

## Inclusion of Machalilla Poison Dart Frog *Epipedobates machalilla* in Appendix II

### Proponent: Ecuador

**Background:** *Epipedobates machalilla* (called *Colostethus machalilla* in the reference on which CITES amphibian taxonomy is currently based) is one of nearly three hundred currently recognized species of poison dart frogs or dendrobatids. Owing to concerns regarding the potential impact of the international pet trade on some species of poison dart frogs, two dendrobatid genera – *Dendrobates* and *Phyllobates* – were included in Appendix II in 1987. Soon after, taxonomic revision led to the genus *Dendrobates* being split into two genera, *Dendrobates* and *Epipedobates*, a change subsequently accepted in CITES taxonomy. It was agreed that the intent of the original listing was that all frog species included in the genus *Dendrobates* at the time of the listing were to be included in Appendix II. The listing in the Appendices was therefore changed to include all species in the genera *Dendrobates* and *Epipedobates*. Subsequent changes resulted in three species in the new genus *Epipedobates* being further renamed, two being recognized under current CITES taxonomy as in the large genus *Allobates* (*A. femoralis* and *A. zaparo*) and one in the monotypic genus *Cryptophyllobates* (*C. azureiventris*). These are currently listed under those names in Appendix II.

When *E. machalilla* was described in 1995, it was included in the genus *Colostethus* which was not listed in the CITES Appendices. Taxonomy of dendrobatid frogs has been subject to extensive revision since the last CITES standard taxonomy for amphibians was adopted (the relevant parts of Frost, D.R. (2004) "Amphibian Species of the World, an online Reference" V. 3.0 (as of April 7 2006)). These changes are reflected in the standard taxonomy to be considered for adoption at CoP16 (Frost, D.R. (2011) Amphibian species of the world, with a revision of the genus *Ranitomeya* by Brown *et al.*: see Notification No. 2012/060). [See analysis below]. One of these changes was to transfer the species *machalilla* from *Colostethus* to *Epipedobates*. Under the revised taxonomy, *Epipedobates machalilla* would be the only currently recognized species in the genus *Epipedobates* not listed in the Appendices.

**Summary:** The Machalilla Poison Dart Frog *Epipedobates machalilla* is a dark-brown, non-venomous dendrobatid that occurs in the dry western lowland forests of Ecuador. It inhabits tropical thicket, thorny scrub and very dry tropical forest. It is reported to be not rare within its range, but is believed likely to be in decline because of widespread habitat loss as a result of conversion to agriculture and logging. It was assessed by IUCN in 2004 as Near Threatened. It is subject to conservation measures in Ecuador and its geographic range overlaps with Parque Nacional Machalilla and Reserva Ecológica Manglares Churute.

There is very little information on use or trade in *E. machalilla*. However, there is no indication that the species is in demand for the international pet trade, or that it is subject to any extensive domestic use, although some specimens are said to have been used in embryological studies. The species bears a resemblance to the Appendix-II listed *Epipedobates boulengeri*; the latter species is reported in trade as a live animal, albeit at low numbers – it is reportedly not highly sought-after by hobbyists. The CITES trade database records around 50 specimens a year traded between 1994 and 2010 most, particularly those reported in recent years, recorded as captive-bred. Ecuador and Czech Republic were the two major exporting countries. *E. boulengeri* occurs in Colombia and Ecuador and was assessed as Least Concern by IUCN in 2004.

*E. machalilla* is proposed for inclusion in Appendix II in accordance with Article II paragraph 2 b for look-alike reasons. If the proposal is adopted, all species in the genus *Epipedobates* as recognized in the proposed new standard taxonomy will be listed in Appendix II.

**Analysis:** There is no indication that regulation of international trade in *Epipedobates machalilla* is necessary to prevent the species itself becoming eligible for inclusion in Appendix I in the near future, nor that it is reducing the population to a level at which it might become threatened by continued harvesting or other influences (criteria for inclusion in Appendix II in Annex 2 a of *Resolution Conf. 9.24 (Rev. CoP15)*).

