009; P; (Génier 2009)
<i>Gymnetis drogoni</i> Ratcliffe, 2018; P; (Ratcliffe 2018)
<i>Gymnetis viseroni</i> Ratcliffe, 2018; P; (Ratcliffe 2018)
<i>Odontolytes tectipennis</i> (Stebnicka & Skelley, 2005); H, P; MEPN; (Stebnicka and Skelley 2005)
<i>Odontolytes waoraniae</i> (Stebnicka & Skelley, 2005); H, P; MEPN (Stebnicka and Skelley 2005)
<i>Onorius inexpectatus</i> Frolov & Vaz de Mello, 2015; H, P; (Frolov and Vaz de Mello 2015)
<i>Palaeophileurus silvestris</i> Neita & Ratcliffe, 2017; P; (Neita and Ratcliffe 2017)
<i>Phanaeus achilles lydiae</i> Arnaud, 2000; P; (Arnaud 2000)
<i>Spodochlamys nazareti</i> Arnaud, 1995; P; (Arnaud 1995)
Family Staphylinidae
<i>Gnathymenus rossii</i> Assing, 2013; P; (Assing 2013)
<i>Leptonia onorei</i> Pace, 2008; P; (Pace 2008)
Order Diptera
Family Anthomyzidae
<i>Mumetopia messor</i> Roháček & Barber, 2008; P; (Roháček and Barber 2008)
Family Aulacigastridae
<i>Aulacigaster albifacies</i> Rung & Mathis, 2011; P; MEPN; (Rung and Mathis 2011)
<i>Aulacigaster formosa</i> Rung & Mathis, 2011; P; MEPN; (Rung and Mathis 2011)
<i>Aulacigaster trifasciata</i> Rung & Mathis, 2011; P; MEPN; (Rung and Mathis 2011)
<i>Aulacigaster unifasciata</i> Rung & Mathis, 2011; P; MEPN; (Rung and Mathis 2011)
<i>Aulacigaster vespertina</i> Rung & Mathis, 2011; P; MEPN; (Rung and Mathis 2011)
Family Ceratopogonidae
<i>Forcipomyia aida</i> Hochman, Marino & Spinelli, 2017; H, A; (Hochman et al. 2017)
<i>Forcipomyia ivani</i> Hochman, Marino & Spinelli, 2017; H, A, P; (Hochman et al. 2017)
Family Clusiidae
<i>Craspedochaeta argoniae</i> Lonsdale & Marshall, 2006; P; (Lonsdale and Marshall 2006)
<i>Craspedochaeta pollostos</i> Lonsdale & Marshall, 2006; P; (Lonsdale and Marshall 2006)
<i>Hendelia heliconiae</i> Lonsdale & Marshall, 2011; P; (Lonsdale and Marshall 2011)
<i>Sobarocephala archisobarocephala</i> Lonsdale & Marshall, 2012; H; (Lonsdale and Marshall 2012)
<i>Sobarocephala bucki</i> Lonsdale & Marshall, 2012; H; (Lonsdale and Marshall 2012)
<i>Sobarocephala bulbosus</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala dichotomos</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala echinata</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala epeira</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala fuscina</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala hispidifunda</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala leptolineata</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala lita</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala maquipucuna</i> Lonsdale & Marshall, 2012; H; (Lonsdale and Marshall 2012)
<i>Sobarocephala paieroi</i> Lonsdale & Marshall, 2012; H; (Lonsdale and Marshall 2012)
<i>Sobarocephala patina</i> Lonsdale & Marshall, 2012; H; (Lonsdale and Marshall 2012)
<i>Sobarocephala pectinaria</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala sinuata</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)

