

New country records of *Hyalinobatrachium iaspidiense* (Amphibia, Anura, Centrolenidae) from the Amazonian lowlands of Ecuador and Peru

Mario Yáñez-Muñoz¹, Pedro Pérez-Peña² and Diego Cisneros-Heredia^{*1,3,4}

Abstract. We report the first records of *Hyalinobatrachium iaspidiense* (Ayarzagüena, 1992) from Ecuador and Peru based on voucher specimens collected in lowland Amazon rainforests. These are the westernmost records of this species and suggest a continuous distribution across the entire Amazon basin.

Introduction

Glassfrogs, anurans of the family Centrolenidae, have received considerable attention during the last decade (for a bibliographic review see Cisneros-Heredia and McDiarmid, 2007). In particular, studies on the Glassfrogs from the eastern slopes of the Andes and from the Amazonian lowlands have revealed our lack of understanding of its diversity and distribution patterns (Cisneros-Heredia and McDiarmid, 2006a, 2006b, 2007; Guayasamin et al., 2006; Cisneros-Heredia and Meza-Ramos, 2007; Cisneros-Heredia et al., 2008). Herein we present the first country records of *Hyalinobatrachium iaspidiense* from Ecuador and Peru that suggest a continuous distribution of this species across the Amazonian basin.

Hyalinobatrachium iaspidiense is among the most distinctive species of centrolenids by having a particular dorsal pattern only shared with *Hyalinobatrachium mesai* (Cisneros-Heredia and McDiarmid, 2007; Barrio-Amoros and Brewer-Carias, 2008). Both species show large lime-green dorsal blotches that turn white when individuals are preserved (Ayarzagüena, 1992; Lescure and Marty, 2000; Señaris and Ayarzagüena, 2005; D.F.

Cisneros-Heredia, R.W. McDiarmid, J.P. Caldwell and G. Rivas, pers. obs.). These marks are a unique colour arrangement of the dorsal parietal peritoneum of centrolenids (Cisneros-Heredia and McDiarmid, 2007). The most conspicuous difference between *Hyalinobatrachium iaspidiense* and *H. mesai* are the green bones of the latter vs. white bones in the former.

Hyalinobatrachium iaspidiense was described based on specimens collected at Quebrada Jaspe, state of Bolívar, Guayana region of Venezuela (Ayarzagüena, 1992). Señaris and Ayarzagüena (2005) reported it from Caño Colima on the slopes of Serranía de Imataca, state of Bolívar, Venezuela. It has been reported as *H. nouraguense* (a synonym, see below for details) in: four localities in French Guiana (Lescure and Marty, 2000); one in Guyana (Ernst, Rödel and Arjoon, 2005); four in Suriname (Kok and Castroviejo-Fisher, 2008); and two in Brazil (Cordeiro-Duarte et al., 2002; Caldwell and Shepard, 2005). Thus, it has been reported so far only from north-eastern areas of Amazonia.

Between 20th of May and 1st of June 2007 a male of *Hyalinobatrachium iaspidiense* (DHMECN 04033, Museo Ecuatoriano de Ciencias Naturales, Quito, Ecuador; Fig. 1) was collected from the locality of Totoa Nai'qui, Cofán-Dureno territory, province of Sucumbíos, Republic of Ecuador (0.03442° S, 76.75278° W, ca. 280 m above sea level) by Mario Yáñez-Muñoz and Angel Chimbo. It was found on the leaf of a bush directly over the water surface in a flooded forest. This record represents the first country record of this species from Ecuador. Yáñez-Muñoz and Chimbo (2007) reported this specimen as "*Hyalinobatrachium* sp. A" and Yáñez-Muñoz and Cisneros-Heredia (2008) as "*Hyalinobatrachium* sp. N12", commenting that it was "apparently related or conspecific with *Hyalinobatrachium iaspidiense*".

1 Museo Ecuatoriano de Ciencias Naturales, Sección Vertebrados, División de Herpetología, calle Rumipamba No. 341 y Ave. de Los Shyris, Quito, Ecuador.