Under look-alike criteria, set out in Annex 2 b of *Resolution Conf. 9.24 (Rev. CoP15)*, the species could be included in Appendix II if it resembled a species

included in the Appendices under the criteria in Annex 2 a of the Resolution. The species does resemble the Appendix-II listed *E. boulengeri* to some extent. *E. boulengeri* was included in Appendix II (as *Dendrobates boulengeri*) under the general listing for *Dendrobates* spp. in 1987. This was before formal criteria for amending the Appendices had been established in the original *Resolution Conf. 9.24*. However, there was no indication in the original proposal that the species was included for anything other than very general look-alike reasons, as comprising part of a genus for which concern had been expressed regarding some species. Subsequent experience appears to bear this out: *E. boulengeri* is classified as Least Concern and is reported in trade in low numbers (most now apparently captive-bred), indicating that this species does not itself meet criteria for inclusion in Appendix II under Annex 2 a of *Resolution Conf. 9.24 (Rev. CoP15)*. Moreover, *E. boulengeri* has been included in Appendix II for 25 years, and *E. machalilla* recognised as a species for 16 years, during which time there appear to have been no problems implementing the Convention for the former species.

Adoption of the new taxonomic standard for amphibians will result in a complicated series of listings of dendrobatid frogs in Appendix II, owing to the many taxonomic changes to the species originally included in the genus *Dendrobates* when it was listed in Appendix II in 1987. Under the new standard, the following will be listed:

- 11 of 12 species in the genus *Andinobates* (species currently included in *Dendrobates*, excluding that described since 2004);
- all 3 species in the genus *Adelphobates* (currently included in *Dendrobates*);
- 4 out of 46 species in the genus *Allobates* (two currently included in *Epipedobates* and two currently listed in Appendix II as *Allobates femoralis* and *Allobates zaparo*, all having originally been included in *Dendrobates*).
- 25 out of 31 species in the genus *Ameerega* (species currently included in *Epipedobates*, excluding six species described since 2004);
- all 5 species in the newly configured genus *Dendrobates*;
- 5 out of 6 species in the newly configured genus *Epipedobates* (excluding *E. machalilla*);
- both species in the genus *Excidobates* (currently included in *Dendrobates*);
- 1 out of 58 species in the genus *Hyloxalus* (currently listed in Appendix II as *Cryptophyllobates azureiventris*, and at different times included in *Dendrobates*, *Ameerega* and *Phyllobates*);
- 1 species in the monotypic genus *Minyobates* (currently *Dendrobates steyermarki*);
- 8 out of 9 species in the genus *Oophaga* (species currently included in *Dendrobates*, excluding *Oophaga sylvatica*);
- 5 species in the unchanged genus *Phyllobates*;
- 11 out of 17 species in the genus *Ranitomeya* (species currently included in *Dendrobates*, excluding six species described since 2004);

The list above includes seven cases (including *Epipedobates*) where only part of a genus is included in the Appendices. The apparent intent of this proposal is to ensure that all members of the genus *Epipedobates* are now included in Appendix II. However, as the genus *Epipedobates* was not recognised at the time of the original listing, it is not evident that this would necessarily have been the intention of the original proponents. On its own merits *E. machalilla* does not appear to meet the criteria for inclusion in Appendix II, either under Annex 2 a of *Resolution Conf. 9.24 (Rev. CoP15)* or as a 'lookalike' species under Annex 2 b.

Given that, even if this proposal were accepted, under the proposed new taxonomy, six other genera of dendrobatid frog would only be partially included in Appendix II, it would appear that the inclusion of *E. machalilla* in Appendix II will make no significant contribution to facilitating implementation or enforcement of the Convention for this group of species.

