A New Species of Proceratophsys (Anura: Leptodactylidae) from the Amazon Rain Forest

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ABSTRACT.—A new Proceratophsys from Rondônia, Brazil, is described based on adult and tadpoles. The new form represents a species with eyelids bordered by large, irregularly arranged, eratic postocular swellings absent, snout obtruse with fanning lip in profile, tympanum defined as a depression in the skin, and dorsal surfaces of body and leg bearing high elevated warts. The new species extends the known distribution of the genus to the northwest and represents the first described species of Proceratophsys from the Amazon rain forest. We discuss the species group arrangement in Proceratophsys based on morphology, geographic distribution, and habitat.

RESUMO.—Um novo Proceratophsys é descrito de Rondônia, Brasil, com base em adulto e rãovelhos. A nova forma representa uma espécie com pálpebras bordadas por verrugas irregularmente arredondadas, estomôntemôntis pós-ocular ausente, focinho obtuso com borda projeitada em perfil, tímpano definido como uma depressão na pele e superfícies dorsais do corpo e pernas com verrugas altas. A nova espécie estende a distribuição conhecida do gênero para o norte e representa a primeira espécie de Proceratophsys da floresta pluvial amazônica. Discutimos o arranjo em grupos de espécies da Proceratophsys com base em morfologia, distribuição geográfica e habitat.

The genus Proceratophsys, currently composed of 13 species (Frost, 1985; Heyer et al., 1993; Car-

Dans a, 1998), is most diverse in eastern Brazil

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within the Atlantic Forest domain (sensu Ab/Saber, 1977). Two species of Proceratophsys are known to occur further west in South Amer-
ica, one in central Brazil (P. gynata) (Frost, 1985) and the other in northeast Argentina (P. affinis). Recently, new species of Proceratophsys have been described (e.g., Mercadal del Barrio and Barrio, 1993), even from areas with relatively well-known herpetological faunas in southeast
Brazil (Gazetta and Sazima, 1993; Eberovich and Sazima, 1998). The only previously reported occurrence of a Proconotrophys species in the Amazonian forest references tadpoles of an uniden-
tified species (Hero, 1996). Herein we describe a new Proconotrophys from the State of Rondônia, northern Brazil, which represents the first de-
scribed species of Proconotrophys from the Am-
azon rain forest.

**Materials and Methods**

Detailed comparisons with the new form were restricted to the most similar species of Proconotrophys. These include three species with-
out enlarged palpebral appendages and without postocular swelling (see Fig. 2A in Gazetta and Sazima, 1993), namely: Proconotrophys chrysops (Müller, 1884), P. guaínae (Miranda-Ribeiro, 1937), and P. caruru (Eberovich and Sazima, 1998).

The holotype and paratypes are housed in the Museu de História Natural da Universi-
dade Estadual de Campinas (ZUEC). We ex-
amined specimens of Proconotrophys chrysops from southeastern Brazil, P. guaínae from Guáiana and Mato-Grosso (Central Brazil), and the types of P. caruru (see Appendix) of all of which are housed at ZUEC and Museu de Zoologia da Universidade de São Paulo (MZUSP). All me-
surements were made with calipers to the near-
est 0.1 mm. Head width and length was mea-
sured at the corner of the mouth, hand length from the base of the inner metacarpal tubercle; other measurements were taken as in Heyer et al. (1990). The tadpoles of the new species were identified as belonging to a Proconotrophys by di-
rect comparison with those of other congeneric species housed at ZUEC (Proconotrophys appen-
diculata, P. bous, P. caruru, and P. palustris). Only the new species is known to occur at the type locality in Rondônia, so there is little chance of confusing congeneric tadpoles. The tadpole de-
scription and measurements follow Allig (1970) and Allig and Johnson (1989). Coloration in life of adults was based on photographs of one liv-
ing and two freshly killed individuals. Individual-
uals were sexed by dissection. Webbing formu-
las follow Savage and Heyer (1997). Tadpoles (ZUEC 11544-45) were preserved, and perma-
nently stored, in 5% formalin immediately after capture.