2 Universidad Nacional de la Amazonia Peruana, calle Pevas 5ta Cuadra, Iquitos, Perú.

3 Universidad San Francisco de Quito, Colegio de Ciencias Biológicas & Ambientales, calle Diego de Robles y Ave. Interoceánica, Campus Cumbayá, Edif. Maxwell, Casilla Postal 17-1200-841, Quito, Ecuador;
e-mail: diegofrancisco_cisneros@yahoo.com

4 King's College London, Department of Geography, Strand, London WC2R 2LS, United Kingdom.

* corresponding author



Figure 1. *Hyalinobatrachium iaspidiense* (DHMECN 04033) from the Cofán-Dureno territory, province of Sucumbíos, Republic of Ecuador.

In November 2003 a female of *Hyalinobatrachium iaspidiense* (MZUNAP 0517, Museo de Zoología, Facultad de Ciencias Biológicas, Universidad Nacional de la Amazonia Peruana, Iquitos, Peru; Fig. 2) was collected at the Lago Preto-Paredón on the frontier between Peru and Brazil in the province of Ramón Castilla, department of Loreto, Republic of Peru (4.46157° S, 71.75133° W, ca. 95 m above sea level) by Pedro Pérez-Peña. The individual was found on the leave of a shrub ca. 1.2 m above the ground and about 50 m away from a small lagoon in terra firme forest dominated by *Lepidocaryum tenue* and represents the first record of this species from Peru. Pérez et al. (2006) and Pérez (2007) regarded this specimen as “*Hyalinobatrachium* sp”.

Specimens DHMECN 04033 and MZUNAP 0517 show all diagnostic characteristics of *Hyalinobatrachium iaspidiense*, including the dorsal coloration pattern, white bones, transparent ventral parietal peritoneum and most visceral peritonea covered by iridophores except

for the pericardium that is transparent; supporting their specific identification.

These new records extend the known range of *Hyalinobatrachium iaspidiense* nearly 1900 km from the nearest known locality, the municipality of Presidente Figueiredo (state of Amazonas, Brazil) and represent the westernmost record of this species suggesting that *H. iaspidiense* is widely distributed across the entire Amazonian lowlands (Fig. 3).

Ernst et al. (2005) as well as Cisneros-Heredia and McDiarmid (2007) suggested synonymy of *Hyalinobatrachium iaspidiense* and *H. nouraguense* based on morphological characters. This hypothesis was later supported by molecular data (Guayasamin et al. 2007: Fig. 5 and 6) showing that almost no differentiation between populations collected from or near the respective type localities was evident. By analysing the information presented by Ernst et al. (2005), Cisneros-Heredia and McDiarmid (2007) and Guayasamin et al. (2007) we treat both species



Figure 2. *Hyalinobatrachium iaspidiense* (MZUNAP 0517) from Lago Preto-Paredón, department of Loreto, Republic of Peru.

as conspecifics of *H. iaspidiense* Ayarzagüena, 1992. Cisneros-Heredia and McDiarmid (2007) reported that *H. nouraguensis* and *H. iaspidiense* differed in the condition of iridophores over the pericardium, but a closer inspection showed that these differences are preservation artefacts rather than valid intraspecific differences (Lescure and Marty, 2000; Señaris and Ayarzagüena, 2005; G. Rivas pers. comm.; S. Castroviejo-Fisher pers. comm.). Cisneros-Heredia and McDiarmid (2007) hypothesized that species with large dorsal blotches of iridophores form a monophyletic group but were uncertain about the relationships of this group regarding other *Hyalinobatrachium*. We agree with this hypothesis and consider that *H. iaspidiense* and *H. mesai* form a monophyletic group supported by the synapomorphy of blotches of iridophores on the dorsal parietal peritoneum.