Supporting Statement (SS)	Additional information
<u>Taxonomy</u>	
<p><i>Epipedobates machalilla</i> was discovered in 1995 and included in the genus <i>Colostethus</i> as <i>Colostethus machalilla</i>.</p> <p>In 2006, the species was transferred to the genus <i>Epipedobates</i>.</p> <p><i>Colostethus machalilla</i> is treated as a synonym of <i>E. machalilla</i>.</p>	<p>According to the standard references for Amphibia proposed for consideration at CoP 16 (AC26 Doc. 20, Annex 3 – p. 3), there are currently six species within the genus <i>Epipedobates</i> (Frost, 2011):</p> <ul style="list-style-type: none"> <li>• <i>Epipedobates anthonyi</i></li> <li>• <i>Epipedobates boulengeri</i></li> <li>• <i>Epipedobates espinosai</i></li> <li>• <i>Epipedobates machalilla</i></li> <li>• <i>Epipedobates narinensis</i></li> <li>• <i>Epipedobates tricolor</i></li> </ul> <p>Under the current standard CITES taxonomy (adopted (Frost, D.R. (2004) "Amphibian Species of the World, an online Reference" V. 3.0 (as of April 7 2006)), the species is recognised as <i>Colostethus machalilla</i>.</p>
<u>Range</u>	
Ecuador.	
<u>IUCN Global Category</u>	
Near Threatened.	Assessed 2004 (ver. 3.1)
<b>Biological and trade criteria for inclusion in Appendix II (Res. Conf. 9.24 (Rev. CoP15) Annex 2 a)</b>	
<b><u>A) Trade regulation needed to prevent future inclusion in Appendix I</u></b>	
<b><u>B) Regulation of trade required to ensure that harvest from the wild is not reducing population to level where survival might be threatened by continued harvest or other influences</u></b>	
<p><i>E. machalilla</i> is endemic to Ecuador. The species is known in approximately thirty locations in the Pacific lowlands, in the Ecuadorian provinces of El Oro, Los Rios, Bolivar, Cotopaxi, Guayas and Manabi Cañar.</p> <p>The species is associated with dry coastal scrub, deciduous coastal forest, humid tropical Choco forest and western lowland forest habitats.</p> <p><i>E. machalilla</i> lives in sympatry with <i>Hyloxalus awa</i> in the Chindul Mache Mountains in the Cordillera de la Costa and with <i>Hyloxalus infraguttatus</i> to 600 m in the Chimbo River basin and in the Cordillera de Chongón Colonche. The species has been found in high densities along the Ayampe river.</p>	<p><i>E. machalilla</i> is known from more than ten localities in the Pacific lowlands of Ecuador in the provinces of El Oro, Los Ríos, Bolívar, Guayas, Azogues, and Manabí, from 10 to 515 m above sea level (Coloma et al., 2004). It is associated with dry western lowland forests (Coloma, 1995).</p>

Supporting Statement (SS)	Additional information
<p><b>Population status:</b>  <i>E. machalilla</i> is not rare within its range. It has been listed as Near Threatened by IUCN because the species is probably in significant decline owing to widespread habitat loss through much of its range, making it close to qualifying for a Vulnerable classification.</p> <p>Between February 2005 and January 2010, an inventory of amphibians was carried out across four localities of the Chongón region and the Colonche mountains. A total of 443 individuals were recorded across the four sites surveyed. Overall, the sites show a marked dominance of <i>E. machalilla</i> (<math>P_i = 0.139</math>).</p> <p>Although <i>E. machalilla</i> may be locally abundant, in some areas it is restricted to the edges of rivers and streams.</p> <p><b>Levels of trade:</b>  <i>E. machalilla</i> is primarily used in scientific studies of embryonic development. Levels of trade in <i>E. machalilla</i> are uncertain. The supporting statement states that there is no information available on the extent of national utilisation of <i>E. machalilla</i>; trade in <i>E. machalilla</i> parts or derivatives; or levels of legal and illegal trade. However, there is extensive trade in other species of the <i>Epipedobates</i> genus, particularly <i>Epipedobates tricolor</i> and <i>Epipedobates anthonyi</i>.</p>	<p><i>Overall the four sites show a marked dominance of Hyloxalus infraguttatus (<math>P_i = 0.273</math>) recorded at all locations as well as Pristimantis achatinus (<math>P_i = 0.151</math>) and <i>E. machalilla</i> (<math>P_i = 0.139</math>) (Amador and Martinez, 2011).</i></p>

### Inclusion in Appendix II to improve control of other listed species

#### A) Specimens in trade resemble those of species listed in Appendix II under Res. Conf. 9.24 (Rev. CoP15) Annex 2 a or listed in Appendix I