Proconotrophys concinnipinnus sp. n. (Figs. 1–2)

Habitat.—ZUEC 11387, an adult female, col-
lected by Paulo S. Benzecri and Marcelo N. de C. Kokubum on 8 January 1997 at Ijuenda Ja-
buri (approximately 60'43"W, 11°37'S), Munici-
TABLE 3. Measurements (mm), and percentages of snout-vent length (percentage) of three types of Proceratophrys concolorconcolor.

<table>
<thead>
<tr>
<th>Type</th>
<th>11387</th>
<th>11338</th>
<th>11349</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult female</td>
<td>Adult female</td>
<td>Juvenile male</td>
<td></td>
</tr>
<tr>
<td>Snout-vent length</td>
<td>59.8</td>
<td>58.8</td>
<td>43.8</td>
</tr>
<tr>
<td>Head length</td>
<td>21.4</td>
<td>23.5</td>
<td>14.4</td>
</tr>
<tr>
<td>Head width</td>
<td>20.1</td>
<td>20.6</td>
<td>15.0</td>
</tr>
<tr>
<td>Eye diameter</td>
<td>9.6</td>
<td>8.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Eye-nostril distance</td>
<td>11.3</td>
<td>11.8</td>
<td>19.2</td>
</tr>
<tr>
<td>Typanum diameter</td>
<td>3.6</td>
<td>3.9</td>
<td>5.2</td>
</tr>
<tr>
<td>Thigh</td>
<td>24.4</td>
<td>24.1</td>
<td>17.3</td>
</tr>
<tr>
<td>Shank</td>
<td>21.2</td>
<td>21.3</td>
<td>15.8</td>
</tr>
<tr>
<td>Foot</td>
<td>22.1</td>
<td>21.3</td>
<td>15.2</td>
</tr>
<tr>
<td>Hand</td>
<td>19.9</td>
<td>20.3</td>
<td>14.0</td>
</tr>
</tbody>
</table>

pality of Espigã D'Oeste, State of Rondônia, Brazil.

Proceratophrys—ZUEC 11388, an adult female; ZUEC 11389, a juvenile female; ZUEC 11390, a juvenile of unknown sex. All individuals were collected at the same place and on the same date as the holotype.

Diagnosis: A formal, synapomorphy based, definition of the genus Proceratophrys is lacking. The new form closely resembles other Proceratophrys in general aspect, especially Proceratophrys cristiceps and P. guaia. Proceratophrys concolor concolor differs from all other Proceratophrys by the following combination of character: eyelids bordered by irregulary arranged warts; no postocular swellings; tympanum well defined as a depression in the skin; short, oblong, with flaring tip in profile; dorsal sinus of body and legs with high elevated warts. Proceratophrys cristiceps, P. guaia, and P. curua lack prominent palpebral appendages and postocular swellings. Only P. concolor concolor has this tympanum defined as a depression in the skin. Unlike P. concolor concolor, P. cristiceps and P. guaia have vertical spots in profile, narrow heads, dorsal crests well defined beyond the sacral region, strongly (yellow or black) keel-ratinated inner metatarsal tubercles, and less elevated dorsal warts. The new species can be distinguished from P. curua by having larger and fewer eyelid warts, better defined dorsal crests, higher elevated dorsal warts, and darker dorsal coloration in preservative.