<i>Sobarocephala spatulata</i> Lonsdale & Marshall, 2012; P; (Lonsdale and Marshall 2012)
<i>Sobarocephala subtriangulina</i> Lonsdale & Marshall, 2012; H; (Lonsdale and Marshall 2012)
<i>Sobarocephala tinctoalata</i> Lonsdale & Marshall, 2012; H; (Lonsdale and Marshall 2012)
Family Curtonotidae
<i>Curtonotum bivittatum</i> Klymko & Marshall, 2011; H; (Klymko and Marshall 2011)
Family Drosophilidae
<i>Drosophila anthurium</i> Llangarí & Rafael, 2020; H, P; (Llangarí and Rafael 2020)
<i>Drosophila ayauma</i> Peñafiel & Rafael, 2019; H, P; (Peñafiel and Rafael 2019a)
<i>Drosophila cajanuma</i> Peñafiel & Rafael, 2019; H, P; (Peñafiel and Rafael 2019b)
<i>Drosophila carchensis</i> Peñafiel & Rafael, 2018; H, A, P; (Peñafiel and Rafael 2018c)
<i>Drosophila cartucho</i> Llangarí & Rafael, 2020; H, P; (Llangarí and Rafael 2020)
<i>Drosophila carvalhoi</i> Cabezas, Llangarí & Rafael, 2015; H, A, P; (Cabezas et al. 2015)
<i>Drosophila cashapamba</i> Céspedes & Rafael, 2012; H, A, P; (Céspedes and Rafael 2012a)
<i>Drosophila caxarumi</i> Peñafiel & Rafael, 2018; H, P; (Peñafiel and Rafael 2018b)
<i>Drosophila chichu</i> Peñafiel & Rafael, 2019; H, P; (Peñafiel and Rafael 2019a)
<i>Drosophila chorlavi</i> Céspedes & Rafael, 2012; H, A, P; (Céspedes and Rafael 2012a)
<i>Drosophila condorhuachana</i> Céspedes & Rafael, 2012; H, P; (Céspedes and Rafael 2012b)
<i>Drosophila cosanga</i> Ramos & Rafael, 2017; H; (Ramos and Rafael 2017)
<i>Drosophila cruzloma</i> Llangarí & Rafael, 2018; H, A, P; (Llangarí and Rafael 2018)
<i>Drosophila cuasmali</i> Peñafiel & Rafael, 2018; H, P; (Peñafiel and Rafael 2018c)
<i>Drosophila cumanda</i> Llangarí & Rafael, 2018; H, A, P; (Llangarí and Rafael 2018)
<i>Drosophila cuyuja</i> Ramos & Rafael, 2015; H; (Ramos and Rafael 2015)
<i>Drosophila deloscolorados</i> Llangarí & Rafael, 2020; H, P; (Llangarí and Rafael 2020)
<i>Drosophila guacamayos</i> Ramos & Rafael, 2017; H, P; (Ramos and Rafael 2017)
<i>Drosophila guajalito</i> Llangarí & Rafael, 2020; H, P; (Llangarí and Rafael 2020)
<i>Drosophila inti</i> Cabezas, Llangarí & Rafael, 2015; H, P; (Cabezas et al. 2015)
<i>Drosophila intillacta</i> Cabezas & Rafael, 2013; H, P; (Cabezas and Rafael 2013)
<i>Drosophila kasha</i> Peñafiel & Rafael, 2019; H, P; (Peñafiel and Rafael 2019b)
<i>Drosophila kingmani</i> Peñafiel & Rafael, 2018; H; (Peñafiel and Rafael 2018a)
<i>Drosophila kurillakta</i> Peñafiel & Rafael, 2019; H; (Peñafiel and Rafael 2019a)
<i>Drosophila machalilla</i> Acurio, Rafael, Céspedes & Ruiz, 2013; H, A, P; (Acurio et al. 2013)
<i>Drosophila malacatus</i> Peñafiel & Rafael, 2018; H; (Peñafiel and Rafael 2018a)
<i>Drosophila millmasapa</i> Peñafiel & Rafael, 2018; H, P; (Peñafiel and Rafael 2018a)
<i>Drosophila misi</i> Peñafiel & Rafael, 2018; H, P; (Peñafiel and Rafael 2018b)
<i>Drosophila napoensis</i> Ramos & Rafael, 2015; H, P; (Ramos and Rafael 2015)
<i>Drosophila neoamaguana</i> Ramos & Rafael, 2017; H, A, P; (Ramos and Rafael 2017)
<i>Drosophila neoasiri</i> Figuero & Rafael, 2013; H, P; (Figuero and Rafael 2013)
<i>Drosophila neocapnoptera</i> Figuero & Rafael, 2013; H, A, P; (Figuero and Rafael 2013)
<i>Drosophila neoprosaltans</i> Ramos & Rafael, 2017; H, A, P; (Ramos and Rafael 2017)
<i>Drosophila neoyanayuyu</i> Ramos & Rafael, 2017; H, A, P; (Ramos and Rafael 2017)
<i>Drosophila nigua</i> Cabezas, Llangarí & Rafael, 2015; H, P; (Cabezas et al. 2015)
<i>Drosophila nina</i> Cabezas & Rafael, 2015; H, A, P; (Cabezas and Rafael 2015)
<i>Drosophila papallacta</i> Figuero & Rafael, 2013; H, A, P; (Figuero and Rafael 2013)
<i>Drosophila papaver</i> Tamayo & Rafael, 2016; H, A, P; (Tamayo and Rafael 2016)