<p><i>E. machalilla</i> is a dark brown Dendrobatid frog. Unlike other species of the <i>Epipedobates</i> genus, it is non-venomous. Males are generally associated with rostrum-cloacal lengths of between 14.4 and 16.0 mm. Females may have a rostrum-cloacal length of up to 15.8 mm.</p> <p><i>E. machalilla</i> is differentiated from other <i>Epipedobates</i> species by its pale olive brown dorsum with dark brown markings; solid oblique lateral stripes; yellow or yellowish-orange inguinal and posterior calf regions; and a large and strongly curved tarsal keel.</p> <p>While there is no detected trade in <i>E. machalilla</i> (possibly due to low international demand for the genus <i>Colostethus</i>), there is international market demand for other <i>Epipedobates</i> species. For example, <i>E. boulengeri</i> is in international trade and it is suggested that distinguishing between this species and <i>E. machalilla</i> may present difficulties for non-experts.</p>	<p><i>The species currently recognised in the genus Epipedobates are distributed across the Pacific lowlands and western Andean slopes of southern Colombia, Ecuador, and northern Peru (Cisneros-Heredia and Yanez- Muñoz, 2010).</i></p> <p><i>The supporting statement for the original listing of Dendrobates spp. in Appendix II suggested that due to the large intraspecific variation in colouration of these species, combined with relatively small interspecific variation, look-alike problems may occur (Anon., 1987).</i></p> <p><i>As regards other species in the genus Epipedobates, the species <i>E. boulengeri</i> would appear to be the most similar in appearance to <i>E. machalilla</i>. Diagnostic features of <i>E. boulengeri</i> include a dark brown to dark red dorsum; solid oblique lateral stripes; a solid labial stripe; a whitish-blue venter with dark spotting/reticulation/marbling; and a large and strongly curved tarsal keel (Cisneros-Heredia and Yanez- Muñoz, 2010). <i>E. boulengeri</i> occurs in the southern part of the Colombian Pacific Lowlands (in Gorgona Island, Nariño, Cauca, Valle del Cauca Departments) and in the northwestern</i></p>
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Supporting Statement (SS)	Additional information
	<p><i>lowlands of Ecuador (in Esmeraldas, Pichincha and Imbabura Provinces), at elevations of less than 1,460 m above sea level (Bolívar et al., 2010). Distribution maps on the IUCN Redlist website indicate the distribution of E. boulengeri appears to abut that of E. machalilla in Ecuador with a possible slight degree of overlap in the ranges of these two species.</i></p> <p><i>E. boulengeri appears in the international pet trade (Bolívar et al., 2010). According to CITES trade data during the period 1994-2010 around 800 live E.boulengeri were reported in trade (~ 50 per year) predominantly reported as captive-bred, particularly in recent years. Ecuador and the Czech Republic were the major reported exporters of E. boulengeri specimens during the period 1994-2010 (UNEP-WCMC CITES Trade Database, data extracted 5 November 2012).</i></p> <p><i>There has been no reported trade in Epipedobates spp. from Ecuador. While E. boulengeri is kept and bred by collectors in vivaria (Anon., 2012a), it appears that some amphibian collectors may regard it as an uninspiring pet due to its dull colouration (Anon., 2012b).</i></p>

#### Other information

#### Threats

The coastal forests of Ecuador are highly threatened due to human pressure, with only 2% of the original forests remaining. The destruction of the forests is mainly the result of human population growth, a doubling of agricultural production and increases in the extraction of wood and large-scale planting of forests with African Oil Palm (*Elaeis guineensis*) and eucalyptus (*Eucalyptus* spp.).

An environmental impact assessment for a proposed sediment dredging station at Severino in Manabi Province found that the development would likely impact negatively upon amphibians in this region, including *E. machalilla*.

The major threats to *E. machalilla* are agriculture, involving the cultivation of crops and rearing of livestock, and logging.

#### Conservation, management and legislation

All other species of the genus *Epipedobates* are listed in Appendix II of CITES. *E. machalilla* is subject to conservation measures in Ecuador. Ecuador has two environmental laws for the protection of biodiversity: the Environmental Management Act 2004 and the Forest Law and Conservation of Natural Areas and Wildlife Act 2004. The main legal instrument is the Unified Text of Secondary Environmental Legislation of the Ministry of the Environment TULAS, which establishes requirements for the management, conservation, protection and commercialisation of Ecuador's native wildlife.