Description of the holotype (Fig. 2, Table 1):—Head 33.5% wider than snout outline nearly round, almost semicircular in dorsal view; orbit with flaring tip in profile; nare and eyelid not projecting beyond head contour viewed from above; tympanum defined as a depression in skin; caudal crests distinct; no interocular crest; lateral margin of upper eyelid with large, irregularly arranged warts, medial margin of distal portion; face with few large warts; row of five enlarged warts on each side of head, from below eye to angle of jaw; six enlarged yellowish wart below angle of jaw; ears elliptical andoval, diverging downward and backward; inner metatarsal tubercle, free posteriorly; vomerine teeth in two short transverse series, lying between choanae, separated by about one-half length of single vomerine tooth row; man dibular synapophysis with round pin-like process, with a corresponding cleft in upper jaw; finger length IV < III < II ≈ I < III; inner carpal tubercle oval; outer carpal tubercle obliquely divided in equal oval halves; subdigital finger tubercles large, squared with rounded corners; supernumerary subdigitals well defined, rounded; sides of fingers and toes with distinct wart ridges; no web be tween fingers; outer margin of forearm with two parallel rows of 4–7 enlarged warts running two-thirds length of forearm; patagium to midlength of upperarm; symmetrical crests of warts from posterior eyelid to sacral region; crest ini tially narrowing to mid-body, then diverging until sacral region, beyond sacral region low to vent; dorsal warts in two size classes, the large one are few in number and regularly scattered, also on flanks and dorsum of legs; warts inside dorsal crests equal in aspect to those outside; under magnification, skin and warts of dorsal parts covered by many small, circular keratini zed spots; dorsal warts of arms more uniform in size than that of dorsum; toe length 1 = II < III = IV < V; inner metatarsal tubercle very keel-ratinated, nodular, large, keel-ratinated; outer metatarsal tubercle small but discernible, rounded; no distinctive heel decoration; ridge of warts along tips of toes, 4–5 enlarged warts beyond inner metatarsal tubercle, those proximal same size as outer meta tarsal tubercle; side of foot warts; toes webbed at base; webbing formula II–1 II–1 III–2 III–1 IV–1 V–2; dorsal skin covering first phalange of fingers and toes smooth, defined proximally by a dorsal fold; belly bearing equal sized warts; ventral warts covered with circular spots, but not keratinized as on dorsum; distal ventral surface of thigh with large warts than belly, a medial circular region with smooth skin; dermal groove from vent to ventral surface of thigh; one or two enlarged yellowish warts below and to each side of vent.

Variation: The other adult female (paratypotypic type ZUEC 11389) differs from the holotype mainly by the belly bearing unevenly sized spots; an interocular row of 12 warts to the margin of one eyelid to the other; and 1–2 dor-
Habitat and distribution.—At *Azadirachta indica*, the preeminent vegetation is Open Rain Forest (IBGE, 1992). The frogs were collected at night inside the forest along the margin of the permanent pond where the tadpoles were collected. The new species is known only from the type locality.

Etymology.—The specific epithet "concentroramus" is composed from the Latin words "concentrare" meaning concave, concave, and "ramus", meaning rami. The combination is used as a noun in apposition. The name refers to the depression on each side of the head at the location of the tympanum.

Discussion.—The occurrence of *Proctophrys concentratoramus* in the state of Bahia, Brazil expands the known distribution of the genus to the northwest and represents the first described *Proctophrys* from the Amazon rain forest. The taxonomic status of some populations of *Proctophrys* from the Amazon basin remains unresolved. The tadpole of *P. concentratoramus* differs from the tadpole of *Proctophrys* described by Hero (1963) from Manaus (Central Amazon) by being 43% larger in total length, even in earlier developmental stage. One of us (AAG) has examined adults of another undescribed *Proctophrys* species from the State of Pará (Brazil), collected by M. Corrêa and C. E. B. Haddad. It is unknown if the Pará species is conspecific with the tadpoles described by Hero (1963). Thus, besides *P. concentratoramus*, at least one more new species of *Proctophrys* is known from the Amazon Forest. Two species groups have been recognized in *Proctophrys*: the *P. hylocephalus* and *P. bairdi* species groups (Lynch, 1971; Larnach, 1986). However, considering the recently described species, this arrangement appears unsatisfactory. The presence of a postocular swelling suggests a morphophyletic group relating *Proctophrys* to “bairdi” to other two species from the *P. hylocephalus* species group we consider valid: *P. wilneri* and *P. patilisius*. The presence of a prominent medial palpebral appendage suggests another group related to *P. bairdi*, which also includes *P. appi- docrata*, *P. pyri*, *P. lettero*, *P. meleagrops*, *P. marmoratus*, and *P. schirchi*. Shared derived characters are evident both between *P. hylocephalus* and *P. crassus*, *P. curvis*, *P. gama*, and the undescribed species from Pará. Some zoogeographic agreement exist in this group arrangement. The *P. hylocephalus clade* are present in southern Brazil and adjacent countries. *P. patilisius* may represent a reclusal species in the Poços de Caldas plains, of the interior of southeastern Brazil (Giar- reta and Sazima, 1993). The *P. bairdi* species group is related to eastern Atlantic forest, and


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