<i>Drosophila pappobolusae</i> Figuero, León, Rafael & Céspedes, 2012; H, A, P; (Figuero et al. 2012a)
<i>Drosophila pichka</i> Peñafiel & Rafael, 2018; H, P; (Peñafiel and Rafael 2018a)
<i>Drosophila podocarpus</i> Peñafiel & Rafael, 2019; H, P; (Peñafiel and Rafael 2019b)
<i>Drosophila pseudokorefae</i> Ramos & Rafael, 2018; H, P; (Ramos and Rafael 2018)
<i>Drosophila pseudomorelia</i> Ramos & Rafael, 2018; H, P; (Ramos and Rafael 2018)
<i>Drosophila quijos</i> Ramos & Rafael, 2015; H, P; (Ramos and Rafael 2015)
<i>Drosophila quinarensis</i> Peñafiel & Rafael, 2018; H, A, P; (Peñafiel and Rafael 2018b)
<i>Drosophila rucux</i> Céspedes & Rafael, 2012; H, A, P; (Céspedes and Rafael 2012a)
<i>Drosophila rusaryu</i> Peñafiel & Rafael, 2018; H, P; (Peñafiel and Rafael 2018a)
<i>Drosophila sachapuyu</i> Peñafiel & Rafael, 2018; H, A, P; (Peñafiel and Rafael 2018b)
<i>Drosophila sagittifolii</i> Llangarí & Rafael, 2017; H, A, P; (Llangarí and Rafael 2017)
<i>Drosophila saraguru</i> Peñafiel & Rafael, 2019; H, P; (Peñafiel and Rafael 2019a)
<i>Drosophila shunku</i> Peñafiel & Rafael, 2018; H, A, P; (Peñafiel and Rafael 2018a)
<i>Drosophila shunkuku</i> Peñafiel & Rafael, 2018; H, A, P; (Peñafiel and Rafael 2018a)
<i>Drosophila sisapamba</i> Figuero, León, Rafael & Céspedes, 2012; H, P; (Figuero et al. 2012a)
<i>Drosophila taki</i> Peñafiel & Rafael, 2018; H, P; (Peñafiel and Rafael 2018a)
<i>Drosophila tinalandia</i> Llangarí & Rafael, 2018; H, A, P; (Llangarí and Rafael 2018)
<i>Drosophila tsachila</i> Llangarí & Rafael, 2020; H, P; (Llangarí and Rafael 2020)
<i>Drosophila valenteae</i> Llangarí & Rafael, 2018; H, A, P; (Llangarí and Rafael 2018)
<i>Drosophila verbesinae</i> Figuero, León, Rafael & Céspedes, 2012; H, A, P; (Figuero et al. 2012a)
<i>Drosophila wachi</i> Peñafiel & Rafael, 2019; H, A, P; (Peñafiel and Rafael 2019b)
<i>Drosophila warmi</i> Peñafiel & Rafael, 2019; H, A, P; (Peñafiel and Rafael 2019a)
<i>Drosophila wayta</i> Figuero, León, Rafael & Céspedes, 2012; H, P; (Figuero et al. 2012a)
<i>Drosophila yambe</i> Cabezas, Llangarí & Rafael, 2015; H, P; (Cabezas et al. 2015)
<i>Drosophila yanacocha</i> Tamayo & Rafael, 2016; H; (Tamayo and Rafael 2016)
<i>Drosophila yanaurus</i> Figuero, Rafael & Céspedes, 2012; H, A, P; (Figuero et al. 2012b)
<i>Drosophila yanayuyu</i> Céspedes & Rafael, 2012; H, A, P; (Céspedes and Rafael 2012a)
<i>Drosophila yurag</i> Figuero & Rafael, 2011; H, A, P; (Figuero and Rafael 2011)
<i>Drosophila yuragshina</i> Figuero & Rafael, 2011; H, P; (Figuero and Rafael 2011)
<i>Drosophila yuragyacum</i> Figuero, Rafael & Céspedes, 2012; H, A, P; (Figuero et al. 2012b)
<i>Drosophila zamorana</i> Peñafiel & Rafael, 2018; H, A, P; (Peñafiel and Rafael 2018b)
<i>Hirtodrosophila lojana</i> Peñafiel & Rafael, 2019; H, A, P; (Peñafiel and Rafael 2019b)
<i>Hirtodrosophila villonacu</i> Peñafiel & Rafael, 2019; H; (Peñafiel and Rafael 2019b)
Family Hybotyidae
<i>Elaphropeza thoracica</i> Raffone, 2010; P; (Raffone 2010)
Family Micropezidae
<i>Cardiacephala aeruginosa</i> Ferro & Marshall, 2018; H; (Ferro and Marshall 2018)
<i>Cardiacephala aspera</i> Ferro & Marshall, 2018; H; (Ferro and Marshall 2018)
<i>Cardiacephala vitrata</i> Ferro & Marshall, 2018; H; (Ferro and Marshall 2018)
<i>Paragrallomya ecuadorensis</i> Ferro & Marshall, 2020; H; (Ferro and Marshall 2020)
Family Neriidae
<i>Longina anguliceps</i> Buck & Marshall, 2004; P; (Buck and Marshall 2004)
<i>Longina semialba</i> Buck & Marshall, 2004; P; (Buck and Marshall 2004)

Family Psychodidae

Sycorax wampukrum Bravo & Salazar, 2009; H, P; (Bravo and Salazar 2009)

Family Sphaeroceridae

Antrops anovariegatus Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops aurantifemur Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops baeza Kits & Marshall, 2013; H; (Kits and Marshall 2013)

Antrops bellavista Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops bucki Kits & Marshall, 2013; H; (Kits and Marshall 2013)

Antrops cotopaxi Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops diversipennis Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops eurus Kits & Marshall, 2013; H; (Kits and Marshall 2013)

Antrops fuliginosus Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops guandera Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops papallacta Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops pecki Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops quadrilobus Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops sierrazulensis Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops tetrastichus Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Antrops variegatus Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)

Aptilotella angela Luk & Marshall, 2014; H; (Luk and Marshall 2014)

Aptilotella ebenea Luk & Marshall, 2014; H; (Luk and Marshall 2014)

Aptilotella gemmula Luk & Marshall, 2014; H; (Luk and Marshall 2014)

Aptilotella pichinchensis Luk & Marshall, 2014; H; (Luk and Marshall 2014)

Boreantrops auranticeps Kits & Marshall, 2015; H, P; (Kits and Marshall 2015)

Boreantrops pollex Kits & Marshall, 2015; H, P; (Kits and Marshall 2015)

Boreantrops subemarginatus Kits & Marshall, 2015; P; (Kits and Marshall 2015)

Bromoecia abundantia Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia aculatus Yau & Marshall, 2018; P; (Yau and Marshall 2018)

Bromoecia aurita Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia balaena Yau & Marshall, 2018; P; (Yau and Marshall 2018)

Bromoecia brachium Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia cercarcuata Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia coniclutis Yau & Marshall, 2018; P; (Yau and Marshall 2018)

Bromoecia pinna Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia ponsa Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia ramus Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia robustora Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia triunguia Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia undulata Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Bromoecia wolferinei Yau & Marshall, 2018; H, P; (Yau and Marshall 2018)

Coproica bispatha Bergeron, Marshall & Swann, 2015; P; (Bergeron et al. 2015)

Coproica brachystyla Bergeron, Marshall & Swann, 2015; P; (Bergeron et al. 2015)