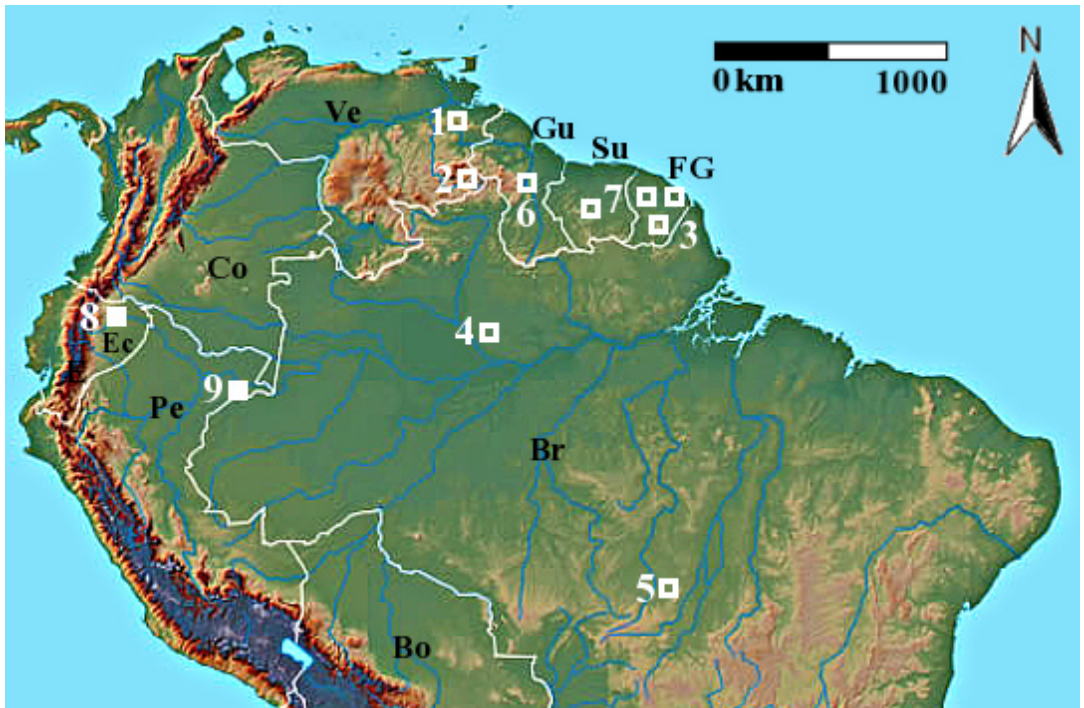


Figure 3. Map of northern South America showing the known localities of *Hyalinobatrachium iaspidiense* based on the new localities reported herein (closed symbols) and literature records (open symbols): (1) Quebrada Jaspe, (2) Caño Colima, (3) mountain areas of Kaw, Montes Trinité, Courcibo, and Saut Arataye/Nouragues Reserve, (4) President Figueiredo, (5) lower River Cristalino region, (6) Mabura Hill Forest Reserve, (7) Sipaliwini district, (8) Cofán-Dureno territory, (9) Lago Preto-Paredón. Country codes: Venezuela = Ve; Colombia = Co; Ecuador = Ec; Peru = Pe; Guyana = Gu; Suriname = Su; French Guiana = FG; Brazil = Br; Bolivia = Bo.

Acknowledgments. We are grateful to Roy W. McDiarmid, Janalee Caldwell, Gilson Rivas, and Santiago Castroviejo-Fisher for their helpful comments and discussions. We thank Pablo Puertas, Richard Bodmer, Angel Chimbo, Corine Vriesendorp, Sebastian Descanse, and Alvaro del Campo for field and laboratory assistance, Mark Bowler for taking the pictures; and María Olga Borja for pre-reviewing the manuscript. M. Yáñez-Muñoz's research was supported by the Field Museum of Chicago through their Rapid Biological Inventories, Environmental and Conservation Program coordinated by Corine Vriesendorp, Debora Moskovits, and Randall Borman. P. Pérez-Peña's research was supported by Wildlife Conservation Society-Peru. D. Cisneros-Heredia's research was supported by Ma. E. Heredia and L. Heredia, the Smithsonian Women's Committee, the 2002 Research Training Program at the National Museum of Natural History-Smithsonian Institution, King's College London, Universidad San Francisco de Quito, the Russel E. Train Education for Nature Program of the World Wildlife Fund WWF, and the "Fernando Ortiz-Crespo" Endangered Species Program managed by EcoCiencia and Conservation International.