*The geographic range of E. machalilla overlaps with Parque Nacional Machalilla and the Reserva Ecológica Manglares Churute (Coloma et al., 2004).*

Supporting Statement (SS)	Additional information
<p><i>E. machalilla</i> is included in the Strategic Plan for the Conservation of Amphibians in Ecuador.</p> <p>The species has been reported as present in Ecuador's Machalilla National Park and in the Cerro Blanco Protected Forest, a private protected area.</p> <p>The supporting statement states that there are no international or domestic control measures relating to this species.</p>	
<b><u>Captive Breeding/Artificial Propagation</u></b>	
<p>A captive breeding study found that the development of <i>E. machalilla</i> takes 19-20 days. The supporting statement notes that there is no information on captive breeding for trade.</p>	<p><i>E. machalilla reproduces in captivity and deposits moderately sized eggs (1.6 mm in diameter) in terrestrial nests (Del Pino et al., 2004).</i></p>
<b><u>Other comments</u></b>	
	<p><i>Other species currently listed in the Appendices as part of the original genus level listing would be listed in the Appendices under their new nomenclature. This and other nomenclatural changes would result in some but not all species of the genera Ameerega and Allobates being included in the appendices. A wider review of the species in trade within the genera and the issues of similarity would be useful to determine the listings continue to meet the relevant criteria and that the Appendices correctly reflect the conservation needs of species.</i></p> <p><i>Cisneros-Heredia and Yanez- Muñoz (2010) described a new species of the genus Epipedobates, Epipedobates darwinwallacei, from the area of Mindo in north-western Ecuador.</i></p>

**References:**

- Amador, L.A. and Martínez, C.C. (2011). Anfibios presentes en cuatro localidades de la Cordillera Chongón – Colonche, Ecuador. *Boletín Técnico 10, Serie Zoológica* 7: 55-68.
- Anon. (1987). Proposal for the inclusion of *Dendrobates* species in Appendix II. *CoP 6, Proposal 47*.  
[http://www.cites.org/eng/cop/06/prop/Proposals/E06-Prop-47\\_Dendrobates.PDF](http://www.cites.org/eng/cop/06/prop/Proposals/E06-Prop-47_Dendrobates.PDF)
- Anon. (2012a). *Epipedobates boulangeri*. <http://homepage.ntlworld.com/alan.cann/Eboulangeri.html>. Viewed November 2012.
- Anon. (2012b). *Epipedobates boulangeri*. [http://dendroworld.co.uk/BDGarchive/e\\_boulangeri.html](http://dendroworld.co.uk/BDGarchive/e_boulangeri.html). Viewed November 2012.
- Bolívar, W., Coloma, L.A., Ron, S. and Grant, T. (2010). *Epipedobates boulangeri*. In: IUCN 2012. *IUCN Red List of Threatened Species*. Version 2012.2. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on 5 November 2012.

- Coloma, L. A. (1995). Ecuadorian frogs of the genus *Colostethus* (Anura: Dendrobatidae). *Miscellaneous Publications of the Museum of Natural History, University of Kansas* 87: 1-72.
- Coloma, L.A., Ron, S., Yáñez-Muñoz, M., Cisneros-Heredia, D. and Almendáriz, A. (2004). *Epipedobates machalilla*. In: IUCN 2012. *IUCN Red List of Threatened Species*. Version 2012.2. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on 5 November 2012.
- Cisneros-Heredia, D. F. and Yanez- Muñoz, M.H. (2010). A new poison frog of the genus *Epipedobates* (Dendrobatoidea: Dendrobatidae) from the north-western Andes of Ecuador. *Avances en Ciencias e Ingenierías* 2: 83-86.
- Del Pino, E., Ávila, M. E., Pérez, O., Benitez, M. S., Alarcón, I., Noboa, V. and Moya, I. M. (2004). Development of the dendrobatid frog *Colostethus machalilla*. *International Journal of Developmental Biology* 48:663-670.
- Frost, D.R. (2011) (ed.). *Amphibian Species of the World: a taxonomic and geographic reference, an online reference*. <http://research.amnh.org/herpetology/amphibia/index.html> Version 5.5 as of December 2011.