Coproica diabolica Bergeron, Marshall & Swann, 2015; P; (Bergeron et al. 2015)

<i>Coproica galapagosensis</i> Bergeron, Marshall & Swann, 2015; H, P; (Bergeron et al. 2015)
<i>Coproica novacula</i> Bergeron, Marshall & Swann, 2015; P; (Bergeron et al. 2015)
<i>Leptocera papallacta</i> Buck & Marshall, 2009; H, P; (Buck and Marshall 2009)
<i>Leptocera plax</i> Buck & Marshall, 2009; P; (Buck and Marshall 2009)
<i>Minilimosina sclerophallus</i> Marshall, 1985; P; (Marshall 1985)
<i>Photoantrops echinus</i> Kits & Marshall, 2013; H; (Kits and Marshall 2013)
<i>Poecilantrops stellans</i> Kits & Marshall, 2013; H, P; (Kits and Marshall 2013)
Family Syringogastridae
<i>Syringogaster atricalyx</i> Marshall & Buck, 2009; P; MEPN; (Marshall et al. 2009)
<i>Syringogaster brachypecta</i> Marshall & Buck, 2009; H, P; (Marshall et al. 2009)
<i>Syringogaster plesiotergera</i> Marshall & Buck, 2009; P; MEPN; (Marshall et al. 2009)
Family Tachinidae
<i>Erythromelana cryptica</i> Inclan, 2013; P; (Inclan and Stireman 2013)
Family Tanipezidae
<i>Neotanypeza marshalli</i> Lonsdale, 2013; H, P; (Lonsdale 2013)
<i>Neotanypeza plotoplax</i> Lonsdale, 2013; H; (Lonsdale 2013)
<i>Neotanypeza posthos</i> Lonsdale, 2013; P; (Lonsdale 2013)
<i>Neotanypeza vexilla</i> Lonsdale, 2013; H; (Lonsdale 2013)
Family Tephritidae
<i>Anastrepha amaryllis</i> Tigreiro, 1998; H; (Tigreiro 1998)
<i>Anastrepha anopla</i> Norrbom & Korytkowski, 2012; H, P; MEPN; (Norrbom and Korytkowski 2012)
<i>Anastrepha grandicanina</i> Norrbom & Korytkowski, 2012; P; MEPN; (Norrbom and Korytkowski 2012)
<i>Anastrepha hadracantha</i> Norrbom & Korytkowski, 2012; H, P; MEPN; (Norrbom and Korytkowski 2012)
<i>Anastrepha haplacantha</i> Norrbom & Korytkowski, 2012; H; MEPN; (Norrbom and Korytkowski 2012)
<i>Anastrepha hyperacantha</i> Norrbom & Korytkowski, 2012; H, P; MEPN; (Norrbom and Korytkowski 2012)
<i>Anastrepha isolata</i> Norrbom & Korytkowski, 2009; H; MEPN; (Norrbom and Korytkowski 2009)
<i>Anastrepha macracantha</i> Norrbom & Korytkowski, 2012; H; MEPN; (Norrbom and Korytkowski 2012)
<i>Anastrepha neogigantea</i> Norrbom & Korytkowski, 2012; H; MEPN; (Norrbom and Korytkowski 2012)
<i>Molynocoelia erwini</i> Norrbom, 2011; H; MEPN; (Norrbom 2011)
Order Ephemeroptera
Family Leptophlebiidae
<i>Atopophlebia pitculya</i> Flowers, 2012; H, A, P; (Flowers 2012)
Order Hemiptera
Family Coreidae
<i>Onoremia acuminata</i> Brailovsky, 1995; H; (Brailovsky 1995)
Order Hymenoptera
Family Apidae
<i>Oxytrigona huaoranii</i> González & Roubik, 2008; P; (González and Roubik 2008)
Family Dryinidae
<i>Gonatopus sandovalae</i> Guglielmino, Olmi, & Speranza, 2016; H; (Guglielmino et al. 2016)
<i>Gonatopus tapiai</i> Olmi & Guglielmino, 2016; H; (Olmi and Guglielmino 2016)
Family Formicidae
<i>Basiceros onorei</i> Baroni & De Andrade, 2007; H; (Baroni and De Andrade 2007)