References

- Ayarzagüena, J. (1992): Los Centrolenidos de la Guayana Venezolana. *Publ. Asoc. Amigos Doñana* 1: 1–48.
- Barrio-Amoros, C.L., Brewer-Carias, C. (2008): Herpetological results of the 2002 expedition to Sarisariñama, a tepui in Venezuelan Guayana, with the description of five new species. *Zootaxa* 1942: 1–68.
- Caldwell, J.P., Shepard, D.B. (2005): Frogs of the Lower Cristalino River Area. In: *Amphibians and Reptiles of the Lower Cristalino River Region of the Southern Amazon*. Vitt, L.J., Caldwell, J.P., Colli, G.R., França, F.G.R., Shepard, D.B., Eds., Norman, Sam Noble Oklahoma Museum of Natural History. Available online at: <http://www.omnh.ou.edu/personnel/herpetology/vitt/Cerrado/Cristalino/index.htm>.
- Cisneros-Heredia, D.F., McDiarmid, R.W. (2006a): A new species of the genus *Centrolene* (Amphibia: Anura: Centrolenidae) from Ecuador with comments on the taxonomy and biogeography of glassfrogs. *Zootaxa* 1244: 1–32.
- Cisneros-Heredia, D.F., McDiarmid, R.W. (2006b): Review of the taxonomy and conservation status of the Ecuadorian glassfrog *Centrolenella puyoensis* Flores & McDiarmid (Amphibia: Anura: Centrolenidae). *Zootaxa* 1361: 21–31.
- Cisneros-Heredia, D.F., McDiarmid, R.W. (2007): Revision of the characters of Centrolenidae (Amphibia: Anura: Athesphatanura), with comments on its taxonomy and the description of new taxa of glassfrogs. *Zootaxa* 1572: 1–82.
- Cisneros-Heredia, D.F., Meza-Ramos, P. (2007): An enigmatic new species of glassfrog (Amphibia: Anura: Centrolenidae) from the Amazonian Andean slopes of Ecuador. *Zootaxa* 1485: 33–41.
- Cisneros-Heredia, D.F., Venegas, P.J., Rada, M., Schulte, R. (2008): A new species of Glassfrog (Anura, Centrolenidae) from the Foothill Andean forests of Ecuador and Peru. *Herpetologica* 64: 342–353.
- Cordeiro-Duarte, A.C., Sanaiotti, T.M., Duarte, E.L.C., Pereira, O. (2002): Geographic Distribution. *Hyalinobatrachium nou-raguensis*. *Herpetol. Rev.* 33: 220.
- Ernst, R., Rödel, M.-O., Arjoon, D. (2005): On the cutting edge—The anuran fauna of the Mabura Hill Forest Reserve, Central Guyana. *Salamandra* 41: 179–194.
- Guayasamin, J.M., Bustamante, M.R., Almeida-Reinoso, D., Funk, W.C. (2006). Glass frogs (Centrolenidae) of Yanayacu Biological Station, Ecuador, with the description of a new species and comments on centrolenid systematics. *Zool. J. Linn. Soc.* 147: 489–513.
- Guayasamin, J.M., Castroviejo-Fisher, S., Ayarzagüena, J., Truieb, L., Vilà, C. (2008): Phylogenetic relationships of glassfrogs (Centrolenidae) based on mitochondrial and nuclear genes. *Mol. Phylogenet. Evol.* 48: 574–595.
- Kok, P.J.R., Castroviejo-Fisher, S. (2008): Glassfrogs (Anura: Centrolenidae) of Kaieteur National Park, Guyana, with notes on the distribution and taxonomy of some species of the family in the Guiana Shield. *Zootaxa* 1680: 25–53.
- Lescure, M., Marty, C. (2000): Atlas des Amphibiens de Guyane. *Patrimoines Naturels*, 45: 1–388.
- Pérez, P.E. (2007) Finding frogs in the Peruvian Amazon. *Wildlife Conservation* 2007: 14.
- Pérez, P.E., Bodmer, R.E., Puertas, P.E. (2006): Anuros y Saurios del Interfluvio Yavari-Tahuayo y su Comparación con las Áreas Naturales Protegidas en la Región Loreto, Perú. Iquitos, Manejo de Fauna silvestre en Amazonia y Latinoamérica.
- Señaris, J.C., Ayarzagüena, J. (2005): Revisión taxonómica de la Familia Centrolenidae (Amphibia: Anura) de Venezuela. Sevilla, Publicaciones del Comité Español del Programa Hombre y Biosfera – Red IberoMaB de la UNESCO.
- Yáñez-Muñoz, M.H., Chimbo, A. (2007): Anfibios y Reptiles, In: Ecuador: Territorio Cofán Dureno, p. 96–99. Borman, R., Vriesendorp, C., Alverson, W.S., Moskovits, D.K., Stotz, D.F., del Campo, A., Eds., Chicago, The Field Museum, Rapid Biological Inventories Report 19.
- Yáñez-Muñoz, M.H., Cisneros-Heredia, D.F. (2008): Notes on Geographic Distribution: Amphibia, Anura, Centrolenidae: *Cochranella orejuela*, first country records from Ecuador. *CheckList* 4: 50–54.