<i>Leptanilloides copalinga</i> Delsinne & Donoso, 2015; H; (Delsinne et al. 2015)
<i>Leptanilloides prometea</i> Delsinne & Donoso, 2015; H, P; (Delsinne et al. 2015)
<i>Pachycondyla cernua</i> Mackay & Mackay, 2010; P; (Mackay and Mackay 2010)
<i>Pyramica heterodonta</i> Rigato & Scupola, 2008; P; (Rigato and Scupola 2008)
<i>Strumigenys lojaensis</i> Lattke & Aguirre, 2015; H; (Lattke and Aguirre 2015)
<i>Strumigenys longimala</i> Baroni & De Andrade, 2007; H, P; (Baroni and De Andrade 2007)
<i>Strumigenys nageli</i> Baroni & De Andrade, 2007; H, P; (Baroni and De Andrade 2007)
<i>Strumigenys onorei</i> Baroni & De Andrade, 2007; H, P; (Baroni and De Andrade 2007)
Family Halictidae
<i>Chlerogella euprepia</i> Engel, 2010; P; (Engel 2010)
<i>Chlerogella mourella</i> Engel, 2003; P; (Engel 2003)
Family Sphecidae
<i>Pison arachniraptor</i> Menke, 1988; P; (Menke 1988)
Family Trichogrammatidae
<i>Adryas erwini</i> Pinto & Owen, 2004; H, A; MEPN; (Pinto and Owen 2004)
<i>Pachamama speciosa</i> Owen & Pinto, 2004; P; MEPN; (Owen and Pinto 2004)
Order Lepidoptera
Family Saturniidae
<i>Automeris abdominapoensis</i> Brechlin & Meister, 2011; P; (Brechlin and Meister 2011a)
<i>Automeris abdomipichinchensis</i> Brechlin & Meister, 2011; P; (Brechlin and Meister 2011a)
<i>Automeris isabellae</i> Brechlin & Käch, 2017; P; (Brechlin et al. 2017)
<i>Automeris manzonoi</i> Brechlin, Käch & Meister, 2013; P; (Brechlin et al. 2013)
<i>Automeris parapichinchaensis</i> Brechlin & Meister, 2011; P; (Brechlin and Meister 2011a)
<i>Citheronia kaechi</i> Brechlin, 2019; P; (Brechlin et al. 2019)
<i>Copaxa andorientalis</i> Brechlin & Meister, 2012; P; (Brechlin and Meister 2012c)
<i>Copaxa litensis</i> Wolf & Colan, 2002; P; (Wolfe and Colan 2002)
<i>Dirphia apeggyae</i> Brechlin, Meister & Käch, 2011; P; (Brechlin and Meister 2011c)
<i>Dirphia sachai</i> Brechlin & Käch, 2017; P; (Brechlin 2017)
<i>Gamelia kaechi</i> Brechlin & Meister, 2012; P; (Brechlin and Meister 2012a)
<i>Hirpida kaechi</i> Brechlin, 2019; P; (Brechlin 2019)
<i>Periga barragani</i> Brechlin, Käch & Meister, 2013; P; (Brechlin and Meister 2013)
<i>Rothschildia aricia ariciopichichensis</i> Brechlin, Käch & Meister, 2012; P; (Brechlin and Meister 2012b)
<i>Rothschildia aricia napoecuadoriana</i> Brechlin & Meister, 2010; P; (Brechlin and Meister 2010)
<i>Rothschildia inca inecuadoriana</i> Brechlin & Meister, 2012; P; (Brechlin and Meister 2012b)
<i>Rothschildia lebecuatoriana</i> Brechlin & Meister, 2012; P; (Brechlin and Meister 2012b)
Order Orthoptera
Family Tettigoniidae
<i>Artiotonus tinae</i> Montealegre, Morris, Sarria & Mason, 2011; H, A; (Montealegre et al. 2011)
<i>Supersonus undulus</i> Sarria, Morris, Windmill, Jackson & Montealegre, 2014; H, A; (Sarria et al. 2014)
Order Trichoptera
Family Anomalopsychidae
<i>Contulma palaguillensis</i> Holzenthal & Ríos, 2012; P; (Holzenthal and Ríos 2012)

Phylum Nemata
Class Secernentea
Order Strongylida
Family Moloneidae
<i>Neomolineus pierredesseti</i> Guerrero, 2020; P; MEPN; (Guerrero 2020)
Family Strongyloidea
<i>Parastrongyloides neotropicalis</i> Guerrero, 2016; H, A; MEPN; (Guerrero 2016)
Phylum Platyhelminthes
Class Cestoda
Order Phyllobothriidea
Family Phyllobothriidae
<i>Clistobothrium amyae</i> Caira, Hayes & Jensen, 2020; H, P; MEPN; (Caira et al. 2020)
<i>Clistobothrium gabywalterorum</i> Caira, Hayes & Jensen, 2020; H; MEPN; (Caira et al. 2020)
<i>Scyphophyllidium timvickiorum</i> Caira, Hayes & Jensen, 2020; H, P; MEPN; (Caira et al. 2020)
Order Tetraphyllidea
Family Serendipidae
<i>Serendip deborahae</i> Brooks & Barriga, 1994; H, P; MEPN; (Brooks and Barriga 1994)

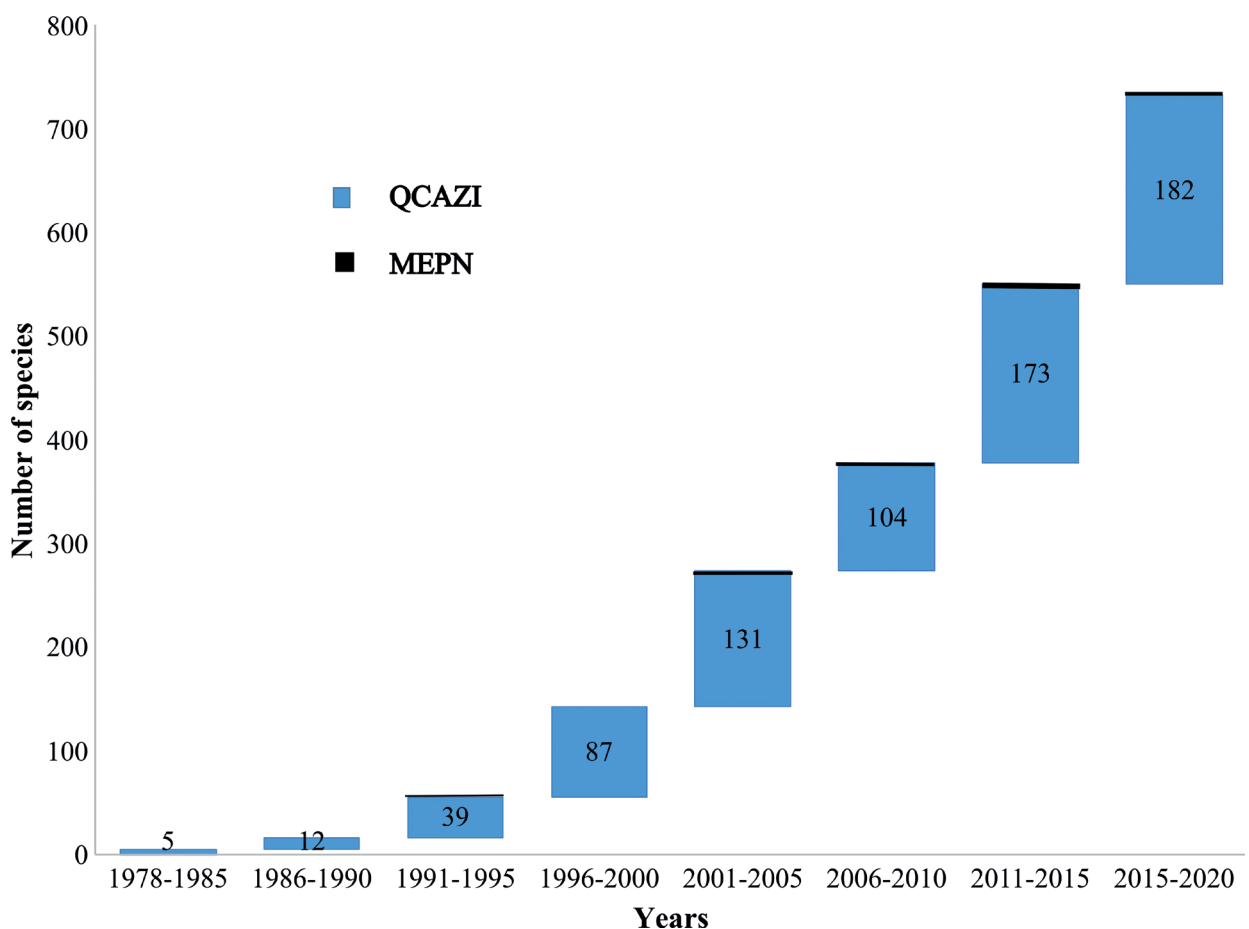


Figure 1. Cumulative number of Ecuadorian species with types in the QCAZI (blue) and MEPN (black) museums. The size and number inside the box correspond to the number of species lodged in both museums in that time period.

Table 2. Type specimens from other countries.

Phylum Arthropoda
Class Insecta
Order Coleoptera
Family Curculionidae
<i>Pandeleteius campbelli</i> Howden, 1976; P; QCAZI; Colombia; (Howden 1976)
Order Diptera
Family Clusiidae
<i>Sobarocephala thrinax</i> Lonsdale & Marshall, 2012; P; QCAZI; Bolivia; (Lonsdale and Marshall 2012)
Family Tachinidae
<i>Erythromelana arciforceps</i> Inclan, 2013; P; QCAZI; Brazil; (Inclan and Stireman 2013)
<i>Erythromelana catarina</i> Inclan, 2013; P; QCAZI; Brazil; (Inclan and Stireman 2013)
<i>Erythromelana distincta</i> Inclan, 2013; P; QCAZI; Brazil; (Inclan and Stireman 2013)
<i>Erythromelana leptoforceps</i> Inclan, 2013; P; QCAZI; Brazil; (Inclan and Stireman 2013)
<i>Erythromelana woodi</i> Inclan, 2013; P; QCAZI; Bolivia; (Inclan and Stireman 2013)
Order Hymenoptera
Family Diapriidae
<i>Turripria woldai</i> Masner & García, 2002; P; QCAZI; Panamá; (Masner and García 2002)
Family Encyrtidae
<i>Anagyrus lizanorum</i> Noyes & Menezes, 2000; P; MEPN; Costa Rica; (Noyes 2000)
<i>Anagyrus paralia</i> Noyes & Menezes, 2000; P; MEPN; Costa Rica; (Noyes 2000)
<i>Anagyrus sinope</i> Noyes & Menezes, 2000; P; MEPN; Estados Unidos y Bahamas; (Noyes 2000)
<i>Blepyrus hansonii</i> Noyes, 2000; P; MEPN; Costa Rica; (Noyes 2000)
<i>Blepyrus zenonis</i> Noyes, 2000; P; MEPN; Costa Rica; (Noyes 2000)
<i>Gyranusoidea amasis</i> Noyes, 2000; P; MEPN; Costa Rica; (Noyes 2000)
<i>Gyranusoidea rhodope</i> Noyes, 2000; P; MEPN; Costa Rica; (Noyes 2000)
<i>Hambletonia pilosifrons</i> Sharkov & Woolley, 1997; P; MEPN; Costa Rica; (Sharkov and Woolley 1997)
Family Formicidae
<i>Simopelta transversa</i> Mackay & Mackay, 2008; P; QCAZI; Colombia; (Mackay and Mackay 2008)
Phylum Mollusca
Class Gastropoda
Order Stylommatophora
Family Bulimulidae
<i>Bostryx bermudezae</i> Weyrauch, 1958; P; MEPN; (Weyrauch 1958)
<i>Bostryx vilchezi</i> Weyrauch, 1960; P; MEPN; (Weyrauch 1960)
<i>Scutalus versicolor lachayensis</i> Weyrauch, 1967; P; MEPN; (Weyrauch 1967)
Family Clausiliidae
<i>Hemicena cerrateae</i> Weyrauch, 1958; P; MEPN; (Weyrauch 1958)
<i>Parabalea omissa</i> (Weyrauch, 1957); P; MEPN; (Weyrauch 1957)
<i>Steeriana celendinensis isidroensis</i> Weyrauch & Zilch, 1954; P; MEPN; (Zilch 1954)

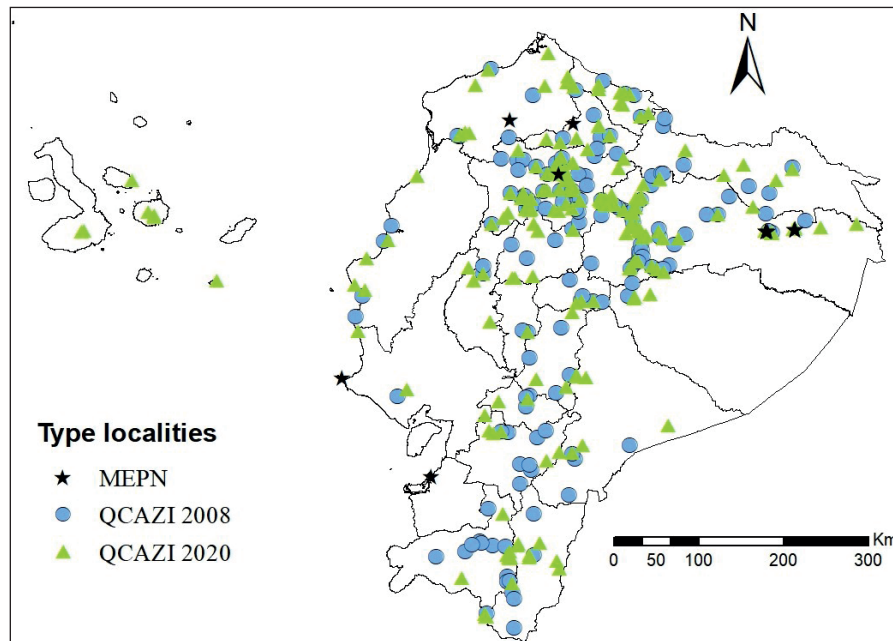


Figure 2. Geographical distribution of Ecuadorian type localities deposited at the MEPN and QCAZI museums showing the 24 provinces.

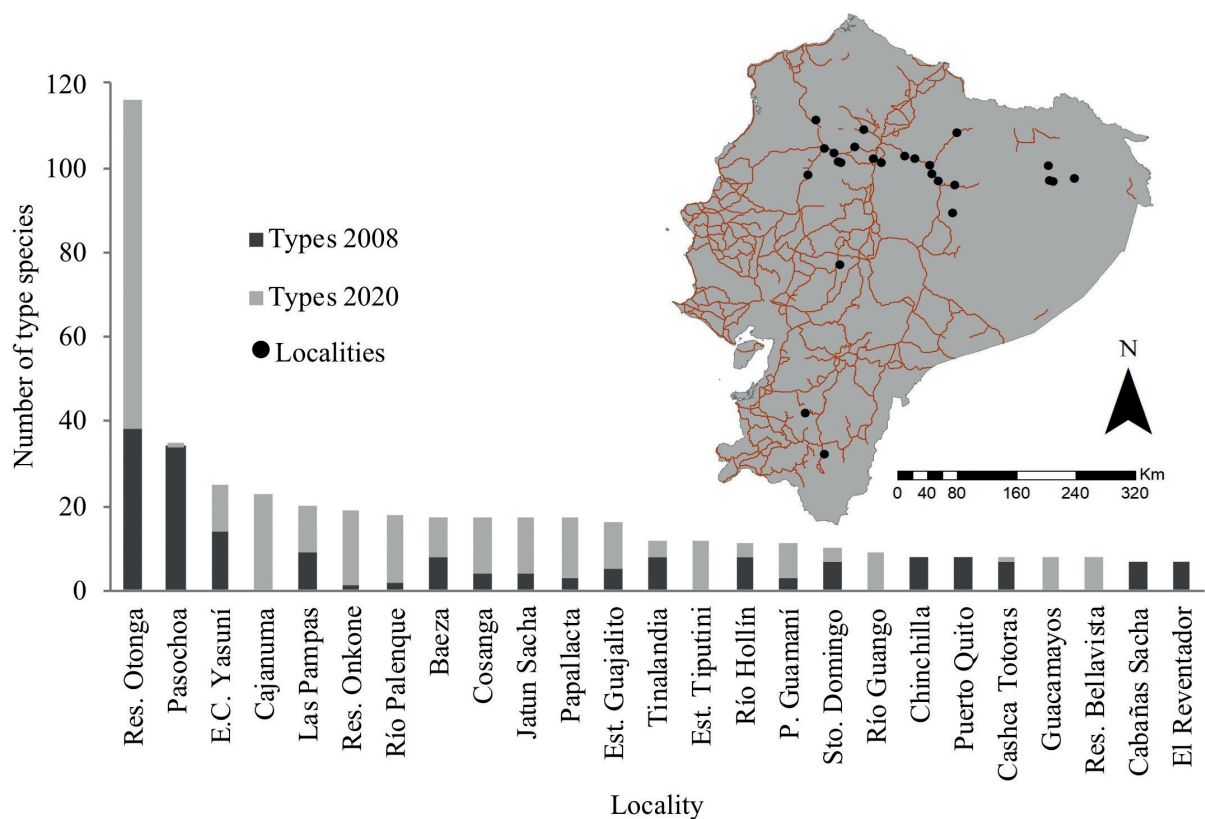


Figure 3. The twenty-five localities with the most type species registered in the 2008 and 2020 publications. We include a map of the main road system for the country and these 25 type localities.

major roads of the country; except those found within Yasuni National Park (Fig. 3). 59% of localities provided type specimens for both 2008 and 2020 datasets. 19% of localities are new providers of type specimens, and the remaining 22% of localities provided type specimens for only the 2008 dataset. Insecta and Arachnida are the most abundant classes in the catalog. Insecta comprises eight orders, 43 families, 108 genera, and 327 species. From these, Diptera, with 1,473 type specimens, provides 65% of all types. In particular, Drosophilidae (71 species) and Sphaeroceridae (47 species) are the best-represented families in our catalog. Arachnida comprises seven orders, 20 families, 34 genera, and 111 species. Finally, we corrected information provided in the 2008 dataset, by removing nine species wrongly identified as type material (Table 3) and by correcting spelling mistakes in the names of four species (Table 4).

Table 3. Species excluded from the 2008 dataset.

Phylum Arthropoda
Class Insecta
Order Lepidoptera
Family Nymphalidae
<i>Manerebia germaniae</i> Pycrz & Hall, 2005
<i>Manerebia golondrina</i> Pycrz & Willmott, 2005
<i>Manerebia inderena clara</i> Pycrz & Willmott, 2005
<i>Manerebia inderena laeniva</i> Pycrz & Willmott, 2005
<i>Manerebia inderena mirena</i> Pycrz & Willmott, 2005
<i>Manerebia inderena similis</i> Pycrz & Willmott, 2005
<i>Manerebia satura pauperata</i> Pycrz & Willmott, 2005
<i>Manerebia undulata undulata</i> Pycrz & Willmott, 2005
<i>Pedaliodes morenoi pilaloensis</i> Pycrz & Vilorio, 1999

Table 4. Types that were misspelled in the 2008 dataset.

Phylum Arthropoda
Class Insecta
Order Coleoptera
Family Cerambycidae
<i>Apteraledion lapierrei</i> Hovore, 1992 should be replaced with <i>Apteralcidion lapierrei</i> Hovore, 1992
Family Curculionidae
<i>Baillytes Bartolozzi</i> Voisin, 1996 should be replaced with <i>Baillytes bartolozzii</i> Voisin, 1996
Family Brentidae
<i>Stereodermus jonathani</i> Mantilleri, 2004 is classified within the Brentidae family, not Rhysodidae.
Order Diptera
Family Sphaeroceridae
<i>Druciatus tricetus</i> Marshall, 1995 should be replaced with <i>Druciatus trisetus</i> Marshall, 1995

Discussion

The updated catalog endorses these two museums as benchmarks in invertebrate conservation at the national and international levels. The four largest orders of Insecta, Coleoptera, Diptera, Hymenoptera, and Lepidoptera that are highly diverse globally, are the focus of the highest number of studies in the country and are the best-represented insect groups in both collections. For example, Moret and Murienne (2020) described 25 carabid species of Andean Ecuador. Lonsdale and Marshall (2006, 2011, 2012) increased our understanding of Clusiidae dipterans in Ecuador with 21 new species. Since 2011, Adriano Kury, at the Museu Nacional at Rio de Janeiro (MNRJ, Brazil) has considerably curated the Opiliones collection at QCAZI museum (Kury 2012; Giupponi and Kury 2015). Unfortunately, a great number of these specimens were burned in the 2018 fire at the MNRJ (Kury et al. 2018) and it is only recently that some of these losses have been contextualized (Medrano et al. 2022).

The Arachnida collections in Ecuador are currently one of the best-represented and the most exhaustively studied. 90% of the Aranea species were described by Nadine Dupérré and Elicio Tapia in several publications as part of their project on a survey of Ecuadorian spiders (Dupérré 2022; Dupérré and Tapia 2020a). Pichincha, Cotopaxi, and Napo provinces are again reported as the most explored, and the invertebrates of many localities already listed in the 2008 catalog (e.g., Reserva Otonga and Estación Científica Yasuni) continue to be studied (Monte and Mascagni 2012; Erwin and Henry 2017; Flowers 2018). The southern provinces of Ecuador are starting to appear, i.e., Cajanuma, at the Parque Nacional Podocarpus, in Loja, where 19 species of Diptera: Drosophilidae were discovered and described by Peñafiel and Rafael (2018a, b, c; 2019a, b).

Taxonomists' roles in studying invertebrates is crucial to increase biodiversity knowledge and promote its conservation. The lack of specialists in our country devoted to the study of taxonomy and the diversity of abundant and complex invertebrates prevents the rapid development of this subject needed for our region. In most cases, the specimens need to be sent out for identification to specialists overseas, and their studies can last several years. In this race against habitat loss in Ecuador, it is time to become aware and join efforts with government entities and academia to document and conserve our biodiversity in the hopes to achieve health, food, and clean water security, in other words, attain a place suitable for living.

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Additional information

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No conflict of interest was declared.

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Author contributions

Conceptualization: DAD, ÁB, FSB. Data curation: FSB, VC. Formal analysis: DAD, FSB. Funding acquisition: ÁB. Investigation: FSB, DAD. Methodology: DAD, FSB. Project administration: FSB. Resources: ÁB. Supervision: DAD. Validation: FSB. Writing – original draft: DAD, FSB. Writing – review and editing: FSB, ÁB, VC, DAD.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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Supplementary material 1

Type specimen catalog with original information from their labels

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Data type: text file

Explanation note: Type specimen catalog with original information from their labels. Organized in alphabetical order by class, order, family, genus, and species. The species taxonomic designation given in the initial publications is maintained in this catalog.

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